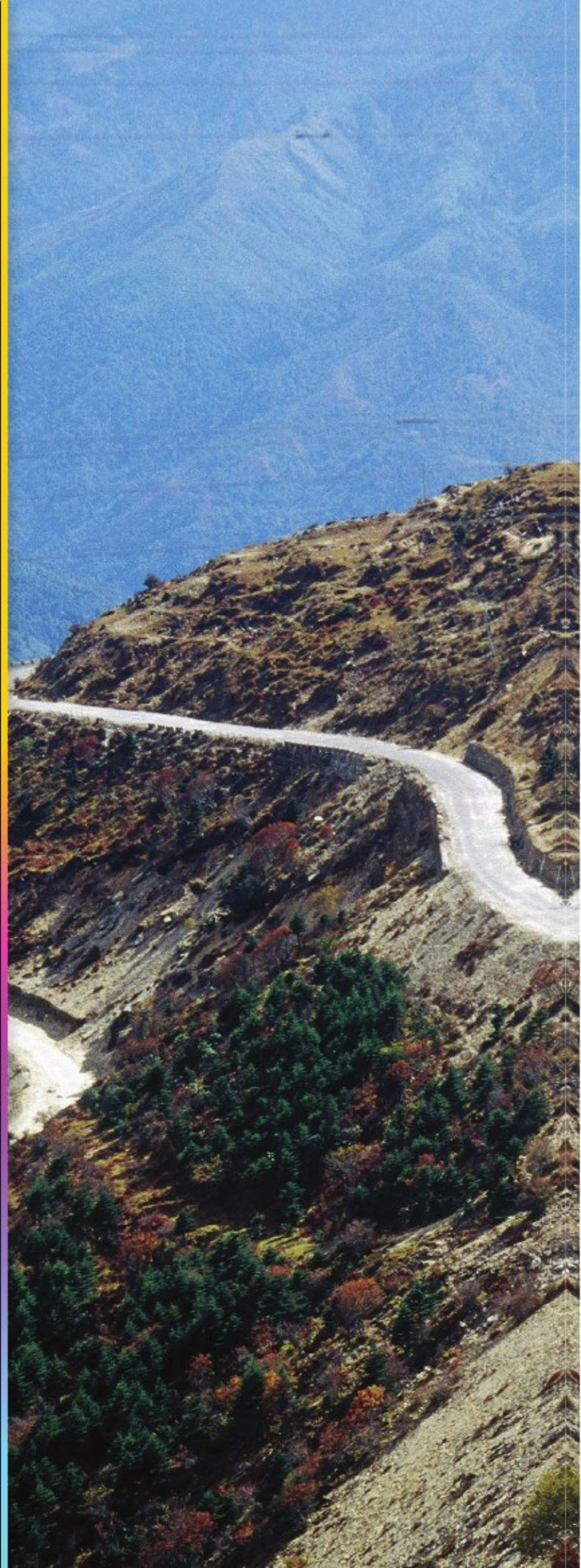
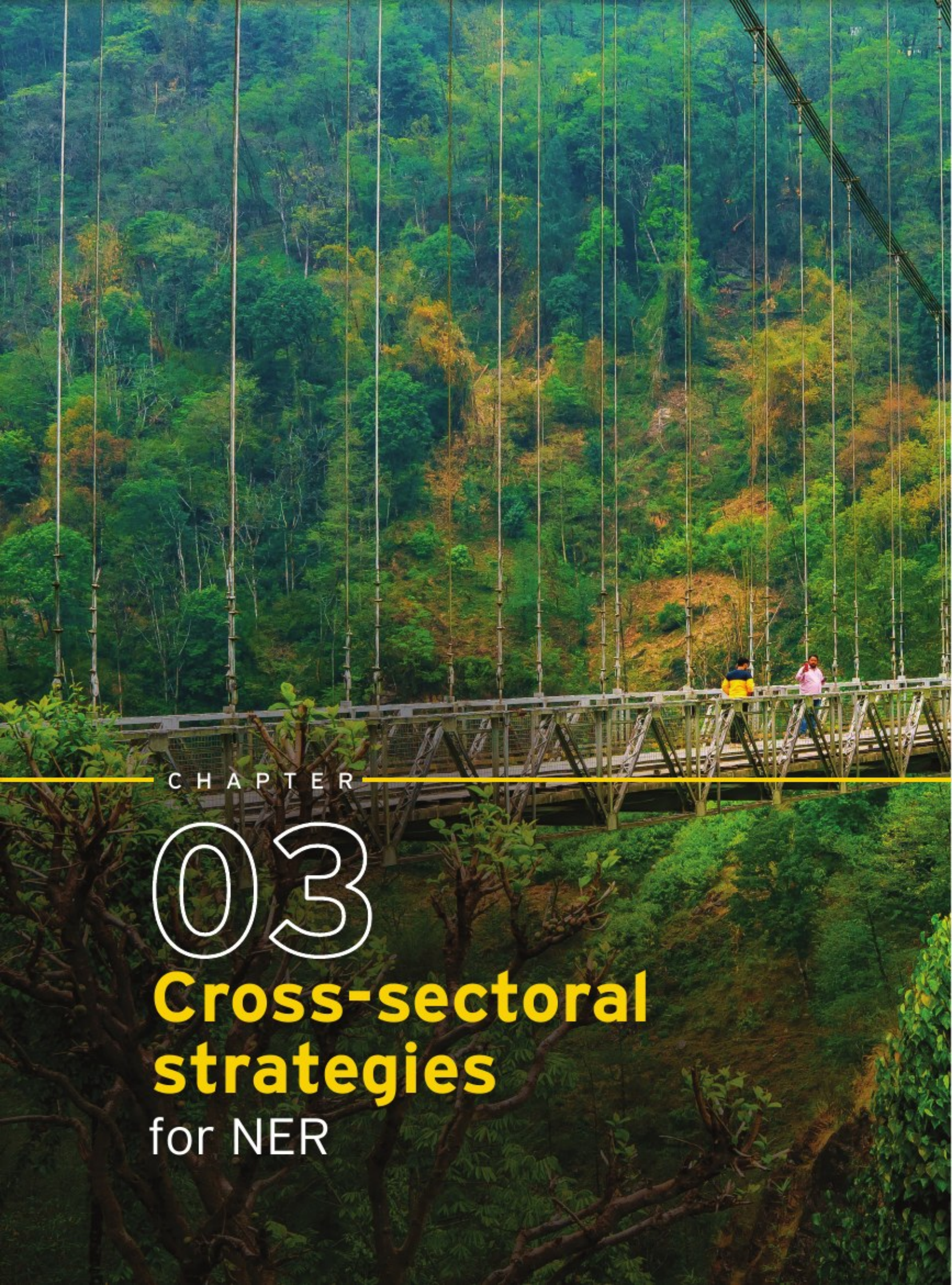


PART-2

Inter-state visioning





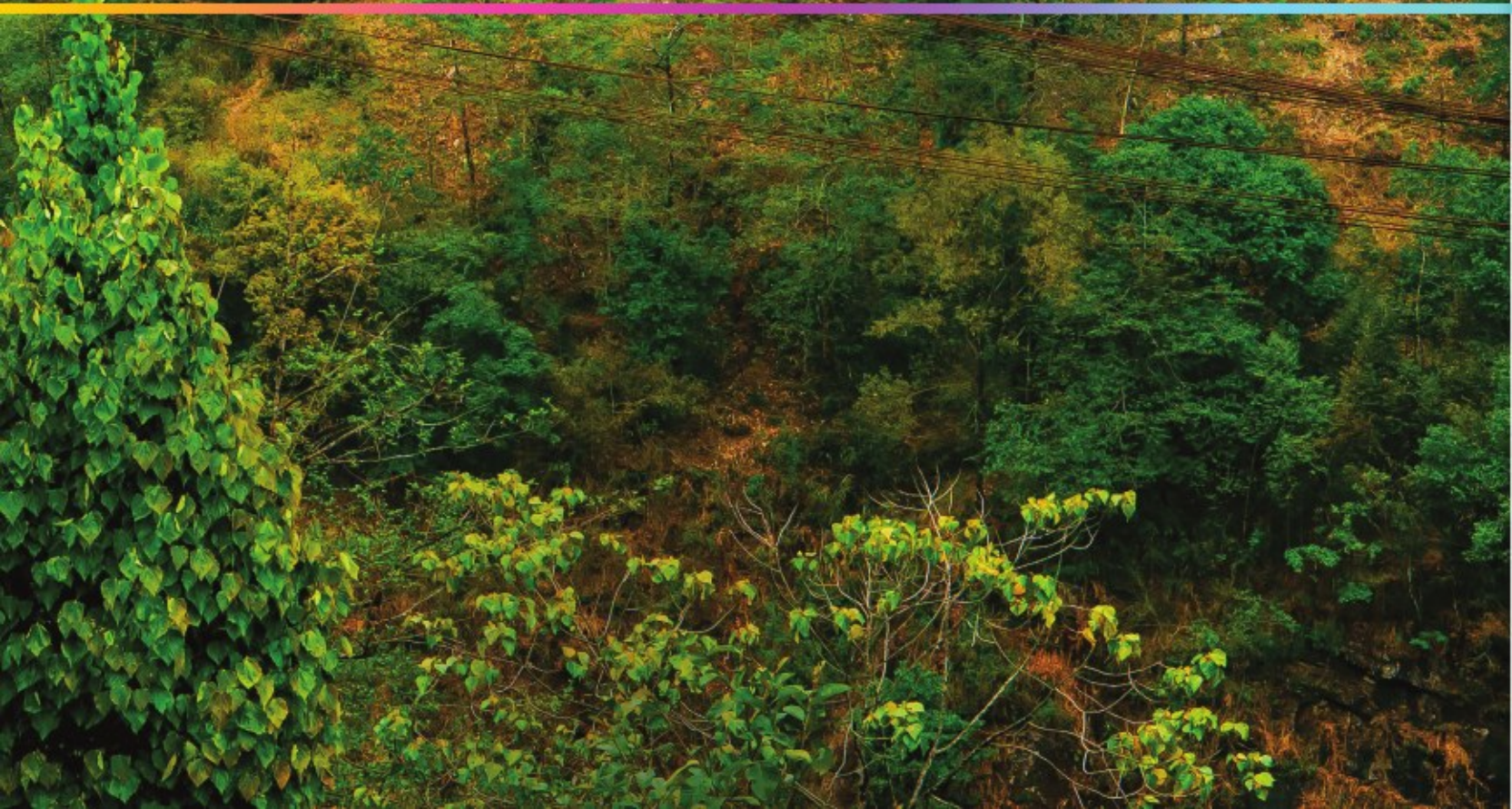


CHAPTER

03

Cross-sectoral strategies

for NER



NER stands at a pivotal moment in its development trajectory. Over the past two decades, major investments in connectivity, public infrastructure and state capacity have laid important foundations. Yet, the next phase of transformation requires a qualitatively different type of strategy – one that shifts from building inputs to enabling outcomes; from infrastructure alone to productivity and competitiveness; from state-driven growth to commercial, scalable and self-sustaining economic activity.

The region's long-term prosperity may depend on whether its economic model can evolve from one primarily enabled by fiscal support to one anchored in a competitive enterprise base, integrated value chains and private capital investment. Achieving this requires a coordinated approach that moves beyond fragmented, state-by-state planning toward shared regional priorities, scale-based interventions and systems thinking. It also requires spatial strategies that overcome the region's dispersed topography, institutional mechanisms that enable enterprises to grow and compete and a regional identity that allows the Northeast to position itself distinctly in national and global markets.

This transformation does not depend on a single reform or program, but a **coherent set of mutually reinforcing levers** that determine whether opportunities convert into outcomes. These levers include:

1. **Multi-state sectoral prioritization**, enabling the government of India to act as convener and accelerator where several states share readiness and opportunity.

2. **Enterprise competitiveness**, as the engine through which jobs, income, exports and tax revenue are generated on a sustained, self-financing basis.
3. **Critical mass through clustering and connectivity**, ensuring that infrastructure translates into agglomeration economies, scale advantages and talent retention.
4. **A spatially differentiated industrialization model**, matching production functions to geography through rural primary processing and urban finishing.
5. **Cross-sector synergy and sequencing**, aligning high-spillover sectors – such as tourism and renewable energy – to unlock compound regional impact.
6. **Investment climate transformation**, enabling commercial private capital to participate at scale through predictable regulation, reliable infrastructure and catalytic demonstration investments.
7. **Regional brand architecture**, turning environmental and cultural strengths into recognized market value.

Taken together, these elements form a cross sectoral **transformation strategy** that is designed to be catalytic, scalable and inclusive – one that enables the Northeast to convert its natural assets, cultural richness and emerging connectivity into a competitive regional economy within India and the wider Indo-Pacific.

3.1 Early and catalytic central support on cross-NER sectors

NER has made meaningful progress in strengthening its development foundations, yet the translation of state-level aspirations into measurable economic outcomes remains constrained by three interrelated structural realities:

- First, planning processes across the eight NER states have historically operated in parallel rather than in coordination, limiting opportunities for knowledge transfer, resource pooling and collective problem-solving.
- Second, administrative and technical capacity at the state level – while improving – remains stretched across competing priorities, making it difficult for individual states to simultaneously build institutions, develop value chains, establish

quality standards and access markets at the scale required for commercial viability.

- Third, each NER state economy is demographically modest, so achieving the critical mass necessary to attract private investment, justify dedicated infrastructure, or command attention in national and global markets is inherently challenging when states act independently.

These are not insurmountable constraints, but they do shape the strategic landscape and point toward a specific opportunity: the need for a disciplined, region-wide prioritization mechanism that enables the Government of India to function as a catalytic convener and accelerator in sectors where multiple



states have independently demonstrated both demand and readiness.

When five or more NER states independently identify the same sector – whether tourism, fisheries, pineapple, textiles, food processing, digital services or bamboo – as a priority area, the convergence is not coincidental. It reflects underlying congruence across three dimensions: natural resource endowment, existing or accessible market opportunities and political and administrative commitment. This alignment significantly reduces the coordination costs typically associated with cross-state initiatives and materially increases the probability of successful implementation.

Shared sectoral focus creates natural economies of scale. Instead of eight states independently investing in separate capacity-building programs, quality certification systems, market linkage mechanisms and branding initiatives – each operating below optimal scale and duplicating effort – a coordinated approach allows these functions to be established once, at a regional level and accessed by all participating states. For sectors where GoI provides catalytic support through shared centers of excellence, regional quality infrastructure, aggregated market access platforms, or co-investment facilities, the per-state cost declines while the collective impact rises. This is particularly consequential given that the GSDPs of the region remains modest; concentrated early investment in sectors with demonstrated multi-state participation generates disproportionately visible results, which in turn build stakeholder confidence, attract follow-on private capital and create the institutional momentum required for deeper, longer-gestation structural reforms.

It is important to clarify what this prioritization framework does and does not imply. It is not an argument for neglecting state-specific comparative advantages, imposing uniform strategies where local differentiation is strength, or centralizing decision-making in ways that undermine state autonomy. Rather, it is a recognition that certain functions – establishing regional standards, creating shared logistics hubs, building collective regional brand equity, aggregating produce to achieve export-worthy volumes, developing specialized training institutions – are most efficiently delivered at regional scale and are difficult for individual states to replicate independently given fiscal and institutional constraints. The framework complements state-level planning by providing enabling architecture that allows state-specific initiatives to succeed at scale. A state may excel in organic ginger cultivation, another in tourism product development and a third in digital service

delivery, but all benefit from shared quality certification, collective market access and coordinated capacity building that only regional coordination can efficiently provide.

The alternative – spreading limited technical assistance, financial resources and policy attention across eight uncoordinated planning cycles covering dozens of sectors – risks three adverse outcomes.

1. **Capacity dilution:** With finite expertise and bandwidth, spreading support thinly means no single intervention receives the sustained attention required to overcome inevitable implementation challenges.
2. **Duplicated learning costs:** Each state independently navigates similar market access barriers, regulatory hurdles and value-chain bottlenecks, incurring time and resource costs that coordinated action would avoid.
3. **Fragmented outcomes:** Even where individual state initiatives succeed locally, they often fail to achieve the scale, quality consistency, or market positioning required for integration into national or global value chains, limiting both economic impact and replicability.

Concentrating early catalytic support on sectors where five or more states demonstrate readiness creates visible, credible wins that serve multiple strategic purposes: they validate the coordination model, build administrative confidence in cross-state collaboration, attract private investors seeking scale opportunities and generate the political and institutional capital needed to tackle more complex, longer-horizon reforms.

The Government of India's role would be to perform three functions that states cannot efficiently execute independently. This includes:

1. **As convener:** Creating neutral platforms for knowledge exchange, joint problem-solving and collective standard-setting across states.
2. **As aggregator:** Pooling demand for technical assistance, quality infrastructure and market access services to achieve scale efficiencies that reduce per-state costs and improve service quality.
3. **As accelerator:** Providing catalytic co-investment, risk-sharing mechanisms and high-level advocacy that de-risks early-stage value chain development and attracts private capital at a pace states acting alone would struggle to achieve.

3.2 Enterprise competitiveness as the foundation for self-sustaining growth and reduced fiscal dependency

The NER's economic trajectory over the past two decades has been substantially shaped by elevated levels of central fiscal transfers, special category benefits and grant-driven development programs. These resources have been instrumental in building foundational infrastructure, expanding public services and maintaining macroeconomic stability across states with limited own-revenue generation capacity. However, this model embeds an implicit assumption that has become increasingly consequential: that continued high levels of discretionary fiscal support might remain available indefinitely and at current scales.

As India's fiscal architecture evolves – with central allocations normalizing in line with national frameworks and competing demands from other regions intensify – the NER faces a structural inflection point. The sustainability of the region's growth and development outcomes can increasingly depend not on the volume of external fiscal inflows but on the productivity, competitiveness and market viability of its enterprise base. Without a robust ecosystem of competitive enterprises – MSMEs, cooperatives, producer collectives, startups and industrial anchors – that can generate employment, income, tax revenue and investable surpluses through market-linked operations, the region risks stagnation or even regression as fiscal support normalizes.

Sustainable economic growth is a function of productivity growth – the capacity of enterprises to generate increasing value per unit of input, whether labor, capital or natural resources. Grant-driven or subsidy-dependent models, while useful for addressing immediate welfare needs, do not inherently build this productivity capacity. They can support consumption, stabilize employment in the short term and fund essential public goods, but they do not, by themselves, create competitive pressures, capability accumulation or market discipline that drive enterprises to innovate, improve quality, reduce costs and scale operations.

The binding constraints facing NER enterprises are well-documented and structurally rooted:

1. **Scale limitations:** Many firms operate below the minimum efficient scale required to justify investment in modern equipment, quality systems or professional management, making per-unit costs uncompetitive relative to mainland producers.
 2. **Market access barriers:** Geographical remoteness, limited transport connectivity and lack of established distribution relationships mean that even competitively priced products struggle to reach high-value markets in metropolitan India or export destinations.
 3. **Inadequate business development services:** The ecosystem of specialized suppliers – quality testing laboratories, product design consultancies, logistics aggregators, digital marketing agencies, working capital financiers – that mainland enterprises routinely access remains underdeveloped or inaccessible in the NER, forcing firms to either forgo these services or incur prohibitive costs to source them externally.
 4. **Input cost disadvantages:** Whether electricity, raw materials, skilled labor or capital, NER enterprises frequently face higher input costs due to thin local markets, supply chain inefficiencies and risk premiums embedded in lending rates.
- These require targeted, competitiveness-oriented interventions – cluster development initiatives that enable collective scale, shared logistics infrastructure that reduces freight disadvantages, business development service hubs that aggregate demand and lower per-firm costs and financial instruments that de-risk lending to viable but under-capitalized enterprises.
- The strategic rationale for prioritizing enterprise competitiveness extends beyond fiscal sustainability to encompass three broader economic imperatives.
1. **Employment and income generation:** Competitive enterprises create not merely jobs but quality employment with rising real wages, which in turn drives consumption growth, tax revenue expansion and reduced out-migration of working-age populations. The region's demographic window – an emerging youth bulge that could either fuel growth or exacerbate unemployment – makes this particularly urgent.
 2. **Value addition and export capacity:** Competitiveness enables NER enterprises to move up value chains, processing raw materials locally rather than exporting them in unprocessed form, capturing higher margins, and accessing premium markets domestically and internationally. This directly addresses the persistent challenge of low



value addition in key sectors like agriculture, horticulture, and natural resources.

3. **Investment attraction and partnership formation:** A visible base of competitive, well-managed enterprises signals to external investors – whether domestic corporates, private equity, or multinational firms – that the region offers viable commercial opportunities, not merely subsidy arbitrage. This is essential for catalyzing the private capital flows that public resources alone cannot provide at the scale required for transformational growth.

Importantly, building enterprise competitiveness does not imply abandoning cooperatives, producer collectives or community-based enterprises in favor of

large corporate models. On the contrary, these organizational forms often possess distinct advantages in the NER context – deep local knowledge, trust-based relationships and alignment with community development objectives. The competitiveness agenda applies equally to them: a cooperative processing organic turmeric must achieve quality consistency, meet food safety certifications, secure reliable logistics and build brand recognition just as rigorously as a private firm to access premium markets and generate sustainable returns for its members. The intervention framework may therefore be enterprise-type neutral, focusing on functional capabilities – production efficiency, quality management, market intelligence, financial planning and regulatory compliance – that all enterprises, regardless of ownership structure, require to compete successfully.

3.3 Critical mass through clustering, high-frequency connectivity and coordinated infrastructure as enablers of scale-dependent competitiveness

The NER confronts a fundamental economic geography challenge that distinguishes it from most other parts of India: its settlement pattern is characterized by demographic dispersion across difficult terrain, with in urban centers and industrial nodes that individually lack the population density, market size, and agglomeration economies that typically drive productivity growth and competitiveness.

Economic research consistently demonstrates that productivity, innovation and income levels are strongly correlated with urban scale and density. Larger cities and integrated economic regions support thicker labor markets that allow better matching between workers and firms, enable specialization and knowledge spillovers across enterprises, justify investments in specialized services and infrastructure that smaller markets cannot sustain, and create competitive pressures that drive continuous improvement.

When urban centers remain small and isolated, agglomeration benefits fail to materialize, leaving enterprises operating at subscale, unable to access specialized inputs, and disconnected from the innovation and knowledge networks that fuel competitiveness in dynamic sectors. The strategic imperative is therefore not merely to build more infrastructure or grow individual cities incrementally, but to deliberately create sufficient critical mass – whether through physical clustering of economic activity, functional integration of proximate urban centers, or high-frequency connectivity that

effectively collapses distance – to simulate the scale-dependent advantages that geography has not naturally provided.

In economies characterized by small, dispersed markets, infrastructure investment alone is necessary but insufficient to catalyze sustained growth. A highway connecting two small towns, a new airport serving a limited catchment, or an industrial estate in an isolated location may improve local conditions but might not, by themselves, generate the scale economies, market depth, or competitive intensity required for enterprises to achieve national or global competitiveness. Infrastructure must be synchronized with spatial economic strategies that channel investment, employment, and enterprise activity toward designated growth nodes; these nodes must be functionally linked through high-frequency, reliable connectivity that enables daily movement of goods, people and information; and public interventions must actively address the coordination failures that prevent private actors from independently achieving the clustering and scale required for competitiveness.

Clustering

When enterprises in related sectors locate in proximity, whether through planned industrial parks, natural agglomeration around resource deposits or policy-induced concentration, several scale-dependent benefits emerge that isolated firms cannot access.

1. **Shared infrastructure and services:** The cost of establishing and operating specialized facilities –

quality testing laboratories, effluent treatment plants, cold storage, logistics aggregation centers, technical training institutes – can be distributed across multiple users, dramatically reducing per-firm costs while improving service quality through specialization and scale.

2. **Supply chain efficiency:** Proximity of suppliers, processors and distributors reduces transaction costs, inventory requirements and lead times, enabling just-in-time operations and rapid response to market demands.
3. **Labor market pooling:** Workers develop sector-specific skills knowing they can move between firms without relocating, while enterprises access a larger, more diverse talent pool that allows specialized hiring.
4. **Knowledge spillovers and innovation:** Informal information exchange, observation of competitor practices and movement of personnel across firms within a cluster accelerate adoption of innovative practices and stimulate incremental innovation.

These are not theoretical possibilities, but empirically documented patterns observed in successful clusters globally – from Bangladesh's garment clusters to Vietnam's furniture manufacturing zones to India's own examples in Tirupur textiles or Nashik wine production.

However, achieving these benefits in NER requires overcoming spatial and institutional barriers that do not exist in more densely populated regions. The region's topography – characterized by hills, rivers and international borders – creates natural fragmentation that market forces alone may not overcome. Individual firms, acting independently, lack both the information and the incentives to coordinate location decisions, particularly when infrastructure networks remain incomplete and policy signals about priority growth nodes are ambiguous or inconsistent across states. This is precisely where strategic public intervention becomes essential – not to dictate every location decision or force artificial concentration, but to provide clear spatial frameworks that guide investment toward designated nodes, enable that infrastructure development is synchronized with industrial policy and urban planning, and address coordination failures through anchor investments, incentive alignment and regulatory clarity.

High-frequency connectivity

The concept of high-frequency connectivity represents a qualitatively different infrastructure objective than traditional onetime capital investments. A highway that connects two cities is valuable; a highway

combined with frequent, reliable bus services, coordinated logistics operations, and integrated digital platforms that enable real-time tracking and booking transforms that physical asset into an economic connector that businesses can depend upon for daily operations. High-frequency connectivity – whether through road, rail, aviation, inland waterways or multimodal combinations – has three essential characteristics, including:

1. **Reliability:** Scheduled services operate consistently, allowing enterprises and workers to plan activities with confidence that transportation can be available when needed.
2. **Frequency:** Sufficient departures throughout the day enable same-day travel for meetings, multiple delivery cycles and flexible supply chain operations rather than requiring overnight stays or multi-day lead times.
3. **Affordability:** Pricing structures make regular use economically viable for businesses and workers, not merely occasional long-distance travelers.

These characteristics determine whether physical connectivity translates into functional economic integration. A region where key cities are connected by flights operating twice weekly at premium prices remain economically fragmented; the same region, with multiple daily flights, coordinated bus services and efficient cargo operations, becomes a functionally integrated economic zone where firms can access larger markets, workers can commute to better opportunities and knowledge can flow rapidly.

The relationship between urban scale, clustering and regional competitiveness operates through several reinforcing mechanisms that collectively determine whether the NER can compete with other Indian regions and global locations for investment, talent and market share. Larger, integrated urban systems offer enterprises access to deeper labor markets where specialized skills are available, as well as proximity to decision-makers and institutions that shape the regulatory and business environment. They also support sophisticated business services – legal, financial, technical and marketing – that small, isolated towns cannot sustain, along with innovation ecosystems where universities, research centers, startups and established firms interact and collaborate.

These advantages are cumulative and self-reinforcing. As urban centers grow and become better connected, they attract talent. That talent, in turn, draws enterprises, generating employment and income that support further growth. Conversely, small and isolated centers struggle to retain talent, especially educated



youth who migrate to larger cities for better career opportunities. This weakens the enterprise base and reduces local opportunities, creating a downward spiral.

Breaking this pattern requires deliberate strategies to create critical mass – either by physically growing priority cities through planned urbanization, by functionally integrating proximate centers through high-frequency connectivity, or by pursuing both.

Coordinated Infrastructure

The imperative for coordination across infrastructure types, states and sectors cannot be overstated. Strategic selectivity – identifying priority growth

nodes based on clear criteria including existing economic base, connectivity potential, resource endowments and cross-border trade opportunities – enables concentration of limited resources to achieve demonstrable outcomes rather than marginal improvements across many locations. This does not imply neglecting rural development or smaller towns but recognizes that regional growth poles and rural prosperity are complementary rather than competing objectives. Strong urban centers provide markets for rural produce, employment opportunities for rural youth, and sources of services and inputs that rural enterprises require. The alternative – diffused investment without strategic concentration – risks creating neither strong urban drivers nor effectively connected rural economies.

3.4 A spatially differentiated strategy for inclusive industrialization in the NER

NER's dispersed population and resource base create industrial challenges distinct from regions anchored around major metropolitan or coastal hubs. Settlements are small and scattered and natural resources – horticulture, bamboo, forest products, aquaculture, minerals – are similarly distributed across varied terrain. This limits the applicability of conventional industrialization strategies that rely either on concentrating production in large cities or replicating industry at every resource site. Concentration achieves scale and competitiveness but excludes producers and incurs high transport and spoilage costs. Dispersed industry enables inclusion but often lacks quality systems, infrastructure and market access. A differentiated approach is required – one that assigns each location only the functions it is structurally suited to perform.

A dual value-addition model addresses this by separating primary processing near production clusters from secondary and tertiary processing in select urban industrial hubs. Localized primary processing responds to three key constraints.

1. **Perishability and quality degradation:** Products such as fruits, vegetables, flowers and fish lose value rapidly. Transporting them raw to distant cities often results in physical losses or lower grades. Establishing washing, grading, drying, freezing, and basic packaging facilities near production centers preserves product quality and enables access to higher-value markets.
2. **Transport costs:** Logistics in the region are expensive due to challenging terrain and limited infrastructure. Many products are bulky or heavy relative to their value – fresh ginger, whole fish

and raw bamboo – making long-distance transport uneconomical. Converting these into semi-processed forms such as dried ginger, fish fillets, bamboo boards) reduces weight and volume, improving transport viability and unlocking distant markets.

3. **Employment and income distribution:** Locating early-stage value addition in rural consolidation points creates jobs where raw materials originate and enables primary producers to capture a larger share of value. This supports rural viability and limits forced migration.

Rural primary processing alone, however, cannot meet market requirements. Most buyers – from retail chains to export markets – require products that comply with certification standards, reliable volumes, consistent packaging, traceability and professional branding. These capabilities demand skilled labor, quality infrastructure and business services that are most efficiently accessed in urban environments. This forms the rationale for urban manufacturing hubs, which handle finishing, packaging, certification, branding, inventory management and logistics.

A high-mix, medium-volume positioning suits the region's diversified resource base. Instead of single-product mega-facilities, urban hubs can process multiple products sourced from various rural clusters – enabling shared infrastructure, diversified revenue streams and cross-market branding. For instance, one facility could aggregate turmeric from Arunachal Pradesh, ginger from Meghalaya and chilies from Nagaland under a common brand while meeting certification requirements.

The effectiveness of this spatial division depends on strong institutional linkages. Rural clusters and urban hubs must function as parts of one system, not isolated entities. Mechanisms such as contract purchase agreements, cooperative federations, anchor enterprises operating linked rural units and digital platforms for pricing, logistics and payments can coordinate supply, quality and market access.

Infrastructure requirements must also be differentiated. Rural consolidation points require dependable electricity, water, access roads and modest processing equipment – reliable and suited to local capacity rather than technologically complex. Urban nodes require industrial-grade utilities, multimodal connectivity to airports or railheads, and proximity to finance, testing labs, logistics providers and business services. Policy incentives can therefore be tailored to the needs of each component rather than uniformly applied.

Scaling may be gradual and evidence-based. Rural clusters can begin with low-risk primary processing and expand as supply volumes and market relationships strengthen. Urban hubs can initially target regional and niche national markets before expanding to national retail and exports. This reduces the risk of overbuilding infrastructure without established supply chains while avoiding the trap of remaining permanently at artisanal scale.

Finally, this model distributes growth and employment more equitably across the region. Value addition is not confined to state capitals and rural youth can access employment without relocating. Producers gain better prices, and urban centers still build competitive manufacturing bases. Spatial equity supports political stability and strengthens the investment environment.

3.5 Cross-sector synergies and sequential prioritization as accelerators of compound regional growth

Economic strategies often treat sectors as independent domains with separate policies, budgets and targets. Regional transformation occurs when progress in one sector expands demand, capabilities, or infrastructure that enables others to grow – creating compound, mutually reinforcing effects. For NER, development has been constrained less by underperformance in any sector and more by limited attention to these synergies. Two sectors – tourism and renewable energy – illustrate how targeted prioritization can unlock broader economic momentum.

Tourism

Tourism functions as a demand aggregator. Visitor expenditure flows directly into accommodations, food services, guides and transport, then indirectly to farmers, processors, construction workers, craft producers and suppliers. Income earned through these channels circulates locally, supporting further services, consumption and job creation. Evidence from comparable economies suggests that each Rupee spent by tourists may generate between INR1.5 and INR2.5 in total economic activity. Tourism also produces strategic intangible benefits – visibility, familiarity and perception shifts – strengthening market acceptance for regional products, attracting investors and partners, and widening opportunities for students, entrepreneurs and talent.

Tourism becomes high-impact only when multiple prerequisites mature together – connectivity, safety

and perception management, adequate accommodation capacity, reliable booking systems, trained service providers, emergency response capabilities and a cohesive regional brand. Weaknesses in any single dimension can deter visitors, which is why fragmented interventions – such as marketing without service readiness or infrastructure without workforce training – have yielded limited results. Tourism requires synchronized investment to cross a threshold where visitors become consistent, private capital follows and services improve further, creating self-reinforcing growth.

Renewable energy

Renewable energy addresses a different but equally central constraint: reliable and affordable electricity. Hydropower potential in the NER is substantial and solar capacity is increasingly viable. Current supply, however, is marked by outages, high transmission losses and expensive diesel-based redundancy. Lack of reliable power raises operating costs for manufacturing, undermines cold-chain viability for horticulture and fisheries, constrains IT-enabled services and slows urban development. When power becomes dependable and cost-competitive, manufacturing can operate multiple shifts, digital firms can scale, cold-chains become financially viable, and urban centers can attract investment in commercial and residential development.

In addition to its enabling role, renewable energy can itself become a sellable economic product. Once base



regional demand is met and generation capacity exceeds internal requirements, electricity becomes an exportable commodity – sold to other Indian states and neighboring countries through the national grid or through long-term purchase agreements with industrial clusters outside the region. Clean-energy exports generate recurring revenue streams for state governments, support fiscal sustainability, and position NER as a contributor to India's clean-energy transition. This turns hydropower and solar assets from enablers alone into direct income-generating resources – creating both economic returns and policy leverage.

Tourism and renewable energy reinforce each other. Tourism increases electricity demand across hotels, transport and recreational sites, which in turn improves capacity utilization and the financial viability of energy assets. Renewable energy installations, especially large hydro projects, can be developed as tourism attractions – reservoir recreation areas, interpretive centers, industrial tourism – adding visitor draw without separate infrastructure. A dual identity as a sustainable tourism destination powered by clean energy strengthens the region's brand. For export-oriented producers, clean-energy credentials also enhance competitiveness as global buyers increasingly require low-carbon supply chains.

The broader principle extends beyond these two sectors: prioritization could favor activities with strong spillovers – those that reduce binding constraints or build shared capabilities – not those with high direct value-added. Extractive activities may show strong direct output but little influence on other sectors. High-spillover sectors, even if requiring longer gestation, create enabling conditions that multiply returns economy wide.

This implies three operational considerations.

1. **Sequencing matters:** Enabling sectors such as power, transport connectivity, and workforce development must be advanced early to unlock downstream industries.
2. **Synchronized investment across complementary prerequisites:** *Investment often yields higher returns than sequential or isolated spending.* For tourism, simultaneous investment in connectivity, hospitality capacity, skills and branding is more effective than incremental interventions.
3. **Strategic investments must be protected:** Through long gestation periods, high-multiplier sectors take time to reach threshold scale where returns become self-reinforcing.

Many NER sectors currently exist below this threshold – present but without sufficient scale to drive ecosystem formation. Tourism operates without consistent standards or large-scale hospitality capacity; hydropower contributes generation but is not yet systematically aligned with industrial locations or export sales strategies. Achieving transformative scale requires a sustained commitment beyond the early phases, where returns appear modest.

The strategic implication is that development planning must evolve from sector-by-sector advancement toward systems thinking – identifying high-spillover sectors, coordinating interventions, sequencing investments, and sustaining them long enough to activate growth flywheels. Execution depends on analytical tools to quantify spillovers, institutional mechanisms that enable cross-sector decision-making, and performance frameworks that reward ecosystem-level results rather than siloed achievements. Doing so can shift NER from fragmented, parallel sectoral expansion toward compound, mutually reinforcing growth, improving productivity, investment attractiveness and long-term prosperity.

3.6 Investment in climate transformation as the foundation for commercially driven private capital mobilization

NER's development financing model has historically depended on public expenditure, which has enabled critical public goods that private capital alone could not have delivered. However, the scale of capital required for full economic transformation is far larger – required investment on the order of hundreds of thousands of crores over a decade. Given fiscal constraints, public resources cannot finance this scale. Long-term prosperity therefore depends on NER's ability to mobilize sustained private capital that flows based on commercial returns. Private capital is essential not only to close financing gaps but also

because it brings capabilities that public spending does not: technology and operational expertise, professional management systems, national and global distribution channels, competitive discipline, and risk capital for scaling and innovation. These elements are central to creating enterprises that survive without subsidy and integrate into modern supply chains.

Despite significant opportunities – resource endowments, strategic location for regional trade, young demographics and multiple sectoral niches – the region attracts limited private capital due to

investment climate constraints that elevate perceived risk and transaction costs. Four categories of challenges are most recurrent in investor assessments.

1. **Regulatory and administrative unpredictability:** Investors cite unclear or changing regulations, sequential approvals requiring multiple departments and long processing timelines. Beyond delays, uncertainty over whether approvals can materialize – and remain valid – raises financing costs and deters multi-year, capital-intensive projects.
2. **Contract enforcement and dispute resolution:** Predictable enforcement of agreements and property rights is critical. Where business disputes are perceived as slow, opaque, or politicized, investors either avoid the market or demand risk premiums that undermine competitiveness.
3. **Infrastructure reliability and delivered-cost competitiveness:** Even where infrastructure exists, reliability is uneven. A manufacturing firm calculates total delivered costs: raw materials, labor, electricity and transport to markets. If power interruption forces diesel usage or logistics costs are significantly higher, competitive advantages elsewhere cannot compensate.
4. **Visibility and perception gaps:** Many investors simply lack information about NER's opportunities, infrastructure parks, sector potential, or success stories. Legacy perceptions – instability, remoteness, weak markets – persist in the absence of proactive engagement, site visits and transparent communication.

Transforming the investment climate therefore requires targeted reforms that replace uncertainty with predictability and lower transaction costs.

Priority reform directions

1. **Regulatory and approvals redesign:** Instead of merely digitizing existing processes, approvals must be redesigned around investor needs: functioning single-window mechanisms with coordination authority; time-bound clearances with deemed approval provisions; reduction of discretionary decision-making through rule-based compliance; and public dashboards to track processing timelines.
2. **Credible investor grievance and ombudsman systems:** Institutions with authority to resolve bottlenecks and enforcement disputes quickly can

prevent project abandonment and signal a reliable operating environment.

3. **Reliability enabled within designated zones:** States need not perfect infrastructure everywhere at once. Enabling uninterrupted power, water, digital connectivity and logistics reliability within selected industrial parks – with compensation mechanisms for service failures – provides risk certainty where investors operate.
4. **Demonstration investments:** Early anchor projects – supported through public-private partnerships or viability gap funding – can demonstrate commercial viability. Once a credible operator succeeds in a sector or location, follow-on investors face lower risk. Public resources may thus catalyze early entries rather than permanently subsidizing operations.
5. **Incentive calibration:** Historically, NER has relied heavily on tax holidays and subsidies. While these may influence marginal decisions, they risk attracting footloose investors and diverting fiscal resources away from public goods that permanently enhance competitiveness. A more strategic approach is to use incentives selectively – time-bound, targeted and designed to trigger demonstration effects – while shifting toward a competitiveness-based model grounded in infrastructure reliability, regulatory predictability and market connectivity.

Investment in climate transformation is foundational to other strategic interventions:

- Sector prioritization is meaningful only if private capital can scale opportunities.
- Enterprise competitiveness cannot be realized if regulatory and infrastructure barriers erode margins.
- Industrial clustering and connectivity require private units to populate zones.
- Tourism and renewable energy development rely heavily on private hotels, operators and power developers.
- The dual value-addition model requires private processors and manufacturers across rural and urban nodes.
- These strategies are mutually reinforcing – none can reach transformative scale without private capital.



3.7 Regional brand architecture as a market-making mechanism and value differentiation platform

NER has several distinctive strengths – clean natural environments, biodiversity, culturally rooted practices and predominantly low-input or natural agriculture – that align well with evolving consumer and investor preferences toward sustainability, authenticity and wellness. Across the region, enterprises and communities already embody these characteristics: organic turmeric cooperatives in Meghalaya, bamboo design units in Mizoram, handloom artisans in Manipur and eco-tourism initiatives in Arunachal Pradesh. Each reflects a shared foundation of environmental integrity and cultural depth.

A key opportunity is to translate these attributes into collective market value. Today, many actors carry the responsibility of communicating their strengths independently – often without the scale, budgets, or marketing networks needed to build broad recognition. A regional brand architecture can provide an enabling platform: a unifying identity that different states, sectors and enterprises can use to signal shared qualities and reach buyers more efficiently.

Regional branding examples globally demonstrate what becomes possible when place-based identity is intentionally designed. Costa Rica, through its “*Pura Vida*” positioning, successfully built global recognition of nature, wellness and eco-tourism – not only benefiting tourism but also enhancing credibility for its agricultural exports, conservation economy and wellness industries. Similarly, Kerala, through its “*God’s Own Country*” positioning, successfully built global recognition around backwaters, Ayurveda and cultural authenticity – not only benefiting tourism but also enhancing credibility for its spice exports, wellness retreats, handloom textiles and sustainable living practices. The branding transformed Kerala from a lesser-known Indian state into a distinctive destination associated with holistic health, natural beauty and cultural preservation, creating economic value across multiple sectors from medical tourism to organic agriculture.

In each successful case, the region becomes associated with a *single defining perception*. For NER, the aspiration could be similar: that when consumers, visitors and investors think of the region, their first association is: “India’s organic, sustainable, culturally authentic region.” Such a top-of-mind identity can simplify market discovery, create positive expectations even before individual products are evaluated and unlock premium positioning – from high-value tea and spices to craft textiles and eco-tourism. It also helps enterprises that would otherwise

compete as commodities enter differentiated, value-based market categories.

A regional brand also plays an enabling role where attributes are *credence qualities* – characteristics consumers cannot verify easily (organic methods, cultural authenticity, ethical sourcing). A shared brand with certification, standards and traceability converts these qualities into trusted, market-relevant signals.

To support this, several foundational pillars are essential:

1. **Credibility and verification infrastructure:** Standardized, region-wide certification and GI protection can lower per-enterprise costs and enable that claims are backed by recognized systems.
2. **Quality standards and consistency:** Clear minimum standards, transparent participation criteria and processes to maintain consistency help that when buyers see the regional brand, expectations are met.
3. **Coordinated, professional marketing:** Pooled budgets, storytelling content, retail partnerships, trade-fair participation and digital campaigns – allows cumulative visibility that no single actor could achieve alone.
4. **Broad enterprise access:** To maximize impact, MSMEs, artisans, cooperatives and producer groups require straightforward pathways to participation, technical support to meet standards and awareness programs.

Governance structure is critical. A hybrid public-private platform – anchored by government mandate and supported by industry expertise – can deliver operational agility. Independent expert bodies can oversee certification and standards, ensuring fairness and credibility.

State and sector-specific identities can nest within this shared architecture. “*Sikkim Organic*”, “*Nagaland Handloom*”, or “*Arunachal Adventure*” can reinforce a regional umbrella identity (“Organic, Sustainable, Authentic North-East India”), ensuring both unity and differentiation through aligned messaging and shared guidelines.

Strategic sequencing matters. Focusing early on categories where NER already has strong

differentiation can build confidence and demonstrate impact. Initial thrust areas may include:

- Organic and natural food products
- Experiential and eco-tourism
- Handloom and handicrafts
- AYUSH and natural wellness products
- Geographic-indication-eligible specialty crops

Measurement and learning loops – awareness surveys, enterprise participation metrics, market-entry numbers – enable course correction and strengthen accountability. Because brand equity builds over years, multi-year program continuity and ring-fenced funding are required. International experience suggests that five-seven years of consistent campaigning, certification development and enterprise support are needed before widespread perception change is achieved.

A regional brand architecture can help NER become immediately recognizable – synonymous with purity, nature, sustainability and cultural richness. States could leverage a shared identity that makes it easier to attract consumers, visitors and investors who value the region's inherent strengths. With coordinated inputs, NER can build a distinctive market identity that drives value capture, supports livelihoods, and aligns economic growth with cultural and environmental stewardship.





An aerial photograph of a lush landscape in Northeast India. The top half of the image shows a dense green forest. Below the forest, there are terraced rice fields in various stages of growth, with some fields appearing bright yellow and others green. Several small, traditional thatched-roof huts are scattered throughout the fields. A paved road runs diagonally across the lower right portion of the image. The overall scene is vibrant and scenic.

CHAPTER

04

Northeast India:

**The regional
advantage mix**



India's Northeast Region (NER) has the potential to emerge as an increasingly significant growth driver for Viksit Bharat 2047. The region's eight states possess a set of strategic advantages that are beginning to coalesce into a coherent development opportunity, with periods of growth exceeding the national average over the past decade.

One of NER's most immediate advantages is geography. With 98% of its perimeter an international border, the region functions as India's gateway to Southeast Asia and the broader Indo-Pacific economic corridor^{16,17}. This strategic positioning is being activated through major connectivity investments: 16,000+ km of national highways and new rail links to previously unconnected state capitals¹⁸. This infrastructure development is fundamentally improving the region's economic accessibility.

The region has substantial natural assets. NER accounts for nearly one-fourth of India's forest cover and possesses extensive freshwater systems – resources that support both climate resilience and renewable energy potential^{19,20}. These ecological foundations are enabling the development of a bioeconomy centered on organic farming, forest-based

value chains and high-value horticulture. The sector is showing early signs of becoming an export-oriented growth avenue grounded in sustainable practices.

NER's demographic profile adds another layer of advantage. The region has a relatively young population, with literacy levels above the national average in several states, and carries indigenous knowledge of sustainable resource management. Its cultural diversity – manifested through festivals, traditional arts, sports and tourism – represents a soft-power asset that strengthens India's broader global engagement.

These inherent strengths are supported by a range of targeted policy interventions. Dedicated central funding, including a 10% allocation of national budgets for NER, and customized development schemes have created an enabling institutional framework²¹

The convergence of these factors – geostrategic location, connectivity infrastructure, natural resources, emerging bioeconomy, human capital and focused policy support – positions NER to play a strategic role in India's development trajectory to 2047. This chapter examines how these advantages can be leveraged to realize that potential.

4.1 Geo-strategic and trans-boundary advantage

NER's geography endows it with a critical geostrategic advantage at the crossroads of South and Southeast Asia. The region shares a long international boundary of 5,182 km, over 98% of its perimeter, with key neighboring countries: Bangladesh, Bhutan, China, Myanmar and Nepal¹⁷. By contrast, its connection to mainland India is the Siliguri corridor, which at its narrowest point is only 22km¹⁷. What was historically regarded as a developmental constraint is now increasingly being re-conceptualized as a strategic gateway, with NER occupying a central role in shaping India's future engagement with South East and East Asia.¹⁶ It lies at the heart of regional cooperation initiatives such as the *Act East Policy*, *BBIN* (*Bangladesh-Bhutan-India-Nepal*) and Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (*BIMSTEC*), giving India land access to booming ASEAN markets and beyond. As Hon'ble Union Minister Jyotiraditya Scindia noted, the Northeast's strategic geography has "*translated the*

region into the most powerful gateway to Southeast Asia"²²

Crucially, NER serves as India's primary land bridge to the economically dynamic ASEAN region. Major transboundary infrastructure projects underscore this advantage. The upcoming India-Myanmar-Thailand Trilateral Highway (via Manipur) and the Kaladan Multimodal Transit Transport project (connecting Mizoram to Myanmar's Sittwe port) might connect the landlocked NER, opening direct trade and energy routes. Likewise, new cross-border rail and road links such as the rail line from Tripura to Bangladesh's Chittagong port are positioning the NER as a sub-regional connectivity hub in eastern South Asia. This geostrategic leverage creates conditions under which border trade and commerce could expand significantly. The Finance Commission has observed that the NER's location can make cross-border markets more cost-effective than distant domestic markets for many surplus products. For example, Bangladesh and ASEAN

¹⁶ Press Release: Press Information Bureau: Rising Northeast Investor Summit

¹⁷ <https://fincomindia.nic.in/asset/doc/commission-reports/13th-FC/reports/report14.pdf>

¹⁸ Press Note Details: Press Information Bureau: The Northeast: Where the Sun of Development Rises

¹⁹ <https://apfbcs.nic.in/uploads/media/pdf/Drivers%20of%20degradation.pdf>

²⁰ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

²¹ Press Release: Press Information Bureau: Rising Northeast Investor Summit

²² Press Release: Press Information Bureau: Rising Northeast Investor Summit



countries present ready markets for the NER's agricultural produce, minerals and manufactured goods. With sustained connectivity gains, NER is expected by 2047 to evolve into a key commercial junction linking India with its eastern neighbors, thereby enhancing export performance and strengthening strategic influence.

Beyond its economic implications, the region's geostrategic location carries substantial security and diplomatic relevance. Accounting for nearly one-third of India's land boundaries, the NER occupies a critical position in border governance and regional stability. Sustained prosperity and stability in NER are therefore integral to strengthening India's frontier management,

while improved connectivity and development in border areas can progressively address long-standing challenges related to insurgency and informal cross-border activities through enhanced livelihoods and institutional presence. In the long run, NER's transboundary ties and cultural linkages with neighboring people, as well as its participation in transnational initiatives, can bolster India's soft diplomacy in the region. By 2047, NER is envisaged as India's "Ashtalakshmi" gateway. This strategic advantage contributes not only to the internal advancement of the eight NER states but also reinforces India's positioning across the broader Bay of Bengal and ASEAN subregions.

4.2 Connectivity and infrastructure leverage advantage

Long constrained by difficult terrain and decades of relatively limited capital investment, NER is now undergoing a decisive transformation in its infrastructure landscape, enabling it to actively leverage its latent connectivity potential. Over the past ten years, a sustained policy focus by the Government of India has translated into an unprecedented scale-up of investment in transport, digital and energy infrastructure, reshaping both intra-regional accessibility and external integration.

Since 2014, budgetary allocations directed toward infrastructure development in the NER have expanded multiple times over. In the rail sector, this shift is particularly pronounced: the Ministry of Railways increased its average annual investment nearly fivefold, with cumulative allocations reaching INR62,477 crore for projects in the region by 2023²³. This enhanced financial commitment has accelerated the execution of projects that had remained pending for decades, resulting in the systematic extension of rail connectivity into states previously outside the national rail grid.

A defining milestone in this process was achieved in 2023 with the commissioning of the Bairabi-Sairang railway line in Mizoram, which connected Aizawl to India's rail network for the first time since Independence. Executed through complex engineering across rugged terrain, involving 143 bridges and 45 tunnels, the project exemplifies the new phase of connectivity-led integration underway in the region. Parallel rail corridors linking Imphal in Manipur and Kohima in Nagaland are advancing toward the objective of providing rail access to all NER state capitals by 2025. At the transboundary interface, the

Agartala-Akhaura rail connection linking Tripura with Bangladesh is nearing completion, significantly shortening distances to seaports and international trade gateways. Collectively, these investments are beginning to shift NER from a largely terminal geography toward a more transit-oriented role, with potential to strengthen economic interaction and strategic mobility.

Road infrastructure has witnessed a similar transformative expansion. By mid-2025, more than 16,200 kms of national highways had been constructed across NER²⁴, strengthening internal connectivity as well as inter-state linkages. Strategic corridors such as the East-West Highway across Assam and the Trans-Arunachal Highway have improved mobility in remote and border areas. The construction of major river crossings, including the Bogibeel Bridge over the Brahmaputra – the longest rail bridge in India – has further integrated previously disconnected regions while substantially reducing travel times. At the grassroots level, the Pradhan Mantri Gram Sadak Yojana has played a critical role in extending last-mile connectivity, with over 16,000 rural road projects covering ~81,000 kms and the construction of more than 2,100 bridges across the region. These initiatives are being coordinated under the PM Gati Shakti National Master Plan, which emphasizes multimodal integration and network optimization. In support of this approach, seventeen new railway surveys spanning 1,790 kms, along with multiple highway projects, have been sanctioned to address residual connectivity gaps and create a coherent, region-wide transport system²⁵.

²³ Press Release: Press Information Bureau: *The North East: Where the Sun of Development Rises*.

²⁴ Press Release: Press Information Bureau: *The North East: Where the Sun of Development Rises*.

²⁵ Press Release: Press Information Bureau: *The North East: Where the Sun of Development Rises*.

Air connectivity has similarly leaped forward, leveraging the NER's position as a gateway. Ten new Greenfield airports have been built in this region over the last 11 years²⁶, a remarkable expansion given that NER previously had only a handful of airports. New airports in states like Sikkim, Arunachal Pradesh, Nagaland, and Mizoram now enable direct flights, boosting tourism and commerce. Under the UDAN regional air connectivity scheme, numerous routes have been added linking NE cities by air at affordable fares.²⁷ For instance, routes like Guwahati-Arunachal (Hollongi) and Agartala-Aizawl are now operational, dramatically shrinking distances. The development of inland waterways further complements the expansion of air, road and rail infrastructure, e.g., the introduction of Roll-on/Roll-off ferry services on the Brahmaputra and improved digital connectivity (BharatNet broadband to all Gram Panchayats). Optimizing returns on this infrastructure requires higher passenger and cargo throughput to reduce costs such as aircraft load factors, per-seat costs, and to enhance airline route viability – outcomes achievable through accelerated urbanization, denser economic activity and strategic route rationalization.

Taken collectively, these advances in physical and digital connectivity are enabling NER to actively capitalize on its geographic position, allowing the movement of goods and people to become faster and more reliable both within the region and in relation to the Indian mainland. Realizing the full potential of this expanded air network, however, depends on airports functioning as interconnected nodes rather than isolated endpoints – an outcome that requires

strengthening surface transport links to broaden each airport's catchment and sustain the passenger volumes necessary for airline viability. The region's pronounced demand seasonality, shaped by tourism flows, monsoon disruptions and agricultural cycles, further underscores the need to develop complementary cargo traffic and align airport expansion with emerging urban centers and cross-border trade corridors. This improvement is progressively integrating regional markets with national value chains, thereby strengthening the internal coherence of the NER economy.

Cross-border connectivity has improved substantially. The operationalization of new border trade points, the establishment of integrated check posts, and the implementation of transit arrangements with Bangladesh, Bhutan and Myanmar are systematically lowering transaction frictions associated with transboundary movement. These measures are reshaping NER's role within sub-regional trade and logistics networks. Looking toward 2047, the cumulative impact of this infrastructure expansion is expected to position NER as a fully connected logistics and commercial hub linking South Asia with Southeast and East Asia. Improved accessibility and infrastructure reliability are also translating into enhanced investment appeal. This trend is already evident, as upgrades in road connectivity and power availability have catalyzed investor interest, reflected in investment commitments amounting to INR4.3 lakh crore announced across sectors at the Rising Northeast Investor Summit 2025.

4.3 Natural capital, climate and water security advantage

NER is often referred to as India's green lung and water tower, a testament to its extraordinary endowment of natural capital. Despite accounting for only around 8% of India's geographical area, the NER contains an exceptionally high concentration of the country's ecological assets. More than 23% of India's forest cover is located within these states, extending across hill systems and river valleys and supporting a rich and diverse biodiversity base. An official satellite-based assessment found that NER has 163,799 km² of forests (circa 2000), roughly one-fourth of India's forest area²⁸. Many states here have more than 70% to 80% of their land under forest. This includes tropical rainforests, subtropical broadleaf forests, alpine forests and bamboo groves, making it part of two

global biodiversity hotspots (Indo- Myanmar and Eastern Himalayas).

Such extensive forests provide critical ecosystem services: carbon sequestration, soil conservation and regulation of the region's abundant rainfall. These ecosystems serve as a critical natural defense for climate change mitigation and adaptation, closely aligned with India's long-term sustainability objectives. At the same time, pressures on forest resources remain evident, as NER recorded an estimated net decline of 1,020 km² of forest cover between 2015 and 2021²⁹. This underscores the need for balanced development that leverages natural capital without eroding it.

²⁶ <https://apfbcs.nic.in/uploads/media/pdf/Drivers%20of%20degradation.pdf>

²⁷ Press Release: Press Information Bureau: Tourism in North-Eastern Region

²⁸ Forest cover and assessment in North East India issues and policies - Geospatial World

²⁹ <https://apfbcs.nic.in/uploads/media/pdf/Drivers%20of%20degradation.pdf>



Water resources constitute another core strategic endowment of NER. Its perennial river systems, most notably the Brahmaputra and Barak, together with their extensive tributary networks, represent a substantial proportion of India's freshwater availability, with the Brahmaputra alone accounting for nearly 30% of national river discharge. Combined with high and sustained monsoonal precipitation, this hydrological abundance underpins the region's exceptionally large hydroelectric potential. NER has the most significant untapped hydropower resources in the country: approximately 56 GW out of India's 133 GW exploitable large-hydro potential (42%) are in NER.³⁰ Arunachal Pradesh itself holds 51,054 MW potential in its rivers. Yet only a small fraction (2.2%) of this has been developed so far³¹. The government has recognized this opportunity, and a new scheme in 2024 provides INR4,136 crore in support for state equity in NER hydro projects, aiming to add 15,000 MW of capacity by 2032³². By 2047, harnessing even half of the NER's renewable water energy has the potential to position the region as a major clean power hub, enabling surplus clean electricity to be supplied to other parts of India and, overtime, to neighboring markets. Importantly, hydropower growth is being pursued with environmental safeguards and local consultation to allow sustainability and community benefit.

Beyond forests and rivers, NER's natural capital includes rich agro-biodiversity and minerals. The region's diverse agro-climatic zones support unique crops and plant species. It is home to over 8,500 species of flowering plants and many endemic medicinal herbs. This biological wealth positions NER

as a leader in traditional medicine and AYUSH development. For instance, there is growing interest in leveraging indigenous knowledge of herbal cures and promoting wellness tourism. The region also possesses notable mineral endowments, including oil and natural gas reserves particularly in Assam as well as deposits of coal and limestone; however, their utilization is being pursued with due caution to minimize ecological impacts. NER's extensive bamboo resources – frequently described as “*green gold*” – are being systematically leveraged through the National Bamboo Mission, which positions bamboo as a critical input for both livelihood generation and industrial development.

Alongside utilization, ecological conservation remains a central priority. Multiple protected landscapes, including UNESCO World Heritage Sites such as Kaziranga and Manas, together with a wide network of wildlife sanctuaries, safeguard the region's distinctive fauna and flora, ranging from one-horned rhinoceroses and elephants to avifauna and rare orchid species. As global climate risks intensify, the NER's ecological systems and hydrological assets are expected to assume an increasingly vital role in ensuring India's long-term water security and climate resilience. Its forests and wetlands buffer floods and store carbon, and its traditional ecological practices (like Jhum's agroforestry, if modernized) offer models for sustainable living. By capitalizing on this natural capital through ecotourism, bio-pharmaceutical research, sustainable logging and fisheries, and massive clean energy generation, NER can achieve green growth that secures both regional and national environmental goals by 2047.

4.4 Bioeconomy, agriculture and nature-based livelihood advantage

NER has a distinctive bioeconomy advantage rooted in its fertile soils, favorable climate and biological diversity. Agriculture and allied activities remain the backbone of livelihoods for most people in the NER, and they offer a unique value proposition for high-value, sustainable products. The region's varied elevations and climates support a wide range of crops – from rice in the Brahmaputra valley to fruits and vegetables in the hill areas to cash crops such as tea, rubber and spices. NER is well-known as the home of premium agricultural produce; for example, Assam tea is world-famous, accounting for over half of India's tea

output. The region also produces 50% of India's total pineapple (notably from Tripura and Manipur) and a significant share of spices such as ginger, turmeric, cardamom and the famed “*Bhut Jolokia*” chili.

Crucially, NER's produce is often organically grown by default, owing to historically low chemical use. This gives the region an edge in the growing market for organic and healthy foods. In fact, the Government aims to transform NER into a “*global hub for organic farming*”, building on success stories like Sikkim (the world's first fully organic state)³³. Under the Mission

³⁰ Press Release: Press Information Bureau: Hydro Potential in the Country

³¹ NITI Aayog, India Climate & Energy Dashboard (ICED), <https://iced.niti.gov.in>

³² Press Release: Press Information Bureau: Cabinet approves Central Financial Assistance towards Equity Participation by the State Governments of the North Eastern Region for development of Hydro Electric Projects in the North Eastern Region.

³³ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

Organic Value Chain Development for NER (MOVCDNER), 434 organic farmer-producer companies covering 1.73 lakh hectares have been formed, benefiting over 2.2 lakh farmers³⁴. These initiatives link small farmers to markets for certified organic products, ranging from Assam's organic red rice to Meghalaya's Lakadong turmeric. By 2047, such efforts are expected to yield a robust organic agriculture sector catering to both domestic and export markets, aligning with a global demand for sustainable foods.

Another pillar of the bioeconomy is the vast potential for horticulture, floriculture and medicinal plants. NER's nickname as "*the land of orchids*" is well earned, as it hosts over 700 orchid species (70% of India's orchid varieties). Floriculture can generate high income; For instance, exotic orchids and anthuriums from states like Arunachal and Sikkim have export potential. NER can emerge as an important exporter of exotic horticultural products and herbs³⁵. Even today, the Finance Commission noted that the region is ideally situated to export orchids, flowers, apples, oranges, spices and herbs to Southeast Asia³⁶. Recent gains include Geographic Indication (GI) tags obtained for 13 unique agri-horti products of NER (such as Manipur's Black Rice and Nagaland's Tree Tomato) to enhance their marketability³⁷. Additionally, the forestry sector and nature-based products are being leveraged for livelihoods: schemes like Van Dhan Vikas Yojana have organized over 3.3 lakh tribal gatherers into Self-Help Groups for value addition of forest products (wild honey, hill brooms, medicinal plants)³⁸. Such a community-led bio enterprise can significantly raise incomes in rural and tribal areas while incentivizing conservation.

NER's bioeconomy also extends to fisheries, animal husbandry and other sustainable enterprises. The region's high rainfall and water bodies are conducive to aquaculture; notably, Meghalaya and Assam are promoting fish farming to reduce dependence on imports. Likewise, NER states are focusing on organic piggery and poultry, given that pork is a staple and there is scope to meet domestic demand (MDONER's High-Level Task Force on NER has a mandate for self-reliance in meat, fish, milk and eggs)³⁹. An emerging sector is agribusiness and food processing. With better connectivity, investors are keen on food processing units (e.g., fruit processing in Tripura, spice oil extraction in Nagaland) to tap the raw produce. The Rising Northeast Investor Summit 2025 saw a significant interest in agro-food processing and agri-logistics, which can modernize the farm sector. These efforts tie into national priorities, too; for instance, NER is expected to shape India's expansion in edible oil production (through the cultivation of palm oil and mustard in certain areas) to reduce imports.

By 2047, NER has the potential to transition decisively from subsistence-oriented agriculture toward high-value, environmentally sustainable value chains, with growing global exports of organic foods, wellness products and indigenous handicrafts. This bioeconomy-led shift is expected not only to enhance rural incomes and generate employment but also to safeguard the region's ecological balance and cultural heritage, thereby delivering a development pathway that aligns economic growth with conservation objectives.

4.5 Cultural, creative and soft power advantage

NER's cultural diversity constitutes a significant soft-power resource and strategic asset for India. According to Census 2011, the NER concentrates over 200 ethnic communities and ~220 languages despite its small demographic footprint as 4% of India's population⁴⁰. Distinct cultural traditions are expressed across states, ranging from the tribal festivals of Nagaland, including the Hornbill Festival, to Manipur's classical and folk-dance forms, the textile heritage of Assam and Meghalaya, and the distinctive culinary

practices of Mizoram and Tripura. Traditional craft production, performance arts and indigenous knowledge systems position NER as a differentiated supplier in niche global markets where cultural authenticity commands premium valuations. This cultural wealth, long underrepresented, is now being leveraged to build NER's brand.

The government has explicitly focused on preserving and promoting the region's cultural diversity as part of

³⁴ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

³⁵ Press Note Details: Press Information Bureau: The Northeast: Where the Sun of Development Rises

³⁶ <https://fincomindia.nic.in/asset/doc/commission-reports/13th-FC/reports/report14.pdf>

³⁷ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

³⁸ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

³⁹ Press Note Details: Press Information Bureau: Northeast: India's Beacon of Inclusive Growth

⁴⁰ Ministry of Home Affairs, Government of India. *North East Division*



its Northeast policy. Showcasing NER culture fosters national integration and endears India to its eastern neighbors, with whom many cultural traits are shared; For example, Tai Ahom cultural links to Southeast Asia, or shared Buddhist heritage with Bhutan and Myanmar. The government's focus on preserving and promoting this diversity recognizes these channels as foundational to India's Act East engagement and the region's integration into cross-border value chains. The shared ethnic and linguistic affinities with Southeast Asian populations can help facilitate cross-border trade networks and diaspora-driven economic linkages unavailable to other Indian regions. Further, the cultural proximity reduces transaction costs in people-to-people connectivity across education, tourism and professional services.

One of the most visible outcomes of this soft-power advantage is NER's increasing stature as a tourism and hospitality hub, where pristine natural environments, together with vibrant and living cultural traditions, offer visitors a uniquely compelling and lasting experience⁴¹. The Ministry of Tourism has organized annual International Tourism Marts in the Northeast to introduce its attractions to global tour operators. Tourist inflows to the NER have recorded a clear upward trend in recent years, supported by improvements in physical connectivity. In 2023, the region received more than 12 million domestic visitors alongside ~221,000 international tourists across its states⁴².

Visitor interest is driven by a diverse range of attractions, including wildlife reserves, iconic living root bridges, heritage sites such as Majuli in Assam, the world's largest river island, and a vibrant calendar of cultural festivals. Events such as Nagaland's Hornbill Festival and Manipur's Sangai Festival have gained international visibility, functioning as prominent platforms for cultural exchange. At the same time, tourism offerings in NER are becoming increasingly diversified, encompassing adventure tourism in the mountainous landscapes of Arunachal Pradesh, tea

tourism across Assam's plantations, golf tourism in Meghalaya, river cruises along the Brahmaputra, and spiritual tourism centered on sites such as the Tawang Monastery in Arunachal Pradesh.

Apart from tourism, the creative talents of the people of NER are increasingly recognized nationally and internationally. The region has become a powerhouse of sports, producing sports icons like boxer Mary Kom (Manipur), weightlifter Mirabai Chanu (Manipur), sprinter Hima Das (Assam), archer Deepika Kumari (Tripura), and many footballers from Mizoram and Meghalaya. Beyond their competitive achievements, these sportspersons embody and project the image of a young, confident and aspirational NER, reinforcing India's national pride. Recognizing this strategic potential, the Government of India has constituted a dedicated High-Level Task Force on the Promotion of Sports in NER to systematically build upon and scale this inherent strength. Culturally, the Northeast's music and fashion have also made waves, from the global following of Naga rock bands and Manipuri dance troupes to designers from Assam and Sikkim showcasing indigenous motifs on national runways. The soft power of music is explicitly seen as an economic force to unlock by 2047⁴³. Furthermore, the region's high literacy and English give its youth an edge in creative industries and services. Many NE youth are joining India's hospitality, aviation, IT, creative and retail sectors, becoming cultural bridges wherever they go.

Internationally, the NER's cultural ties can strengthen India's diplomacy. *Act East* is not just about physical connectivity but also "*cultural integration and soft power*," for instance, promoting Buddhist tourist circuits linking Arunachal and Myanmar, or leveraging the shared heritage of communities across India-Myanmar and India-Bhutan borders⁴³. The Destination Northeast events and festivals hosted in other Indian cities have increased exposure and empathy for NER culture nationwide⁴⁴.

4.6 Demographic, human capital and indigenous knowledge advantage

NER enjoys a significant human capital advantage stemming from its demographic profile, educational achievements and repository of indigenous knowledge. With a population of ~50 million, NER has a younger age profile and higher literacy rates than the national

average. The region's literacy rate was about 79% in 2011 (vs. 73% for India) and has since improved further. Notably, several NE states are among India's most literate. According to Census 2011, Mizoram (91.3%) and Tripura (87.2%) ranked third and fourth

⁴¹ <https://tourism.gov.in/sites/default/files/2022-11/PIB1877003.pdf>

⁴² Press Release: Press Information Bureau: Tourism in North-Eastern Region

⁴³ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4122735#:~:text=,has%20the%20highest%20cultural

⁴⁴ <https://tourism.gov.in/sites/default/files/2022-11/PIB1877003.pdf>



nationally and in recent surveys, Mizoram has reported virtually complete literacy at over 95%. This emphasis on education provides a strong foundation for skill development.

Over the past decade, its education infrastructure has expanded. Hon' Prime Minister noted that public investments of ~INR21,000 crore were directed toward the education sector in NER over the past decade, resulting in the establishment of new schools, colleges and professional institutions. Each state in the region is now supported by a central university, complemented by a growing network of specialized institutions, including NITs, IITs and agricultural universities, designed to cultivate and retain local talent. The result is an emerging educated workforce ready to drive growth in the coming decades.

Demographically, the NER's population growth has moderated and many states are nearing replacement-level fertility, creating a window to reap the demographic dividend before aging sets in. The working-age population proportion may remain high through the 2030s, which, if productively employed, can significantly boost regional GDP. Notably, NER has better gender indicators across several areas. Female literacy is high (e.g., Mizoram had ~89% female literacy in 2011), and women play prominent roles in society and the economy (for instance, in Meghalaya's matrilineal society). Entrepreneurship among women and youth is encouraged through schemes such as the *North East Rural Livelihoods Project* and startup funds.

The region's youth are increasingly joining modern sectors - IT/BPO hubs in Guwahati and Agartala are tapping into the English-speaking youth pool, and many from the NE work in the hospitality and services industries nationwide, valued for their skills. To further harness human capital, MDoNER and the Ministry of Skill Development are running skill development programs tailored to the NE's strengths (such as adventure tourism, handloom design, sports coaching and agro-processing). These programs build on indigenous skills, e.g., traditional handloom weaving

among Assamese and Manipuri women is now being enhanced with design training for global markets.

A genuinely unique asset of NER is the wealth of indigenous knowledge held by its many tribes and communities spanning areas like sustainable agriculture. For instance, the practice of Jhum or shifting cultivation, while needing modernization, embodies principles of agro-forestry and land regeneration known to local tribes. Another example is Ethnomedicine, tribal healers possess knowledge of medicinal herbs for ailments now being documented to integrate with AYUSH systems; And community governance institutions like the Khasi Hills' *Dorbar Shnong* or the village councils of Nagaland, which illustrate robust local self-governance and conflict resolution mechanisms.

Such knowledge is increasingly seen as valuable for sustainable development. For instance, the climate resilience of certain traditional rice varieties or the pest-repellent properties of Naga King Chili are areas of scientific interest. The government, through North Eastern Council (NEC) and other bodies, is supporting research and documentation of this indigenous knowledge to be scaled up or commercialized ethically. By 2047, one can envision centers of excellence in indigenous studies and innovation in the NE, where traditional wisdom meets modern science, whether through developing new phytomedicines from tribal remedies or applying indigenous architectural practices to eco-friendly housing.

Human capital development also encompasses improvements in health and nutrition. Here, too, NER has shown progress, though challenges remain in some pockets (like high maternal mortality in Assam). With focused interventions under the National Health Mission and improvements in connectivity, healthcare access is improving. The youth of NER are thus healthier and better educated than before, eager to contribute. The government's vision is to unlock the "*talents of youth, power of women and strengths of communities*" in the NER.

4.7 Policy, fiscal and institutional architecture

NER operates within a differentiated policy and institutional framework designed to account for its structural characteristics and enable efficient public investment. Consistent with Finance Commission principles that recognize the need to redistribute resources toward states facing structural constraints, the Government of India has developed fiscal mechanisms tailored to the region's unique considerations; These include the hilly terrain,

compressed construction windows due to extreme seasonality and intense monsoons, distinct administrative arrangements including Autonomous District Councils and strategic international borders. These factors collectively elevate delivery costs and governance complexity.

A key element of this architecture is the mandated earmarking of 10% of the Union Government's Gross



Budgetary Support for central ministries toward the NER. This provision has translated in recent years into annual public expenditure approaching INR1 lakh crore for development initiatives across the region, ensuring that national programs spanning infrastructure, health, education, and social sectors contain dedicated allocations structured to reflect NER's delivery environment and maximize long-term returns on public investment. Complementing this mechanism, the region benefits from a highly concessional cost-sharing arrangement under centrally sponsored schemes, with a 90:10 ratio between central and state contributions, in contrast to the 60:40 or 50:50 norms applicable elsewhere.

This distinct fiscal architecture has helped ease the unique financial burdens on NER state governments, enabling the scaling up of infrastructure investment and social sector interventions at a faster pace. For example, the new scheme for Northeast hydro projects is explicitly funded through the 10% NE pool of the Ministry of Power's budget. Likewise, special road development and rural livelihood packages are financed through this mechanism. Additionally, The Ministry of Development of Northeastern Region (MDoNER) was established as a Union ministry specifically to coordinate and fund NE development. MDoNER operates five major central schemes tailored to regional needs – including the North East Special Infrastructure Development Schemes (NESIDS) to fill critical gaps in roads, water and health infrastructure, the PM-DevINE initiative for high-impact projects, and the schemes of the North Eastern Council (NEC).

NEC, in existence since 1971, functions as a regional planning body in which all eight state leaders coordinate with the central government on priorities. It has funded regional projects like interstate roads, power transmission lines, and livelihood programs that might be beyond the scope of any single state. Specialized institutions such as the Northeastern Development Finance Corporation (NEDFi) extend region-specific financial support to entrepreneurs, while agencies like NERAMAC play a dedicated role in strengthening agricultural marketing linkages. Together, this institutional ecosystem – comprising a dedicated ministry, a regional council, and focused development finance and marketing bodies – is distinctive to the Northeastern Region and provides a robust framework for targeted policy design and effective implementation.

The Constitution provides unique institutional status to the NER that protects indigenous governance in parts of the NE, such as Autonomous District Councils (ADCs) under the Sixth Schedule for tribal areas. These councils (in Assam, Meghalaya, Mizoram and Tripura) allow a degree of self-governance and preservation of customary laws. Rather than hindering development, when leveraged properly, such arrangements enables that modernization is locally appropriate and inclusive. For example, village councils in Nagaland and Mizoram manage resources and local dispute resolution, complementing formal administration. This distinct institutional and administrative framework represents a critical design feature that requires recognition, accommodation, and strategic integration into investment and partnership models. Successful PPPs and private investments in NER must account for the role of ADCs in land administration, resource management and community consent processes – factors that, when properly integrated into project design, enhance social license, reduce implementation friction and allow long-term sustainability.

The government has periodically rolled out tailored industrial promotion policies (the latest being the Northeast Industrial Development Scheme), which grant tax holidays, capital subsidies, and transport incentives to industries investing in NE states. The impact of these is increasingly visible in rising private-sector engagement, notably the Rising Northeast Investor Summit 2025 attracted participation from over 80 countries and generated substantial investment commitments, underscoring growing confidence in the region's institutional maturity and governance environment. In parallel, the central government is advancing Ease of Doing Business reforms across NER states while strengthening institutional capacities, including within tribal governance structures – to enhance project preparation, stakeholder coordination and execution quality. Equally important, sustained peace-building efforts have led to the signing of multiple accords with erstwhile insurgent groups in recent years, contributing to improved security conditions that provide an essential foundation for development pathways that honor the region's cultural distinctiveness and administrative arrangements.

4.8 Strategic implications for Vision 2047 – The Northeast as a growth engine

Each of the dimensions outlined constitutes an essential component in advancing the vision of a developed India at its centenary. These strengths reposition NER from "from frontier to frontrunner" in multiple domains. This has several strategic implications:

- **National integration and security:** A prosperous, well-connected NER can cement India's unity and integrity. By 2047, long-standing perceptions of grievance and marginalization within the region are expected to be replaced by a deep sense of participation and ownership in India's national development journey. Enhanced livelihood opportunities, strengthened governance frameworks, and renewed cultural confidence together can progressively diminish the drivers of insurgency and reinforce the security and stability of India's borders. NER becoming an economic hub and transit corridor also means India can project stability and influence across its eastern borders, contributing to a peaceful neighborhood.
- **Economic growth pole:** Sectors such as tourism, hydropower, organic agri-export, bamboo-based industries, handicrafts and IT/BPO services can collectively create hundreds of thousands of jobs. If the current investment commitments materialize, NE states could significantly raise their per capita incomes, potentially surpassing the national average by 2047. This fulfills the government's aim to make Northeast India the most prosperous region by 2047, ensuring balanced regional development across the country.
- **Gateway to East Asia:** NER is strategically positioned to serve as India's primary gateway to ASEAN economies. From 1965 to 1990, the 23 East Asian economies grew faster than all other regions of the world, led by the "East Asian Tigers", i.e., Japan, Singapore, South Korea and Taiwan⁴⁵. These economies' development trajectories offer instructive precedents for rapid, sustained growth. Strategically, an empowered

NER allows India to unlock the full potential of the Act East Policy. By 2047, seamless highways and railways from India through Myanmar into Thailand and beyond, with the NE at the fulcrum of this trade.

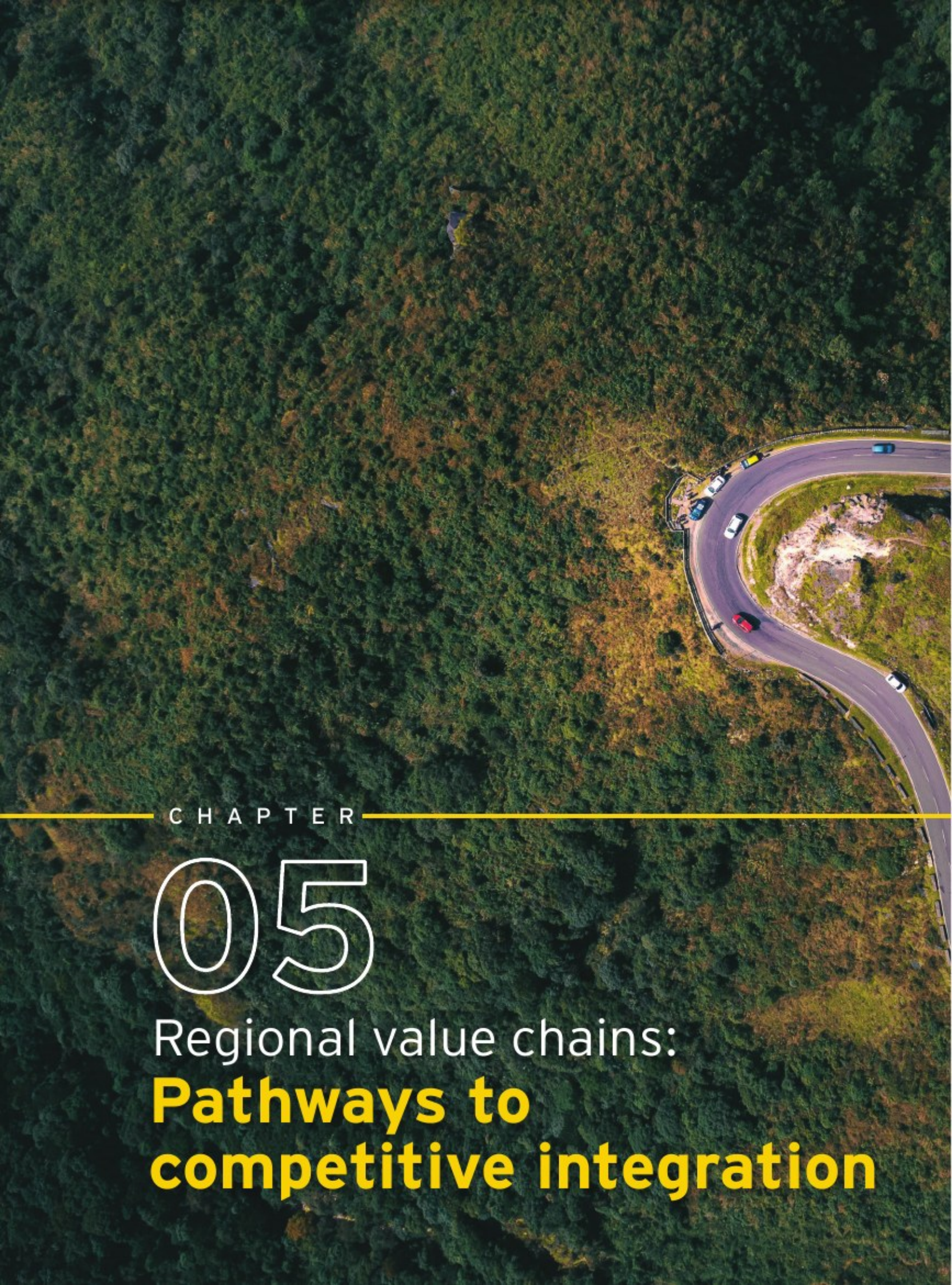
Over time, the NER's border trade centers are expected to mature into dynamic trade and logistics nodes facilitating commercial flows between South Asia and ASEAN economies. Such an evolution would not only expand India's trade footprint but also contribute to supply-chain diversification and improved energy security, including through the cross-regional transmission of surplus hydroelectric power to deficit areas. In this role, NER functions as a strategic gatekeeper of India's eastern frontier and as a gateway enabling deeper eastward economic integration.

- **Sustainable development model:** One of the most significant contributions the Northeast can make by 2047 is to serve as a model of **sustainable, inclusive development**. By preserving its rich natural and cultural heritage even as the economy grows, NER can demonstrate that development need not follow an extractive, high-carbon path. It can lead India in meeting Sustainable Development Goals (many NE districts are already improving on SDG indices). A green NER with large forest cover and renewable energy could be pivotal for India's climate targets. Culturally sensitive growth might also show the way in protecting indigenous peoples' rights while improving their quality of life. The notion of a "Northeast Model" of development, repeatedly referenced in national vision frameworks, reflects an approach centered on leveraging indigenous strengths in ways that offer replicable lessons for other regions. Illustratively, practices such as community-led tourism initiatives in Meghalaya or the large-scale adoption of organic farming in Sikkim demonstrate pathways that could be adapted and scaled across other parts of the country.

⁴⁵ World Bank. (1993). *The East Asian miracle: Economic growth and public policy*. <https://documents1.worldbank.org/curated/en/975081468244550798/pdf/multi-page.pdf>





An aerial photograph of a winding asphalt road that curves through a dense, lush green forest. Several cars are visible on the road, including a red car, a white car, and a blue car. The road is bordered by a guardrail on the outer side. The forest is thick with trees, and the overall scene is captured from a high angle, looking down on the landscape.

CHAPTER

05

Regional value chains:

**Pathways to
competitive integration**



The eight states of the North Eastern Region (NER) possess a distinctive portfolio of strengths—from producing some of the world’s finest orthodox tea and cultivating pineapples with unique sweetness profiles to mining high-quality limestone and coal, growing organic spices, and sustaining globally significant biodiversity. These capabilities arise from intrinsic regional advantages: altitude and rainfall patterns conducive to high-value crops, agro-climatic conditions that support diverse agricultural and forest products, and mineral-rich geology that enables competitive extraction.

The opportunity looking toward 2047 lies in extending these natural strengths beyond primary production to encompass processing, branding, and market development. By shifting from a predominantly raw-material supply base to integrated value creation, NER can substantially enhance regional returns. When tea is blended and packaged within the region, when pineapples transition into branded processed products, when minerals feed local downstream manufacturing, and when tourism spending is retained within local enterprises, the economic multipliers increase significantly.

This chapter evaluates fifteen value chains with the greatest potential to catalyze such transformation. These include agriculture and allied sectors (Bamboo, Fisheries, Kiwi, Pineapple, Rice, Rubber, Spices, Tea), industry (Food Processing, High-Mix Manufacturing, Minerals, Pharmaceuticals, Textiles), and services (Digital/IT Hubs, Tourism). For each, the analysis assesses the current landscape of production and

processing, maps resource availability against existing infrastructure, and identifies where value is currently created and where it is being lost.

A state-wise examination highlights the differentiated positions NER’s states occupy within each value chain. It identifies comparative advantages, the distinct strategic roles each state can play, and opportunities for inter-state collaboration—where, for instance, raw material surpluses in one state can anchor processing clusters in another, or where coordinated quality standards and market access strategies can strengthen the region’s collective competitiveness.

Beyond present capacities, the chapter outlines downstream industries and products that could emerge through targeted investment and improved value chain development. It proposes strategic interventions—such as enhancing processing capabilities, upgrading logistics, investing in technology, strengthening market linkages, and enabling entrepreneurship—that can unlock productivity and improve value retention.

Taken together, this framework provides a clear view of where each value chain stands today, how it is distributed across states, which processing stages require development, which states are positioned to lead in specific roles, and what opportunities merit prioritization. The aim is to deliver actionable insights that support the creation of high-productivity value chains, generate quality employment, and deepen NER’s integration into competitive national and global markets—ultimately enabling the region to secure a far stronger economic position by 2047.



5.1 Bamboo

Figure 18: Bamboo product sector snapshot

₹ 9.0			Bamboo 			₹ 103.4 ('000 Crore ₹)				
Highlights and Context										
- NER holds over one-third of India's bamboo area and a major share of the national bamboo stock. - Arunachal Pradesh, Assam and Nagaland are major bamboo-resource states, and bamboo plays a central role in housing, construction, crafts, lifestyle products and bamboo-shoot foods.			- Sector development is driven by the National Bamboo Mission, NEC and NEDFi plans, and State Bamboo Missions. - However, high-value bamboo processing remains limited, with boards, laminates and prefab construction materials largely produced outside the region due to infrastructure and technology gaps.							
Market Snapshot						Revenue in ('000 Crore ₹)				
Industry	Global		CAGR	India		CAGR	NER		CAGR	
	FY25	FY47		FY25	FY47		FY25	FY47		
Bamboo	₹ 582.9	₹ 3,250.7	8.1%	Value	₹ 24.0	₹ 258.4	Value	₹ 9.0	₹ 103.4	
				% of Global	4.1%	7.9%	% of India	37.5%	40.0%	
Strategic Infrastructure & Investments										
- Strengthen scientific clump management and nurseries in major resource states - Develop quality standards and certification for treated and engineered bamboo - Operationalise industrial parks in Assam and Arunachal Pradesh			- Expand community-level treatment and common-facility centres in Tripura, Meghalaya, Mizoram and Manipur - Enable cross-border market linkages with Bangladesh and ASEAN under Act East Policy - Promote a coordinated regional value chain to retain greater value within NER							
Varieties, Use-cases & Product Forms										
Major NER Varieties				Value-Added Products						
- Bhaluka / Balcooa (Construction, Bridges - NE India) - Muli / Mautak (Pulp & Paper - Mizoram, Manipur) - Jati (Basketry, Mats, Construction - Assam, NE Plains) - Kako / Pecha (Premium Pulp, Edible Shoots - Arunachal Pradesh) - Dalu (Mats, Baskets - Assam, Meghalaya)				Category		Example Products				
				Construction & Housing		Scaffolding, structural frames, prefab panels, engineered beams				
				Furniture & Lifestyle		Tables, chairs, décor items, lighting, garden furniture				
				Handicrafts & Traditional		Mats, baskets, hats, containers, souvenirs				
				Industrial & Packaging		Crates, pallets, boxes, biodegradable packaging				
				Textiles & Composites		Bamboo fibre yarns, blended textiles, polymer composites				
				Food, Energy & Agriculture		Fresh/fermented bamboo shoots, biochar, briquettes, farm stakes				
Government Policy & Support				Export Potential & Market Access						
National Bamboo Mission (NBM): Flagship central scheme supporting bamboo plantation, nurseries, processing units, and market linkages. Indian Forest Act Amendment (2017): Removed bamboo on non-forest land from the definition of "tree," enabling easier harvesting, transport, and commercialization. Agarbatti Industry Development Scheme: Promotes bamboo-stick production units in the Northeast, integrating local growers with national incense-stick value chains and MSME employment generation.				Top Export Destinations India		Key HS Codes				
				 GBR		44092100				
				 ESP		Bamboo, incl. strips and friezes for parquet flooring, not assembled				
				 FRA						
				 MDV						
				 CHF						

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi



1. Current scenario: Bamboo in North-East India

The North Eastern Region (NER) holds a position of national prominence in India's bamboo economy, accounting for more than one-third of the country's bamboo area and a substantial proportion of its standing stock. States such as Arunachal Pradesh, Assam, and Nagaland are particularly well endowed, with bamboo deeply embedded in the region's built environment, cultural traditions, and everyday livelihoods—from housing and construction to crafts, lifestyle goods, and an emerging range of bamboo-based foods. This natural abundance, combined with a strong base of traditional knowledge, provides a solid foundation for sectoral development.

Over the past decade, institutional support has strengthened through the National Bamboo Mission, the North Eastern Council, NEDFi, and State Bamboo Missions, which together have channelled coordinated policy attention and investment. Despite this momentum, the region has yet to fully participate in the higher-value segments of the bamboo industry. Engineered products—such as boards, laminates, and prefabricated construction materials—are still predominantly manufactured outside NER, reflecting gaps in processing infrastructure, access to modern

technologies, and the scale needed to anchor competitive value-addition hubs within the region.

Several structural challenges continue to shape sector competitiveness. Productivity remains constrained by ageing clumps and limited scientific management, and a large share of bamboo continues to be traded as raw poles with minimal primary processing. While the artisanal base is rich in skill and tradition, it is highly fragmented, with weak market linkages and limited brand presence, which undermines its ability to tap into premium or design-driven segments. Moreover, the absence of adequate engineered-bamboo, treatment, and preservation facilities restricts the region's participation in higher-value supply chains and limits the durability and market acceptability of bamboo products.

Addressing these constraints—through targeted investments in processing infrastructure, the adoption of modern technologies, strengthened market development, and professionalised value-chain organisation—represents the core strategic opportunity for unlocking the full potential of the bamboo sector in the North East.

2. State-wise status – Resource availability vs. processing infrastructure⁴⁶

Table 5: State-wise status – Resource availability vs. processing infrastructure (Bamboo)

State	Bamboo resource availability	Processing and industrial infrastructure
Arunachal Pradesh	One of India's largest bamboo resource bases; extensive natural stands Bamboo bearing area: 18,424 km ²	Proposed bamboo/wood industrial park; current activity dominated by primary/raw use
Assam	Large bamboo stock in homesteads and forests; supplier for scaffolding Bamboo bearing area: 11,246 km ²	Bamboo Technology Park (Chaygaon), Bamboo Industrial Park (Dima Hasao - planned); active furniture and handicraft clusters
Manipur	Good natural presence; under-utilized for industry Bamboo bearing area: 7,517 km ²	Micro and cottage industry, incense-stick components
Meghalaya	Moderate but important bamboo base; traditional construction use and bamboo foods Bamboo bearing area: 5,347 km ²	Artisanal clusters producing crafts and lifestyle products; limited higher-value industry
Mizoram	Significant bamboo cover; livelihood resource Bamboo bearing area: 4,772 km ²	Limited organized processing capacity; primarily small furniture and construction-use items
Tripura	High availability; strong tradition of mat weaving and handicrafts Bamboo bearing area: 4,466 km ²	Cluster-based processing, common facility centres; focus on mats, décor, incense-stick feedstock
Nagaland	Substantial bamboo resource and cultural usage Bamboo bearing area: 3,980 km ²	Cottage-scale craft and furniture; potential to leverage SEZ and Act East connectivity for future units
Sikkim	Small bamboo area Bamboo bearing area: 1,010 km ²	Mostly local consumption and crafts

⁴⁶ Forest Survey of India. (2023). India state of forest report 2023 (Vol. 1). Ministry of Environment, Forest and Climate Change, Government of India. https://fsi.nic.in/uploads/isfr2023/isfr_book_eng-vol-1_2023.pdf



3. Bamboo value chain in NER

The bamboo value chain in the North Eastern Region (NER) spans three broad stages of processing, each reflecting the region's current capabilities, infrastructure limitations, and areas of emerging potential.

Primary processing forms the foundation of the chain and is widely dispersed across village clusters in Assam, Tripura, Meghalaya, and Nagaland. Activities include harvesting, splitting, drying, and the production of woven mats, baskets, simple furniture frames, and processed bamboo shoots. These outputs—poles, splits, slivers, mats, baskets, basic furniture components, and fresh or fermented shoots—draw on long-standing artisanal skills and readily available raw material, but yield limited value addition.

Secondary processing introduces more organised and semi-industrial activities such as preservation treatment, peeling, seasoning, and the production of veneers, mats, and semi-finished components. This stage is centred largely in Assam, with cluster-level activity emerging in Tripura and Meghalaya. It also includes processes that prepare bamboo for more advanced applications, such as producing treated components, pulp, or intermediate materials used in composites and textiles. While the region has a strong resource base, the scale and sophistication of such

processing remain modest, indicating clear scope to strengthen industrial capacity and technical capabilities.

Tertiary processing encompasses finished goods spanning construction materials, furniture, packaging, textiles and composites, bamboo-based foods, and energy applications. These activities leverage a mix of design, engineering, and market-facing capabilities, and participation varies across states depending on skills, connectivity, and enterprise maturity. As markets increasingly demand sustainable materials, opportunities are expanding in areas such as advanced composites, moulded packaging, and textile applications, where bamboo-derived intermediates can feed high-value product lines. Developing this stage more fully—with states specialising in segments where they hold comparative advantages—offers the greatest potential for enhancing value retention within the region.

Together, these stages illustrate the breadth of NER's engagement with the bamboo economy and highlight where the most significant opportunities lie. While primary processing remains the most widespread, meaningful value capture will depend on deepening secondary and tertiary capabilities that can convert the region's abundant raw material into competitive, market-ready products.

4. Comparative state advantages and strategic roles

Across the North Eastern Region, each state combines distinct resource endowments, geographic advantages, and existing institutional capacities, creating a differentiated strategic landscape for bamboo sector development.

Arunachal Pradesh, with its extensive forest cover and proximity to raw material sources, is naturally positioned as a resource-anchored hub suited to engineered boards, panels, and structural applications.

Assam, benefiting from its more established industrial ecosystem, functions as the region's primary processing corridor—well placed to scale prefabricated housing components, packaging materials, and other engineered bamboo inputs that supply downstream markets.

Tripura's strategic location near Bangladesh provides a gateway for value-added crafts, mat-based products, and lifestyle goods with strong export orientation.

Nagaland, supported by improving Act East connectivity, holds potential as a production-oriented hub that can leverage its cultivation base to serve emerging ASEAN-facing opportunities.

Meghalaya occupies a complementary niche, where its eco-tourism profile and consumer-market orientation support design-led lifestyle products, bamboo-based foods, and premium small-batch offerings.

Mizoram, Manipur, and other emerging states represent the next tier—where early-stage investments in nurseries, preservation, seasoning, and treatment facilities are essential to building the foundations for scalable commercial activity.

Taken together, this differentiated distribution of roles points toward a regional strategy grounded in complementarity rather than duplication—one in which states deepen their respective strengths while remaining integrated within a shared value chain. Realising this potential will require coordinated investment, strengthen cross-state logistics, and enabling policy frameworks that recognise and reinforce the region's internal diversity.

5. Downstream Bamboo products and industry scope

Table 6: Downstream Bamboo products and industry scope

Category	Example Products
Construction and Housing	Scaffolding, structural frames, prefab panels, engineered beams
Furniture and Lifestyle	Tables, chairs, décor items, lighting, garden furniture
Handicrafts and Traditional	Mats, baskets, hats, containers, souvenirs
Industrial and Packaging	Crates, pallets, boxes, biodegradable packaging
Textiles and Composites	Bamboo fiber yarns, blended textiles, polymer composites
Food, Energy and Agriculture	Fresh/fermented bamboo shoots, biochar, briquettes, farm stakes

6. Strategic interventions

Translating the region's comparative advantages into measurable economic outcomes will require a set of coordinated interventions spanning the full length of the bamboo value chain.

At the resource base, strengthening scientific clump management and nursery development in the major bamboo-producing states is a foundational priority, directly addressing productivity constraints that currently limit supply quality and consistency. This upstream investment sets the conditions for more reliable downstream processing. Alongside this, the development of quality standards and certification frameworks for treated and engineered bamboo will be essential to building market credibility and enabling integration with formal construction and industrial supply chains.

At the processing level, operationalising industrial parks in Assam and Arunachal Pradesh would consolidate the region's mid-stream and high-value manufacturing capacity, providing the infrastructure necessary to attract private investment in engineered boards, prefabricated housing products, fibre, and

textiles. In parallel, expanding community-level treatment facilities and common-facility centres across Tripura, Meghalaya, Mizoram, and Manipur would extend processing capability to emerging clusters where scale and infrastructure currently constrain commercial viability.

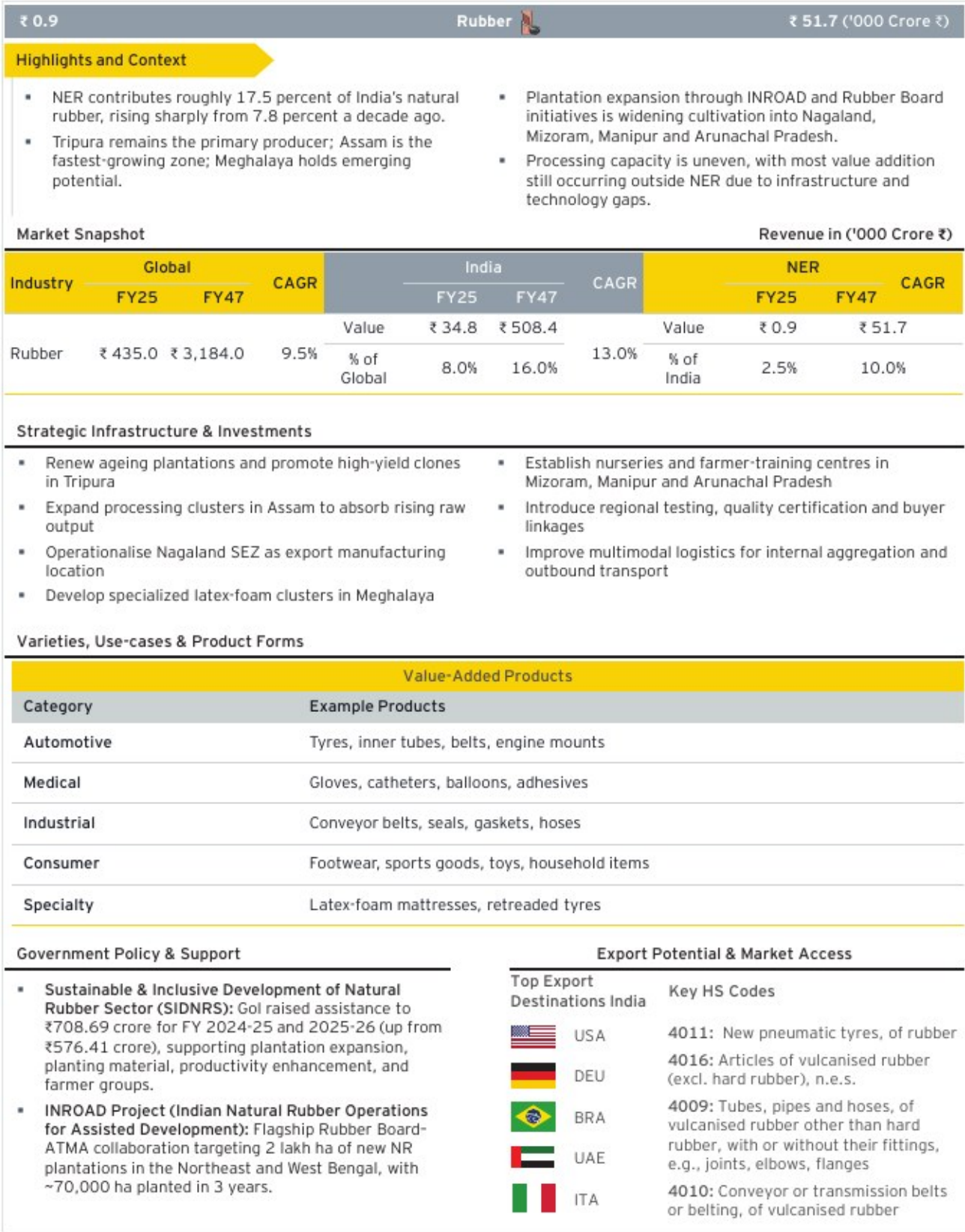
For the artisanal and craft segment, building design, branding, and market-access capabilities within existing clusters would improve value realisation and support better integration with domestic and export markets. This is reinforced by efforts to enable cross-border market linkages with Bangladesh and ASEAN countries under the Act East Policy, which offers a structured framework for expanding the region's external market reach.

Collectively, these interventions are most effective when pursued within a coordinated regional value chain framework one that reduces fragmentation, aligns state-level efforts, and ensures that a greater share of the value generated from the region's bamboo resources is retained within the North Eastern Region itself.



5.2 Rubber

Figure 19: Rubber product sector snapshot



Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi



1. Current scenario: Rubber in North-East India

The North Eastern Region has steadily strengthened its position in India's natural rubber economy, with its share of national production rising from 7.8% a decade ago to 17.5% today⁴⁷. This growth reflects deliberate policy focus and the widening agro-climatic suitability of rubber across the region. Tripura continues to anchor production, while Assam has emerged as the fastest-growing contributor. Meghalaya is recognised for significant untapped potential, and plantation development is expanding into Nagaland, Mizoram, Manipur, and Arunachal Pradesh through the Indian Natural Rubber Operations for Assisted Development (INROAD) programme and the Rubber Board gradually broadening the region's production footprint.

Yet, despite this expansion, the region captures only a fraction of the sector's value. Processing capacity remains uneven and largely concentrated outside the North East, limiting local value addition. This structural imbalance—high primary production but constrained downstream processing—now represents the sector's core strategic challenge.

Several medium-term factors also merit attention. Tripura's plantations are entering a phase where replanting and adoption of improved high-yielding varieties will be essential for sustaining productivity. More broadly, the long gestation nature of rubber necessitates planning cycles that anticipate supply needs well in advance. Processing clusters outside Tripura and parts of Assam remain limited, and the variability of sheet rubber quality—combined with the absence of systematic, region-wide certification standards—weakens the North East's integration into formal industrial supply chains. Logistics constraints, particularly in interstate transport and aggregation, further dilute value retention at the farm and primary processing levels. Addressing these interconnected issues—through targeted investment in processing infrastructure, quality assurance systems, and logistics and market-linkage improvements—will determine the extent to which the region can convert its growing production base into sustained and locally retained economic value.

2. State wise status: Raw availability and processing infrastructure⁴⁸

Table 7: State wise status: Raw availability and processing infrastructure (Rubber)

State	Production and raw availability	Processing and industrial infrastructure
Tripura	Largest producer (1,10,717 MT), high plantation density	208 Group Processing Centers, 2 Central Processing Units, 28 smoke houses, Rubber Timber Unit, Bodhjungnagar Rubber Park and Santirbazar Rubber Park (planned)
Assam	46,500 MT and rapidly expanding	Emerging satellite processing, Model Smokehouse in Goalpara, limited dedicated rubber processing estates
Meghalaya	11,775 MT; 40-hectare nursery	Latex-foam facility in East Garo Hills, niche-product potential
Nagaland	Early-stage plantations	Ganeshnagar SEZ, two industrial estates, sheet rollers distributed
Arunachal Pradesh	Identified potential zones	No processing facilities
Mizoram	Plantation expansion planned	No processing industry presence
Sikkim	Not suitable for rubber	None

3. Rubber value chain in the North-east Region

The rubber value chain in the North Eastern Region follows a structured progression from plantation-level primary processing to the manufacture of finished products. At present, the region participates most strongly at the upstream stages, while tertiary manufacturing remains nascent.

Primary processing forms the foundation of the chain and includes latex tapping, sheet making, drying, and grading. The main outputs—ribbed smoked sheets, concentrated latex, and block rubber—are produced predominantly in Tripura, with Assam steadily expanding its share as plantation coverage grows. This stage is the region's most firmly established area

⁴⁷ All India Rubber Industries Association. *Rubber Production in Northeast India is Growing with Double the Margin in 2025*, Rubber India Weekly (18 June 2025). <https://www.rubber-india.net/rubberindiaweekly/article.aspx?article=9389>

⁴⁸ North Eastern Development Finance Corporation Limited (NEDFi). *Rubber - NER Databank*. <https://databank.nedfi.com/ne-agriculture/rubber>



of activity, supported by a widening smallholder base and increasing agronomic adoption across newer states.

Secondary processing, which involves compounding, additive blending, and material formulation, is concentrated along the Tripura-Assam corridor. This configuration reflects both proximity to raw material sources and natural transit linkages toward Bangladesh, providing a degree of logistical advantage for further development. Nonetheless, the industrial footprint at this stage remains modest relative to the volume of primary output generated, indicating substantial headroom for scale.

Tertiary processing, the production of finished goods such as tyres, footwear, industrial components, latex foam, and medical consumables—represents the highest-value and most capability-intensive segment of the chain. Participation across the North East remains limited and is shaped by gaps in infrastructure, skilled labour availability, and broader market connectivity. Most finished product manufacturing continues to take place outside the region. Building competitive tertiary processing capacity in locations with favourable infrastructure, workforce availability, and external market access therefore represents a significant longer-term opportunity for enhancing regional value retention.

4. Comparative state advantages and strategic roles

The development of the rubber sector in the North Eastern Region is most effectively viewed through differentiated state capacities and geographic advantages, each pointing toward distinct yet complementary strategic roles within a unified regional strategy.

Tripura functions as the core hub of the value chain. Its established processing ecosystem, reliable plantation base, and advantageous proximity to Bangladesh position it as the natural centre for industrial activity and export-linked production.

Tripura and Assam form the primary economic corridor of the region's rubber industry and are best placed to anchor near-term industrial expansion. Tripura functions as the core hub of the value chain. Its established processing ecosystem, reliable plantation base, and advantageous proximity to Bangladesh position it as the natural centre for industrial activity and export-linked production. Assam represents the next tier of opportunity, combining a broader workforce, larger domestic market, and multimodal connectivity that support its evolution into a major processing and distribution centre capable of absorbing growing regional output.

Meghalaya and Nagaland offer more specialised pathways. Meghalaya's market orientation and consumer-facing profile align well with niche

segments such as latex foam and lifestyle-oriented specialty rubber products, where design, quality differentiation, and branding carry greater strategic weight than scale. Nagaland, benefiting from its SEZ frameworks and alignment with Act East policy, holds long-term potential as a manufacturing node geared toward ASEAN markets. Realising this potential, however, will depend on steady plantation expansion and critical infrastructure improvements.

For **Mizoram, Manipur, Arunachal Pradesh**, and the remaining states, the immediate priority is to strengthen the plantation base before large-scale processing or manufacturing can become commercially viable. Investments in agronomic support, high-quality planting material, and essential infrastructure will determine the pace at which these states progress into more active roles within the regional value chain.

Collectively, this differentiated geography points to a sequenced regional strategy—consolidating and reinforcing established hubs while systematically preparing the next generation of producing and processing states. This layered approach maximises current strengths while creating a clear, phased pathway for long-term regional integration and value retention.

5. Downstream Rubber products and industry scope

Table 8: Downstream Rubber products and industry scope

Category	Example products
Automotive	Tires, inner tubes, belts, engine mounts
Medical	Gloves, catheters, balloons, adhesives
Industrial	Conveyor belts, seals, gaskets, hoses
Consumer	Footwear, sports goods, toys, household items
Specialty	Latex-foam mattresses, retreaded tires

6. Strategic interventions

Realising the rubber sector's potential across the North Eastern Region will require a structured set of interventions calibrated to each state's stage of development and strategic role within the broader value chain.

At the production base, renewing ageing plantations and promoting sustainable high-yield clones in Tripura addresses a near-term priority, sustaining and improving output from the region's most established growing zone. Complementing this, the establishment of nurseries and farmer-training centres in Mizoram, Manipur, and Arunachal Pradesh lays the agronomic foundation necessary before commercial processing in these states becomes viable. These upstream investments across different states reflect the region's uneven but advancing development trajectory.

At the processing level, expanding clusters in Assam would increase the region's capacity to absorb rising raw rubber output and reduce dependence on external processing infrastructure. In parallel, developing specialised latex-foam clusters in Meghalaya and operationalising the Nagaland SEZ as an export-

oriented manufacturing location would diversify the region's industrial base and create differentiated production nodes aligned with each state's comparative strengths. Attracting anchor investors in high-value tertiary products including medical consumables such as latex gloves, commercial vehicle tyres, and select consumer goods would deepen the value chain and significantly improve value retention within the region.

Underpinning all of these interventions is the need to strengthen the enabling environment. Introducing regional testing facilities, quality certification systems, and structured buyer linkages would address the credibility and market-access gaps that currently limit the region's participation in formal supply chains. Improving multimodal logistics for internal aggregation and outbound transport is equally critical, as connectivity constraints remain a persistent drag on competitiveness across the value chain. Together, these measures form a coherent strategic programme oriented toward transforming the region's natural resource advantage into sustained industrial and economic value.



5.3 Pineapple

Figure 20: Pineapple product sector snapshot

₹ 4.4			Pineapple 			₹ 83.4 ('000 Crore ₹)			
Highlights and Context									
- NER contributes a substantial 52 % to the total production in India - Studies indicate that while India's production has stagnated, NER exhibits positive growth rates attributed to favourable agro-climatic conditions, organic certifications & production and government support					There is a need for strategic efforts to enhance competitive pricing, market understanding, and supply chain optimization to strengthen position in the international pineapple market				
Market Snapshot						Revenue in ('000 Crore ₹)			
Industry	Global		CAGR	India		CAGR	NER		CAGR
	FY25	FY47		FY25	FY47		FY25	FY47	
Pineapple	₹ 104.4	₹ 766.8	9.5%	Value	₹ 8.7	₹ 133.4	Value	₹ 4.4	₹ 83.4
				% of Global	8.3%	17.4%	13.2%	% of India	50.0%
Strategic Infrastructure & Investments									
- Establish pack houses, pre-cooling and refrigerated transport to reduce loss - Scale Tripura processing clusters and link output to Agartala airport for exports - Build GI-led branding and RTE retail lines in Assam					- Develop organic Queen-pineapple product clusters in Meghalaya tied to tourism - Support Nagaland and smaller states with basic juice units and farmer-group organisation - Create aggregation networks and certification standards for premium and export markets				
Varieties, Use-cases & Product Forms									
Major NER Varieties				Value-Added Products					
- Queen (Assam, Tripura) - Kew (Meghalaya, Nagaland) - Giant Kew (Tripura, Mizoram) - Mauritius (Manipur, Sikkim)				- Canned pineapple slices/chunks - Juice concentrate & nectar - Dried/dehydrated fruit - Jam/jelly & fruit preserves - Wine & vinegar - Freeze-dried powder - Pineapple Fibre			- Pineapple Leaf Fibre (PALF). - Bromelain Extraction from waste - Natural Rope and Cordage Products - Bioethanol Production - Composite Building Materials		
Government Policy & Support				Export Potential & Market Access					
Mission for Integrated Development of Horticulture (MIDH) : area expansion, tech transfer, post-harvest infrastructure. North East Special Package for Industrial Development : Offers capital subsidies for agro-processing units in the Northeast, including pineapple processing. APEDA Export Promotion Schemes: Freight subsidies + marketing/branding support to help horticulture exporters (including pineapple) become competitive overseas.				Top Export Destinations India		Key HS Codes			
				 UAE		080430: Fresh pineapples			
				 Nepal		200940: Pineapple juice			
				 Maldives		200820: Canned pineapple			
				 Canada					
				 Germany					

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi

1. Current scenario: Pineapple in North-East India

The North Eastern Region is India's leading pineapple-producing zone, contributing over 52%⁴⁹ of national output with an annual production of 10–12 lakh metric tonnes. Assam, Tripura, and Meghalaya anchor this production base, each distinguished by a recognised varietal profile.

Assam contributes roughly 3 lakh MT, led by the GI-tagged Assam Jati variety; Tripura produces 1–2 lakh MT⁵⁰ of the GI-tagged Queen Pineapple; and Meghalaya is known for its high-sugar Kew variety, which possesses strong appeal in niche and export markets. This combination of scale, geographic concentration, and GI-backed varietal differentiation positions the North East as a nationally significant and potentially high-value horticulture cluster.

Production is predominantly smallholder-driven and benefits from favourable agro-climatic conditions. Institutional support—through the National Horticulture Mission, state agriculture departments, and a growing network of farmer producer organisations has enabled steady expansion in

cultivated area and output. However, the sector's ability to translate production gains into commensurate economic returns remains constrained by downstream bottlenecks.

Value capture is limited primarily due to gaps in post-harvest infrastructure. Inadequate pre-cooling facilities, cold storage, and pack houses lead to high post-harvest losses – an acute challenge given pineapple's perishability – and reinforce dependence on low-margin fresh fruit sales with limited processing. Supply chains are fragmented and intermediary-driven, while variability in grading and quality, coupled with limited investments in branding, restricts access to premium domestic and international markets.

Strengthening the region's post-harvest ecosystem through improved cold-chain infrastructure, processing capacity, and more integrated market linkages will be essential to enhancing value retention and reducing the economic vulnerability that currently characterises the sector.

2. State-wise status: Resource availability and processing infrastructure⁵¹

Table 9: State-wise status: Resource availability and processing infrastructure (Pineapple)

State	Pineapple resource availability	Processing and industrial infrastructure
Assam	Largest producer~. 3 lakh MT; Queen and Kew	Small juice, jam and (Ready-to-Eat) RTE units; cold storages; FPO-led clusters
Tripura	~1-2 lakh MT; GI- tag Queen Pineapple	Multiple juice and pickle units; Tripura Pineapple Cluster with common facility center; emerging export-processing
Meghalaya	~. 1 lakh MT; high-sugar Kew pineapple	Artisanal juice and candy units; East Khasi Hills processing facility; tourism-linked supply
Manipur	Smallholder-based production	Minimal organized processing
Nagaland	Moderate production	Cottage-scale juice and preserves; farmer groups forming
Mizoram	Climatically suitable but low commercial scale	Cottage-scale processing only
Arunachal Pradesh	Emerging plantations	Negligible processing; fresh fruit moves to Assam
Sikkim	Marginal	Local consumption only

⁴⁹ North Eastern Development Finance Corporation Limited (NEDFi). *Fruits - NEDFi Databank*. <https://databank.nedfi.com/horticulture/fruits>

⁵⁰ North Eastern Development Finance Corporation Limited (NEDFi). *Fruits - NEDFi Databank*. <https://databank.nedfi.com/horticulture/fruits>

⁵¹ North Eastern Development Finance Corporation Limited (NEDFi). *Fruits - NEDFi Databank*. <https://databank.nedfi.com/horticulture/fruits>



3. Pineapple value chain in the North-East Region

The pineapple value chain in the North Eastern Region progresses through three broad stages of processing, with current participation concentrated at the upstream end and substantial scope for advancement into higher-value segments.

Primary processing occurs largely at the farm gate and includes harvesting, sorting, minimal pre-cooling, and basic packaging. The outputs – fresh whole fruit and cut pieces – are channelled through farm-gate collection networks across Tripura, Assam, and Meghalaya. While this stage is the most widespread, it is also the most vulnerable to value loss due to pineapple's high perishability and the limited availability of cold-chain infrastructure at the point of origin.

Secondary processing – encompassing pulping, juicing, canning, dehydration, and concentrate production – represents a more value-retentive stage of the chain. Tripura currently hosts the most

developed industrial base for these activities, with emerging capacity in Assam and Meghalaya. Expanding processing at this level would significantly reduce post-harvest losses and shift a greater share of output toward shelf-stable and transportable formats, thereby enhancing both value retention and supply chain resilience.

Tertiary processing involves the manufacture of ready-to-eat foods, beverages, confectionery, dehydrated products, high value pineapple leather and export-ready packaged goods – the highest value segment of the chain. Participation in this segment within the region remains limited, with most finished product manufacturing occurring outside the North East. Given the region's varietal strengths and the GI recognition of key varieties, developing tertiary processing—especially for premium and export-oriented product lines—offers a substantial opportunity to capture value that currently accrues elsewhere.

4. Comparative state advantages and strategic roles

The development of the pineapple sector in the North Eastern Region is shaped by meaningful differences in varietal identity, production scale, infrastructure readiness, and market orientation. These factors together define a set of complementary strategic roles for the major producing states.

Assam, anchored by its Queen and Kew variety and comparatively stronger cold-chain systems, is well positioned to emerge as a domestic branded-product hub. Its production volume, supported by improving post-harvest infrastructure, enables the development of processed and packaged offerings with clear varietal provenance aimed at organised retail and branded consumer markets across India.

Tripura's role is defined by scale and export potential. With the region's most developed secondary-processing base and access to the GI-tagged Queen Pineapple, the state is naturally suited to serve as the primary cluster for common-facility centres and export-linked processing. Its proximity to Bangladesh provides an additional trade corridor, strengthening its position as the region's anchor for volume-driven, outward-facing production.

Meghalaya occupies a distinct niche built around its premium, high-sugar Kew variety. This varietal advantage lends itself to organic and specialty product lines – such as artisanal candies, premium juices, and tourism-oriented retail products – where quality differentiation and margins matter more than scale. This aligns well with the state's broader eco-tourism and premium consumer profile.

Manipur, Nagaland and other emerging states, though a smaller producer, demonstrates potential for small-batch premium processing through FPO-led models that emphasise quality control, traceability, and direct market linkage. This pathway fits the state's current scale and offers a realistic approach to incremental value addition without the need for large-scale industrial investment.

Collectively, these differentiated roles suggest a regional strategy where scale, specialisation, and market orientation vary by state but together span the full spectrum—from volume-based processing to premium niche production—enhancing both the depth and resilience of the sector across the North East.

5. Downstream pineapple products and industry scope

Table 10: Downstream pineapple products and industry scope

Category	Example products
Beverages	Juice, nectar, squash, ready-to-serve drinks, concentrates
Ready-to-Eat	Canned slices, pulp, puree, frozen chunks, dried fruit
Confectionery	Candies, jams, pineapple leather
Dehydrated	Chips, flakes, powder, granules, chunks
Value-Added	Vinegar, wine, bromelain enzyme extract, pickles

6. Strategic interventions

Strengthening the pineapple sector across the North Eastern Region will require interventions that address both the immediate infrastructure deficits constraining value retention and the longer-term market development opportunities that the region's varietal strengths offer.

The most pressing near-term priority is improving post-harvest infrastructure. Establishing pack houses, pre-cooling facilities, and refrigerated transport across the key producing states would directly reduce the losses that currently erode value at the farm and aggregation level, while also improving the quality and consistency of supply reaching both processors and markets. This foundational investment underpins the viability of all downstream interventions.

At the processing and export level, scaling Tripura's processing clusters and linking output to Agartala airport would create a functional export corridor, enabling the state to more fully realise its role as the region's volume and export-processing hub. In Assam, building GI-led branding and ready-to-eat retail product lines around the Assam Kew and Queen

variety would channel production growth into higher-margin branded formats suited to organised domestic markets. Meghalaya's intervention focus is developing organic Giant Kew Pineapple product clusters tied to tourism retail would leverage the state's premium market positioning and eco-tourism infrastructure to create differentiated, high-value product lines.

For Nagaland and smaller producing states, the appropriate entry point is more modest in scale supporting basic juice processing units and strengthening farmer group organisations to build the aggregation and quality management capabilities that are preconditions for commercial viability. Across all states, creating structured aggregation networks and establishing certification standards for premium and export markets would address the quality consistency and traceability gaps that currently limit the region's access to higher-value buyers. Together, these interventions form a sequenced and spatially differentiated programme that builds from infrastructure and aggregation toward branding, processing, and market integration.



5.4 Tea

Figure 21: Tea product sector snapshot

₹ 46.1

Tea 

₹ 633.5 ('000 Crore ₹)

Highlights and Context

The North Eastern Region contributes approximately 53 percent of India's ~1.38 billion kg tea output (FY24), with Assam alone accounting for ~51 percent.

A massive jump in tea imports from Nepal, Kenya and other African countries, and the Tea Board India's directive for early closure of tea production in North India in 2025 raised concerns for NER, in particular Assam

During the FY25 (April-December), quantity of India's total tea exports stood at 187.14 million kg worth US\$ 627.36 million. NER's organic and premium tea products category shows potential for significant value add and edge

Market Snapshot

Revenue in ('000 Crore ₹)

Industry	Global		CAGR	India			CAGR	NER			CAGR
	FY25	FY47		FY25	FY47	FY25		FY47			
Tea	₹ 522.0	₹ 5,867.9	11.6%	Value	₹ 87.0	₹ 983.5	13.2%	Value	₹ 46.1	₹ 633.5	12.6%
				% of Global	16.7%	16.8%		% of India	53.0%	64.4%	

Strategic Infrastructure & Investments

Strengthen auction reforms, direct-trade models and e-auction digital access for small growers

Support Tripura through estate modernisation, organic certification and branded regional tea packs

Promote Nagaland high-altitude teas through specialty-tea branding and FPO-based processing

Encourage tertiary manufacturing (bags, flavoured blends, RTD beverages) within NER to retain value

Varieties, Use-cases & Product Forms

Major NER Varieties

Orthodox (Assam, Tripura)

CTC - Crush, Tear, Curl (Assam)

Green Tea (Assam, Manipur)

White Tea (Arunachal, Assam)

Purple Tea (Arunachal Pradesh)

Organic Tea (Sikkim, Assam)

Value-Added Products

Tea bags & instant tea

Flavored & blended teas

Ready-to-drink (RTD) tea beverages

Specialty wellness teas

Tea extracts & concentrates

Tea-based cosmetics & supplements

Tea Polyphenol Extraction

Premium Organic Fertilizer from composted tea waste

Sustainable Packaging Materials utilizing tea fibers

Caffeine Recovery for pharma, cosmetics, and energy products

Government Policy & Support

Tea Development & Promotion Scheme (2023-26) with ₹664 crore outlay for quality improvement, mechanization, market promotion, and small growers support

Special Purpose Tea Fund (SPTF) : Subsidies targeting replantation and rejuvenation of tea gardens in Assam and NER estates

Orthodox Tea Production Subsidy : Financial incentive to encourage quality orthodox tea production.

Tea Board Export Promotion Scheme : Financial assistance for international promotions

Export Potential & Market Access

Top Export Destinations India



UAE



Iraq



Russia



USA



United Kingdom

Key HS Codes

090210: Green tea (≤3kg pkgs)

090230: Black tea (fermented)

090240: Other black tea

Source: IMARC Group, Mordor Intelligence, Estimates from NEDF

1. Current scenario: Tea in North-East India

The North Eastern Region is the cornerstone of India's tea economy, contributing nearly 55% of national production, which stood at 1.38 billion kilograms in FY24. Assam alone accounts for ~51%⁵² of this output, producing over 700,000 tonnes annually and positioning the state among the most significant tea-producing regions globally. Tripura further adds 73,000 tonnes through a mix of 54 estates⁵³ and a large, expanding base of small tea growers. Production across the region is dominated by CTC tea, which serves the mass domestic market, while orthodox teas cater to premium and export segments – a distinction that shapes both value realisation and market positioning.

The sector operates within a structured institutional ecosystem comprising the Tea Board of India, state-level plantation boards, and established auction platforms at Guwahati and Jorhat. Within this framework, small tea growers – now over two lakh across the region⁵⁴ – constitute an increasingly important share of the production base. However, many remain only partially integrated into processing, blending, and branding pathways, limiting their ability to capture value beyond the sale of green leaf.

Emerging challenges add further pressure to the value chain. Climate-linked yield variability is affecting consistency of output, with small growers – typically operating with fewer resources and lower adaptive capacity – bearing the disproportionate impact. Auction-driven price volatility compresses margins across the chain, while the predominance of bulk “made tea” sales with limited downstream value addition restricts the region's ability to retain value locally.

Strengthening the linkages between small growers, processing factories, and higher-value market channels, particularly through improved access to processing, enhanced blending and packaging capabilities, and the development of regionally anchored brands represents the most immediate strategic opportunity. Targeted policy intervention in these areas offers the greatest potential to improve incomes, enhance competitiveness, and reinforce the long-term resilience of the sector across the North East.

2. State wise status: Resource availability and processing infrastructure⁵⁵

Table 11: State wise status: Resource availability and processing infrastructure (Tea)

State	Tea resource availability	Processing and industrial infrastructure
Assam	~676 million kg (2023-24); dominant producer with large estates and lakhs of small growers across Brahmaputra and Cachar valleys	More than 800 factories including estate and bought-leaf factories; Guwahati and Jorhat auctions; CTC and orthodox hubs in Jorhat and Dibrugarh
Arunachal Pradesh	~14.1 million kg (2023-24); niche plantations in lower altitude belts	No significant processing facilities
Tripura	~7.4 million kg (2023-24) from estates and small tea growers	23 factories (17 private, 4 cooperatives, 2 public); strong estate-based processing
Nagaland	~2.9 million kg (2023-24); emerging small-tea-grower activity in hilly districts	Limited bought-leaf factories; cottage-scale operations
Meghalaya	~0.3 million kg (2023-24); limited plantation area with STG potential	Minimal organized tea factories
Sikkim	~0.06 million kg (2023-24); negligible commercial area	Local consumption only
Manipur	Small-scale STG plots	Negligible processing; leaf sold as raw green leaves
Mizoram	Marginal potential in suitable pockets	Cottage-scale processing only

⁵² North Eastern Development Finance Corporation Limited (NEDFi). *Study on the Value Addition to Tea, with Special Reference to the Small Tea Growers of the North Eastern Region* (June 2025), PDF. <https://www.nedfi.com/wp-content/uploads/2025/06/Cover-PicES-1.pdf>

⁵³ Government of Assam, Industries & Commerce Department. *About Tea Industries*. <https://industries.assam.gov.in/portlet-innerpage/about-tea-industries>, Government of Tripura, Department of Industries & Commerce. *Tea*. <https://industries.tripura.gov.in/tea>

⁵⁴ North Eastern Development Finance Corporation Limited (NEDFi). *Tea - NER Databank*. <https://databank.nedfi.com/ne-agriculture/tea>

⁵⁵ North Eastern Development Finance Corporation Ltd. (NEDFi). *NEDFi Databank*. <https://databank.nedfi.com/>



3. Tea value chain in the North-East Region

The tea value chain in the North Eastern Region is robust at the primary processing stage but captures progressively less value at the secondary and tertiary levels, where the region's participation declines and higher economic returns increasingly accrue outside the North East.

Primary processing which includes plucking green leaves followed by withering, rolling, fermentation, and drying through either CTC or orthodox methods—forms the operational heart of the regional tea industry. Made tea in granule or leaf form is produced mainly by estate factories and bought-leaf factories concentrated in Assam and Tripura. This stage is mature and widely established, supported by a long-standing industrial base. However, the degree of integration for small tea growers varies considerably, and this uneven linkage to factory infrastructure is reflected in the consistency and quality of their output.

Secondary processing comprises sorting, grading, blending, and packaging of bulk tea for domestic or export markets. Activities at this stage are

concentrated around the Guwahati and Jorhat auction centres, which operate as the region's primary trading platforms. While these auction systems provide structured market access and price discovery, their volume-oriented model limits incentives for investment in higher-grade blending, specialised packaging, and differentiated product offerings within the region.

Tertiary processing, the production of branded retail packs, specialty teas, ready-to-drink beverages, and wellness-oriented infusions – represents the highest-value segment of the chain. Most of this activity currently takes place outside the North East, particularly in Siliguri and Kolkata, where blending infrastructure, branding capabilities, and consumer packaging facilities are more developed. This displacement of value-added activity is one of the sector's most significant structural gaps. Redirecting a meaningful share of tertiary processing back into the region remains a clear opportunity to enhance value retention, strengthen regional market identity, and improve the long-term competitiveness of the North Eastern tea economy.

4. Comparative state advantages and strategic roles

Assam holds an unequivocal position as both the region's and the nation's dominant tea hub. Its role spans the full upstream value chain: it anchors large-scale CTC production for domestic mass-market consumption, hosts the region's primary auction infrastructure at Guwahati and Jorhat, and maintains a base of premium orthodox estates supplying export and specialty markets. The scale, maturity, and institutional depth of Assam's tea ecosystem make it the natural centre for any regional value-addition strategy and the most suitable location for investment in blending, branding, and higher-value processing capacity.

Arunachal Pradesh plays a distinctive and emerging role within the region's tea economy. Producing ~14.1 million kg in 2023-24, its niche plantations in the lower-altitude belts are well-suited to high-quality specialty and orthodox teas. The state's pristine growing conditions and small-batch cultivation practices create strong potential for premium, origin-linked and organic tea lines.

Tripura plays a more focused yet strategically important role. Its established estate cluster provides a stable and organised production base that can support the development of regionally branded teas and, given rising consumer interest in traceability and sustainable cultivation, offers credible potential for an organic tea niche. Tripura's geographic proximity to

Bangladesh also provides a natural export orientation, creating opportunities for branded and specialty teas targeting neighbouring regional markets.

Nagaland and other emerging states represents a longer-term but distinctive opportunity within the sector. Their suitability for organic cultivation position it as a potential source of premium and specialty teas—a segment where provenance, altitude, and cultivation practices carry significant market value. Unlocking this potential will require sustained investment in plantation development, quality systems, and market-building efforts. Nevertheless, the state's inherent agro-climatic advantages offer a strong foundation for creating a differentiated niche over time.

5. Downstream tea products and industry scope

Table 12: Downstream tea products and industry scope

Category	Examples
Bulk / Commodity	CTC granules, orthodox leaf sold via auction or bulk export
Branded Retail	Tea bags, loose leaf packs, dust/fannings
Premium / Specialty	Orthodox, green, white, single-estate, GI-based varieties
Value Added	Ready-to-drink tea, iced tea, lattes, extracts, kombucha
Wellness / Functional	Herbal blends, flavored and organic dustless teas

6. Strategic interventions

Advancing the tea sector across the North Eastern Region will require interventions that address both the structural integration gaps affecting small growers and the value-chain displacement that sees higher-margin processing and branding activities occur largely outside the region.

The most foundational priority is improving the integration of small tea growers into processing and branding chains. Supporting the establishment of mini-factories and collective processing facilities would reduce the dependence of small growers on intermediary bought-leaf arrangements, improve their access to value-retentive processing, and create the conditions for more consistent quality output. Complementing this, auction reforms, direct-trade models, and expanded digital access to e-auction platforms would strengthen price discovery and reduce the market asymmetries that currently compress grower margins.

At the state level, interventions should be calibrated to each state's strategic role. In Tripura, estate modernisation, organic certification, and the development of branded regional tea packs would

consolidate the state's position as a stable, quality-oriented production cluster with growing premium and export potential. In Nagaland, promoting high-altitude specialty teas through dedicated branding initiatives and FPO-based processing would translate the state's agro-climatic credentials into market-recognised product identities capable of accessing premium domestic and international buyers.

Across the region, encouraging tertiary manufacturing including tea bags and/or compressed tea leaves, flavoured blends, ready-to-drink beverages, and kombucha production within the North East would directly address the value-chain displacement that characterises the sector today; retaining within the region economic activity that currently accrues to processing centres in Siliguri and Kolkata. Underpinning all of these interventions is the need for climate-resilient research and development, varietal improvement, and agricultural extension support investments that strengthen the adaptive capacity of growers, particularly small tea growers, in the face of increasing yield variability and shifting growing conditions.



5.5 Rice

Figure 22: Rice: product sector snapshot

₹ 5.7				Rice 				₹ 66.7 ('000 Crore ₹)			
Highlights and Context											
- NER contributes 6.5% to national rice production with high growth potential dependent on productivity increases - Value-added products and the large organic production represent lucrative opportunities to increase sector CAGR						Investment in processing infrastructure can significantly increase regional rice earnings					
Market Snapshot								Revenue in ('000 Crore ₹)			
Industry	Global		CAGR	India		CAGR	NER		CAGR		
	FY25	FY47		FY25	FY47		FY25	FY47			
Rice	₹ 3,654.0	₹ 15,453.2	6.8%	Value	₹ 87.0	₹ 750.2	Value	₹ 5.7	₹ 66.7		
				% of Global	2.4%	4.9%	% of India	6.5%	8.9%		
Strategic Infrastructure & Investments											
- Develop FPO-led procurement nodes and drying yards to reduce post-harvest loss - Modernize mills in Assam and Tripura and promote parboiling equipment upgrades - Establish GI and premium aromatic rice clusters with branding and certification						- Introduce custom-hiring centres for mechanization in rainfed zones - Pilot value-added products such as fortified rice, poha and rice flour linked to small processors - Enable cross-border market access and aggregation platforms for surplus districts					
Varieties, Use-cases & Product Forms											
Major NER Varieties				Value-Added Products							
- Joha (aromatic) - Assam - Black Rice (Chak-hao) - Manipur - Bhalum - Meghalaya - Meidongphou - Manipur - Khonorullo - Nagaland - Gomati - Tripura				- Rice flour & gluten-free products - Rice bran oil - Rice-based spirits - Fortified rice - Ready-to-eat rice products - Specialty packaged rice (Black, Red) - Waste to energy				- Bio-Gas production with Rice Straw - Rice husk pellets - Biochar and Charcoal production - Rice-paper - Rice based skincare value add - Rice-based bio-degradable packaging - Rice Straw			
Government Policy & Support				Export Potential & Market Access							
Northeast Special Rice Promotion: Targeted schemes promoting specialty rice cultivation, processing infrastructure, and market linkages in NER by Central and State governments PM-KUSUM: Solar irrigation subsidies extended to Northeast rice-growing regions for sustainable agriculture. GI Registration Support : For Black Rice (Manipur), Joha Rice (Assam) National Food Security Mission (NFSM) : Supports certified seed production and input subsidies in NER rice cultivation. RKVY-RAFTAAR : Provides capital subsidies for rice processing and allied infrastructure modernization.				Top Export Destinations India				Key HS Codes			
						Saudi Arabia		1006.30		Semi-milled or wholly milled rice	
						Iraq		1006.40		Broken rice	
						Benin		1006.20		Husked or brown rice	
						Iran		1006.10		Rice in the husk, "paddy" or rough	
						UAE					

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi

1. Current scenario: Rice in North-East India

Rice is the foundational food crop of the North Eastern Region, accounting for nearly 70% of cropped area in several states and forming the backbone of both food security and rural livelihoods. Assam is the largest producer, generating ~5.6 million tonnes⁵⁶ annually across the kharif and rabi seasons, followed by Tripura and the valley plains of Manipur and Mizoram. Cultivation is predominantly rainfed and smallholder-driven, supported by a rich diversity of local varieties – including aromatic and GI-linked types such as Bahati and Tulaipangi – which hold inherent potential for premium market positioning.

Institutional support from state agriculture departments and FPO-led aggregation models has helped maintain production stability. However, post-harvest losses remain persistently high, estimated at 15-20%, owing largely to gaps in drying, storage, and milling infrastructure⁵⁷. Value addition within the sector is limited: most paddy is consumed locally or sold as undifferentiated milled rice, with minimal branding or varietal distinction. As a result, returns to farmers remain modest despite the region's substantial production base.

Structural constraints continue to limit the sector's competitiveness and economic contribution. Yields average 2-3 tonnes per hectare – below the national average – reflecting the cumulative effects of rainfed cultivation, limited access to improved inputs, and continued reliance on traditional varieties.

Milling infrastructure is outdated and fragmented, leading to low head-rice recovery and variable quality, which restricts access to formal and premium markets. Aromatic and GI-tagged varieties, though endowed with strong commercial potential, remain underdeveloped due to weak branding, inadequate processing, and absence of dedicated market strategies. Procurement chains remain intermediary-dominated, suppressing farm-gate prices and reducing the incentive for growers to invest in quality enhancement.

Addressing these interconnected challenges through modernisation of milling capacity, targeted post-harvest investment, and structured GI-led market development represents the most significant opportunity for improving value retention and enhancing the sector's long-term economic contribution across the region.

2. State wise status: Resource availability and processing infrastructure⁵⁸

Table 13: State wise status: Resource availability and processing infrastructure (Rice)

State	Rice resource availability	Processing and industrial infrastructure
Assam	Largest NER producer (~5.54 million tonnes, 2023-24); Brahmaputra valley dominance, mixed smallholder and estate-type farms	Hundreds of mills, including 4-8 TPH modern rice mills (Barpeta, Nagaon, Jorhat); procurement and drying gaps persist
Tripura	~0.79 million tonnes (2023-24); high cropping intensity and strong household consumption base	Multiple rice mills including ~6 TPH facilities in and around Agartala; parboiling and raw milling supported by the state
Nagaland	~0.37 million tonnes (2023-24); jhum and valley-based paddy systems	Small custom mills and basic hullers; limited modern processing
Manipur	~0.35 million tonnes (2023-24); valley-based paddy systems with moderate productivity	Small custom mills dominant; limited modern processing
Meghalaya	~0.26 million tonnes (2023-24); rainfed hill rice with lower yields	Primarily cottage hullers; farmgate milling is common
Arunachal Pradesh	~0.25 million tonnes (2023-24); patchy valley cultivation	Basic hullers; paddy often shipped out for milling
Mizoram	~0.04 million tonnes (2023-24); limited lowland pockets	Basic hullers; largely subsistence-oriented
Sikkim	~0.008 million tonnes (2023-24); negligible commercial production	Local consumption only

⁵⁶ North Eastern Development Finance Corporation Limited (NEDFi). Rice - NER Databank. <https://databank.nedfi.com/cereal-crops/rice>

⁵⁷ Ashok Gulati, Raya Das, and Alex Winter-Nelson. Reducing Post-Harvest Losses in Indian Agriculture: A Case Study of Selected Crops (Policy Brief 20), Indian Council for Research on International Economic Relations (ICRIER), April 2024. https://icrier.org/pdf/Policy_Brief_20.pdf

⁵⁸ North Eastern Development Finance Corporation Limited (NEDFi). Rice - NER Databank. <https://databank.nedfi.com/cereal-crops/rice>



3. Rice value chain in the North-East Region

The rice value chain in the North Eastern Region extends from farm-level primary processing to branded and value-added products, though the region's participation remains concentrated in the primary and secondary stages. Tertiary value addition, which generates the highest margins, is still nascent.

Primary processing forms the operational foundation of the chain and includes harvesting, drying, storage, and de-husking to convert paddy into brown or basic milled rice. This activity is dispersed across farm-gate mills and custom hullers in Assam and Tripura, the region's principal rice-producing states. While primary processing is widely accessible to farmers, inconsistent drying practices and limited storage facilities contribute to significant post-harvest losses, reducing both the volume and quality of rice available for further processing.

Secondary processing – polishing, grading, sorting, and parboiling – is undertaken mainly through modern mills with capacities of 4-8 tonnes per hour located in

Barpeta and Nagaon in Assam, and Agartala in Tripura. However, outdated milling equipment remains widespread across the region, leading to low head-rice recovery and limiting the share of premium whole-grain rice relative to broken grain. Upgrading milling technology and strengthening quality control at this stage would directly enhance the commercial value of processed rice and improve farm-gate returns.

Tertiary processing, which includes packaging, branding, fortified rice, rice flour, poha, noodles, and ready-to-cook products, remains underdeveloped. Most processed rice continues to leave the region as bulk, unbranded output, with the finishing, packaging, and product diversification undertaken outside the North East. Developing tertiary processing capacity, particularly for GI-linked aromatic varieties and higher-value product lines, represents the most significant opportunity for improving value retention and enabling the region's distinctive rice varieties to access premium domestic and export markets.

4. Comparative state advantages and strategic roles

Assam's position as the region's dominant rice producer naturally places it at the centre of large-scale milling and processing development. Its production volume supports the creation of industrial milling hubs capable of improving head-rice recovery, reducing post-harvest losses, and supplying organised retail and institutional markets. Equally important is Assam's potential to develop dedicated aromatic-rice clusters around its GI-linked varieties, where provenance-based branding and quality differentiation can unlock access to premium domestic and export segments. Realising this dual role will require coordinated investment in both high-volume processing infrastructure and the specialised supply-chain systems demanded by premium aromatic varieties.

Tripura's strategic role is more focused but remains commercially significant. The state's existing base of local mills and parboiling units provides a strong platform for developing regionally branded packaged rice aimed at organised domestic retail. Its proximity to Bangladesh offers further advantage for cross-border market access. Parboiling capacity, in particular, enables the production of shelf-stable, value-added rice products with broader reach and higher margins than plain milled rice.

Across the remaining states, rice is predominantly a food-security crop, and large-scale commercialisation remains a longer-term prospect, dependent on

productivity improvements and investment in post-harvest infrastructure. However, each state possesses distinct advantages that can be developed over time.

Meghalaya and Nagaland have scope to expand premium niche segments, such as upland and indigenous varieties attractive to health-conscious consumers. **Manipur**, with its heritage black rice, holds potential in nutraceutical and speciality markets. **Mizoram's** small but improving production base can support decentralised milling clusters to reduce import dependence, while **Arunachal Pradesh's** unique agro-ecological zones allow targeted expansion of high-altitude speciality rice. In **Sikkim** - bordering pockets of the region, organic cultivation practices can gradually support a differentiated identity in select markets.

Taken together, these roles point toward a regional development strategy that consolidates the strengths of Assam and Tripura while nurturing the specialised, high-value, or food-security-oriented roles of other states. Such an approach allows the rice value chain to grow without imposing uniform models of commercialisation and ensures that future expansion is grounded in each state's comparative advantage.

5. Downstream rice products and industry scope

Table 14: Downstream rice products and industry scope

Category	Example products
Staple Milled	Polished white rice, parboiled rice
Premium and Aromatic	GI-tagged Bahati, Tulaipanji, other scented varieties
Value Added	Rice flakes (poha), rice flour, noodles, idli rava
Branded Retail	Fortified rice, quick-cook variants, organic packs
Industrial Byproducts	Rice bran oil, animal feed, starch and gluten

6. Strategic interventions

Improving the rice sector's economic contribution across the North Eastern Region requires a layered set of interventions that address post-harvest losses, processing quality, and market development in a coordinated and sequenced manner.

The most immediate priority is strengthening post-harvest infrastructure at the aggregation level. Developing FPO-led procurement nodes and drying yards across surplus districts would reduce the 15-20% post-harvest losses that currently erode value before paddy reaches the mill, while also improving the quality and moisture consistency of supply entering the processing chain. Alongside this, introducing custom-hiring centres for mechanisation in rainfed zones would improve harvest efficiency and reduce labour-linked quality degradation, particularly for smallholder farmers with limited access to farm machinery.

At the processing level, modernising mills in Assam and Tripura and promoting parboiling equipment upgrades would directly improve head rice recovery rates and output quality, enabling the region's

processing base to supply organised retail and institutional markets more competitively. These investments form the industrial foundation on which higher-value product development depends.

Building an improved processing base, establishing GI and premium aromatic rice clusters with dedicated branding and certification frameworks would translate the region's varietal heritage into commercially recognised product identities. This is reinforced by piloting value-added product lines such as fortified rice, poha, and rice flour linked to small processors, diversifying revenue streams and expanding the range of market segments the sector can serve.

Enabling cross-border market access and developing aggregation platforms for surplus districts would widen the commercial reach of regional producers, leveraging geographic proximity to Bangladesh and other neighbouring markets. Together, these interventions will spur the sector's from subsistence-oriented production toward a more commercially integrated and value-retentive rice economy.



5.6 Spices

Figure 23: Spices: product sector snapshot

₹ 87.0				Spices 				₹ 626.8 ('000 Crore ₹)			
Highlights and Context											
- The North Eastern Region contributes approximately 9 percent of India's spices output, producing 7-8 lakh MT annually across ginger, turmeric, black pepper and large cardamom. - Total area under spices is about 2.3 lakh hectares, with ginger (~2 lakh MT) led by Meghalaya and Mizoram, turmeric led by Meghalaya, black pepper concentrated in Nagaland and Arunachal Pradesh, and large cardamom						- led by Sikkim. - Yields are comparatively strong, e.g., ginger 6.8 t/ha vs national 3.5, supported by organic-style cultivation and smallholder systems. - Sector momentum is supported by Spices Board of India, NEDFi-NEC value-chain initiatives and rising export demand for high-curcumin Lakadong turmeric and oleoresins.					
Market Snapshot								Revenue in ('000 Crore ₹)			
Industry	Global		CAGR	India		CAGR	NER		CAGR		
	FY25	FY47		FY25	FY47		FY25	FY47			
Spices	₹ 252.3	₹ 1,467.0	8.3%	Value	₹ 130.5	₹ 950.2	Value	₹ 87.0	₹ 626.8		
				% of Global	51.7%	64.8%	% of India	66.7%	69.6%		
Strategic Infrastructure & Investments											
- Establish solar-based drying, slicing and curing infrastructure in production clusters - Develop GI-based branding and certification hubs for Lakadong turmeric and large cardamom - Create FPO-led processing and packaging units for powders and oleoresins						- Enable SEZ-linked extraction units in Mizoram and Nagaland - Strengthen nurseries and planting material networks for ginger and turmeric - Build export linkages through consolidation platforms and testing labs					
Varieties, Use-cases & Product Forms											
Major NER Varieties				Value-Added Products							
- Nadia Ginger (low fiber premium grade) - Lakadong Turmeric (GI tagged from Meghalaya) - Bhut Jolokia/King Chilli (Assam-Nagaland-Manipur) - Large Cardamom (Sikkim dominance) - Tejpat/Bay Leaf (high export demand)				Category		Example Products					
				Powders and Whole		Scaffolding, structural frames, prefab panels, engineered beams					
				Extracts		Tables, chairs, décor items, lighting, garden furniture					
				Blends and Mixes		Mats, baskets, hats, containers, souvenirs					
				Value Added		Crates, pallets, boxes, biodegradable packaging					
				Organic and GI		Fresh/fermented bamboo shoots, biochar, briquettes, farm stakes					
Government Policy & Support											
SPICED Scheme (₹422.30 crore): Launched by the Spices Board to boost spice exports, improve productivity (notably cardamom), and upgrade post-harvest quality through progressive and collaborative interventions. Export & Market Development Support: Strengthens trade promotion, global buyer-seller meets, participation in international fairs, spice incubation centres, and processing infrastructure helping Northeastern growers access national and international markets.											
Export Potential & Market Access											
Top Export Destinations India				Key HS Codes							
 BGD				091030: Turmeric "curcuma"							
 UAE				091099: Spices (excl. pepper of the genus Piper, fruit of the genus Capsicum or of the genus Pimenta)							
 USA				091091: Mixtures of different types of spices							
 MAR											
 GBR											

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi

1. Current scenario: Spices in North-East India

The North Eastern Region contributes close to 9% of India's total spices output, producing 7-8 lakh metric tonnes annually across its major spice crops – ginger, turmeric, black pepper, and large cardamom⁵⁹.

Cultivation spans roughly 2.3 lakh hectares with clear geographic specialisations: ginger, the highest-volume crop at around 2 lakh MT, is led by Meghalaya and Mizoram; turmeric is concentrated in Meghalaya; black pepper production is prominent in Nagaland and Arunachal Pradesh; and Sikkim leads in large cardamom. A notable strength of the region is its yield performance – ginger productivity averages 6.8 tonnes per hectare, compared with the national average of 3.5 tonnes reflecting the advantages of its agro-climatic conditions and largely organic, smallholder-driven cultivation systems.

Institutional support from the Spices Board of India, NEDFi, and NEC's value-chain initiatives has provided momentum to the sector, complemented by rising demand for high-curcumin Lakadong turmeric and spice oleoresins in export markets. These trends point to strong commercial opportunities, particularly in value-added and extract-based product segments. However, post-harvest losses remain high at ~20%, and processing depth is limited, with a significant

share of output continuing to be sold in raw, unprocessed form that captures only a small fraction of potential value.

Structural gaps further constrain value capture. Weak primary processing – especially in drying, slicing, and curing – results in quality deterioration that undermines the premium potential of the region's differentiated varieties. Oleoresin and extraction capacity remains limited, reinforcing dependence on bulk raw exports and shifting higher-value processing to facilities outside the region. The FPO network, though expanding, remains fragmented, and the absence of systematic certification frameworks restricts access to premium domestic and international markets where traceability and quality standards are increasingly decisive.

Addressing these gaps in an integrated manner – from improved post-harvest handling and primary processing to expanded extraction capacity and structured certification systems – represents the most effective means of enhancing value retention and strengthening the long-term competitiveness of the North East's spice sector.

2. State wise status: Resource availability and processing infrastructure

Table 15: State wise status: Resource availability and processing infrastructure (Spices)

State	Spices resource availability	Processing and industrial infrastructure
Assam	Moderate turmeric and ginger; widespread chilli. Total spice production: 324.1 ('000 MT)	Basic cleaning and drying; limited modern spice processing
Sikkim	National leader in large cardamom; GI premium product. Total spice production: 103.3 ('000 MT)	Cardamom curing and drying units; export orientation
Mizoram	Major ginger grower; turmeric and pepper also present. Total spice production: 100.9 ('000 MT)	Primary drying sheds; emerging cooperative processing
Meghalaya	Leading ginger and turmeric producer; GI Lakadong turmeric (7-9% curcumin). Total spice production: 74.6 ('000 MT)	Drying and polishing units; FPO clusters for powders and oleoresins; strong organic orientation
Manipur	Turmeric, ginger and chilli; organic cluster potential. Total spice production: 67.3 ('000 MT)	FPC-led processing with ICAR support; early-stage cluster activity
Nagaland	Black pepper, Bhut Jolokia dominant; strong ginger and turmeric growth. Total spice production: 46.3 ('000 MT)	Small drying and threshing units; SEZ potential for value addition
Tripura	Steady turmeric and ginger; chilli pockets. Total spice production: 30.8 ('000 MT)	Cottage drying and state-supported clusters
Arunachal Pradesh	Pepper and ginger areas; mixed production trends. Total spice production: 25.2 ('000 MT)	Minimal processing; mostly farmgate drying

⁵⁹ North Eastern Development Finance Corporation Limited (NEDFi). *Action Plan on Value Chain Development of Spice Sector in North Eastern Region (Executive Summary)* (March 2021), Draft Report Submitted to the North Eastern Council, Ministry of Development of North Eastern Region (M-DoNER), Government of India. <https://www.nedfi.com/wp-content/uploads/2022/06/COVER-PIC-ES.pdf>



3. Spices value chain in the North-East Region

The spices value chain in the North Eastern Region extends from farm-level primary processing to specialty product manufacturing, with the region's participation strongest at the upstream stages and tertiary value addition still limited.

Primary processing forms the foundation of the chain and is concentrated at the village and cluster levels, particularly in Meghalaya and Mizoram. Activities at this stage include harvesting, washing, slicing, and drying, typically through solar or traditional methods, along with basic cleaning. The outputs, such as dried rhizomes, pods, peppercorns, and whole spices, are produced widely across the smallholder base. However, reliance on traditional drying methods leads to inconsistent quality and notable post-harvest losses, reducing the commercial value of produce entering the next stage of the chain.

Secondary processing comprises grinding, polishing, powdering, and basic oil and oleoresin extraction. This stage is undertaken largely through FPO-run common-facility centres in Meghalaya and Manipur,

supplemented by smaller dryers and threshers across other states. While the emergence of FPO-managed facilities marks progress toward more organised processing, overall capacity remains insufficient relative to the volume of primary output. Oleoresin extraction capacity, in particular, is inadequate to meet rising export demand for high-value spice derivatives.

Tertiary processing covering specialty blended spice mixes, branded powders, extracts, ready-to-cook formats, and nutraceutical products remains at an early stage of development. A substantial share of raw and minimally processed output continues to flow to processors outside the North East, where extraction, formulation, and packaging infrastructure is more advanced. This outward movement of unprocessed material constitutes the most significant point of value leakage in the sector. Building regional capacity for higher-value processing, alongside stronger market linkages, presents the clearest opportunity for improving value retention and enhancing the competitiveness of the North East's spice economy.

4. Comparative state advantages and strategic roles

The geographic distribution of the spices sector across the North Eastern Region reflects a layered set of agro-climatic strengths, existing processing capabilities, and differentiated market orientations, together shaping a complementary set of strategic roles for each state.

Assam, though not the region's largest spice producer, plays a critical enabling role as the logistics and aggregation hub for outbound spice trade. Its connectivity infrastructure, grading and collection capacity, and established packhouse and cold-chain assets position it as the primary facilitation node through which spices from across the region access domestic and export markets. This function is foundational to the efficient operation of the broader regional value chain.

Sikkim is the national leader in large cardamom, anchored by its GI-tagged premium variety and a strong reputation for 100% organic cultivation. The state's well-established curing and drying units provide a solid foundation for high-value, export-oriented processing. Sikkim's clean-production ecosystem and recognised provenance position it uniquely to strengthen its role in premium spice markets, particularly in global niche segments that prioritise purity, traceability, and quality differentiation.

Meghalaya holds the region's most commercially distinctive position, driven by its high-curcumin

Lakadong turmeric and high-yield ginger cultivars. Both carry strong GI credentials and growing international demand, making the state the natural centre for premium powder production and oleoresin extraction targeted at specialty food and nutraceutical markets.

Manipur's role is defined by its strong organic cultivation profile and FPC-led organisational model, positioning it well for producing certified organic turmeric, ginger, and chilli blends suited to premium and traceable supply chains.

Mizoram, Nagaland and other emerging states serve as key volume clusters for ginger and black pepper respectively. Their immediate priority lies in strengthening near-farm drying, slicing, and basic extraction capacity to stabilise quality and reduce post-harvest losses. Over the longer term, their geographic positioning and resource profiles offer potential for SEZ-linked processing and export-oriented manufacturing, contingent on sustained infrastructure development.

Taken together, these differentiated roles point to a regional spice economy where provenance, certification systems, and processing specialisations vary meaningfully by state. This diversity offers a strong foundation for a coordinated regional strategy that leverages each state's distinct comparative advantage, rather than pursuing uniform development across the North East.

5. Downstream spices products and industry scope

Table 16: Downstream spices products and industry scope

Category	Example products
Powders and Whole	Turmeric powder, ginger powder, dried chilies, peppercorns
Extracts	Oleoresins, curcumin extract, gingerol oil
Blends and Mixes	Curry powders, masala mixes, ready-to-cook blends
Value Added	Spice pastes, dehydrated mixes, turmeric/ginger health shots
Organic and GI	Lakadong turmeric, large cardamom pods

6. Strategic interventions

Unlocking the spice sector's value-addition potential across the North Eastern Region requires a set of interventions that address production quality, processing capacity, and market access in an integrated and spatially differentiated manner.

At the production and primary processing level, establishing solar-based drying, slicing, and curing infrastructure within production clusters is the most immediate priority. Improving drying consistency and post-harvest handling at the farm and village level would directly reduce the quality deterioration and losses that currently constrain the value of output entering the processing chain. Complementing this, strengthening nurseries and planting material networks for ginger and turmeric would improve varietal quality and supply consistency, addressing the agronomic foundation on which all downstream value addition depends.

At the processing level, developing GI-based branding and certification hubs for Lakadong turmeric and large cardamom would formalise and commercialise the premium identity that these varieties already

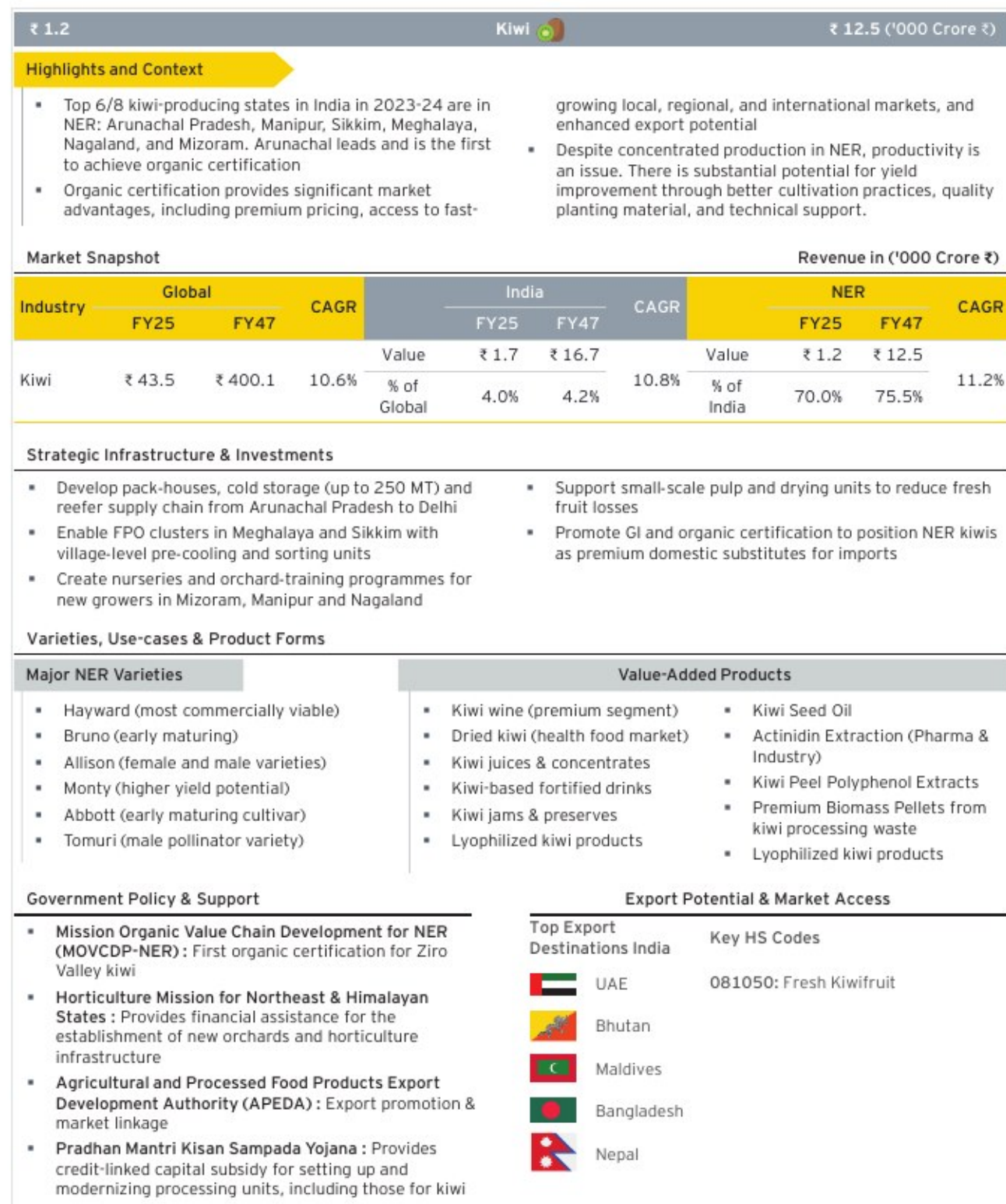
command in export markets. Creating FPO-led processing and packaging units for powders and oleoresins would extend organised processing capability to the smallholder base, enabling greater participation in higher-value product segments while maintaining the organic and traceable production credentials that premium buyers increasingly require. In Mizoram and Nagaland, enabling SEZ-linked extraction units would provide the infrastructure necessary to process the volume output of ginger and pepper clusters into higher-value derivatives, reducing the outward flow of bulk raw material that currently characterises these states' market participation.

Across the region, building export linkages through consolidation platforms and testing laboratories would address the certification and traceability gaps that limit access to formal international supply chains. Together, these interventions form a coherent programme that progressively moves the region's spice sector from raw material supply toward a more integrated, quality-assured, and brand-differentiated position in domestic and export markets.



5.7 Kiwi

Figure 24: Kiwi product sector snapshot



Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi

1. Current scenario: Kiwi in North-East India

The North Eastern Region is India's dominant kiwi-producing zone, accounting for an estimated 80-90%⁶⁰ of national production. Annual output is ~16,000-17,000 tonnes across 4,000-5,000 hectares, with Arunachal Pradesh leading at around 7,050 tonnes, followed by Manipur (2,860 tonnes), Sikkim (2,170 tonnes), and Meghalaya (2,080 tonnes)⁶¹. Cultivation is concentrated in high-altitude belts between 1,200 and 2,800 metres, supported by organic-leaning practices and principal varieties such as Hayward and Allison. This combination of altitude, agro-climatic suitability, and organic cultivation lends the region's kiwi a natural quality differentiation that holds strong commercial potential.

The sector's strategic relevance is reinforced by a strong import-substitution opportunity. India currently sources nearly 75% of its kiwi consumption through imports, creating substantial headroom for the North Eastern Region to expand its share of the national market. Institutional initiatives such as the Mission Organic Value Chain Development for the North Eastern Region (MOVCDNER), state-level horticulture missions under the national horticulture framework, and the Meghalaya Basin Development Authority (MBDA) have supported production growth by strengthening nurseries, farmer mobilisation, and extension services. However, translating these gains

into sustained economic value will depend on building robust post-harvest systems, market linkages, and commercial-scale aggregation that allow the region to move beyond production increases toward integrated value-chain development.

Value addition within the sector is constrained. Most produce is sold in fresh form due to short shelf life, limited cold-chain capacity, and the lack of adequate pack-house infrastructure. Marketing networks are fragmented, with produce typically routed to Delhi through intermediaries, resulting in limited value retention within the region. Processing capacity, particularly for juice and concentrate production, remains minimal, leaving the sector vulnerable to price volatility and seasonal supply gluts. At the farm level, weak orchard management knowledge, inadequate planting material systems, and limited extension support further constrain productivity and quality consistency.

Addressing these structural gaps – from improving orchard management and planting systems to strengthening cold-chain, pack-house, and processing infrastructure – is central to enabling the region to realise its considerable import substitution potential and position its kiwi as a premium domestic and export-oriented product.

2. State wise status: resource availability and processing infrastructure

Table 17: State wise status: resource availability and processing infrastructure (Kiwi)

State	Kiwi resource availability	Processing and industrial infrastructure
Arunachal Pradesh	Largest producer (7.05 KT); hubs include Tawang, West Kameng, Ziro	Proposed cold storage and pack-houses (Bomdila); farmgate sorting; no major processing units
Manipur	2.79 KT centered in Senapati (Purul)	Minimal infrastructure; fresh market sales
Sikkim	2.17 KT from West Sikkim (Rinchenpong)	Basic sorting and packaging; GI and export potential
Nagaland	1.64 KT from Phek and Zunheboto	Cottage-scale drying; early cluster formation
Meghalaya	1.47 KT in East Khasi Hills (Nongspung)	Village-scale packing sheds supported by MBDA
Mizoram	1.03 KT across select districts	Negligible organized infrastructure
Assam	Not a commercial kiwi state (agro-climatic limitations; only small experimental pockets)	Regional hub for aggregation, cold-chain, and multi-fruit processing: Guwahati-based NER ecosystem; Mega Food Park (Nalbari) with Central Processing Centre

⁶⁰ North Eastern Development Finance Corporation Limited (NEDFi). *Fruits - NER Databank*. <https://databank.nedfi.com/horticulture/fruits>

⁶¹ North Eastern Development Finance Corporation Limited (NEDFi). *Fruits - NER Databank*. <https://databank.nedfi.com/horticulture/fruits>



3. Kiwi value chain in the North-East Region

Primary processing includes harvesting, grading, sorting, pre-cooling, and basic packaging, resulting in fresh kiwi trays and punnets. These activities are centred in orchard clusters across Arunachal Pradesh and Meghalaya, the region's leading production zones. However, even at this foundational stage, gaps in pre-cooling and pack-house infrastructure limit shelf life and quality, contributing to post-harvest losses and reducing the share of produce that reaches markets in commercially acceptable condition.

Secondary processing comprising pulp extraction, juice and concentrate production, and dehydration remains largely nascent. While proposed pack-house facilities with capacities of around 16 metric tonnes per day signal planning-level intent, meaningful industrial capacity at this level has yet to materialise. Developing this layer of the chain is particularly important given kiwi's perishability, as secondary

processing offers the most direct avenue for absorbing surplus production, reducing waste, and converting fresh fruit into shelf-stable, transportable formats.

Tertiary processing, which would include ready-to-serve beverages, dried slices, jams, purees, and frozen products, is almost entirely absent within the region. Fresh kiwi continues to move predominantly to Delhi markets through intermediary-driven channels, with finishing, packaging, and value-added manufacturing occurring outside the North East. This near-complete displacement of tertiary activity represents the most significant point of value leakage in the chain and, given India's substantial unmet domestic demand and continuing import dependence, also the most compelling opportunity for investment and strategic policy intervention.

4. Comparative state advantages and strategic roles

The strategic geography of the kiwi sector in the North Eastern Region reflects a clear hierarchy of production maturity, infrastructure readiness, and market orientation. Each state's role is shaped by its altitude, output volume, organic cultivation profile, and connectivity assets.

Arunachal Pradesh, as the region's dominant producer, functions as the core volume and fresh-export hub. Its scale of cultivation and organic-leaning production practices support cold-chain-linked supply to major consumption centres, while also enabling the development of organic branding that can position regional kiwi in premium consumer segments. Targeted investment in pack-house and cold-chain infrastructure in Arunachal Pradesh would have the most immediate and system-wide impact on the region's value retention.

Meghalaya and Sikkim occupy a complementary niche defined by high-altitude growing conditions and strong organic cultivation profiles. These states are well suited to GI-anchored branding and premium fresh-pack development aimed at retail and export markets where provenance, certification, and quality differentiation are central to market access. Their role

is therefore less volume-driven and more oriented toward specialty and high-margin channels.

Manipur, Nagaland and other emerging states represent emerging production zones where volumes are increasing but remain at an early stage of commercial maturity. FPO-led aggregation models provide a practical pathway for organising supply, standardising basic processing, and building market readiness. Incremental investment in aggregation, collection, and basic pre-cooling infrastructure will be essential before larger-scale processing becomes viable.

Assam's role within the kiwi value chain differs from its position in other horticultural sectors. Rather than operating as a major producer, it serves as the processing and logistics gateway for the entire region. Assam hosts pack-houses, cold-chain assets, multi-fruit processing facilities, and export facilitation services that enable the efficient movement of kiwi from dispersed high-altitude clusters to domestic and international markets. This aggregation and logistics role is central to the coherence and competitiveness of the regional value chain.

5. Downstream kiwi products and industry scope

Table 18: Downstream kiwi products and industry scope

Category	Example Products
Fresh Retail	Trays, punnets, organic labelled packs
Beverages	Ready-to-serve juice, nectar, concentrates
Processed	Dried slices, powder, puree, frozen chunks
Confectionery	Kiwi jam, fruit leather, candies
Value Added	Enzyme extracts, smoothies, health drinks

6. Strategic interventions

Developing the kiwi sector's commercial potential across the North Eastern Region requires a set of targeted interventions that address the cold chain deficit, strengthen the smallholder base, and build the market credentials necessary to compete with imports and access premium buyers.

The most immediate infrastructure priority is developing pack-houses, cold storage facilities of up to 250 metric tonnes, and a reefer supply chain linking Arunachal Pradesh to Delhi and other major centres. This investment would directly address the post-harvest losses and quality degradation that currently constrain the marketable volume reaching consumers, while also establishing the logistical backbone necessary for the region to function as a reliable supplier to organised retail and institutional markets.

At the cluster level, enabling FPO networks in Meghalaya and Sikkim with village-level pre-cooling and sorting units would extend post-harvest infrastructure to the smallholder base in the region's niche organic production zones. These investments

support both quality improvement and the aggregation discipline required to supply branded and certified product lines consistently. In parallel, establishing nurseries and orchard training programmes for new growers in Mizoram, Manipur, and Nagaland would build agronomic capacity in the region's emerging production zones; providing the planting material systems and extension support that are currently limiting productivity and orchard management quality.

Supporting small-scale pulp and drying units across key production areas would provide a processing buffer for surplus and below-grade fruit, reducing fresh losses and creating shelf-stable product forms that extend the commercial life of the harvest. Underpinning all of these interventions, promoting GI and organic certification for North Eastern kiwi would formalise the premium identity that the region's altitude and cultivation practices already support, positioning regional production as a credible and high-quality domestic substitute for the imported kiwi that currently meets the majority of India's demand.



5.8 Fisheries

Figure 25: Fisheries product sector snapshot

₹ 7.8

Fisheries

₹ 93.4 ('000 Crore ₹)

Highlights and Context

▪ Inland fisheries in NER produce approximately 6.04 lakh tonnes annually (FY23), accounting for around 5 percent of national output .

▪ Production has increased at 5.38 percent CAGR over the last decade (from 4.03 lakh tonnes in 2014-15) .

▪ Assam is the dominant contributor (~4.4 lakh tonnes), supported by extensive beels, wetlands, ponds and river systems; Tripura and Manipur are the next key contributors

▪ Processing infrastructure can boost regional value add product capture, requiring strategic investment across NER states such as modern fish processing facilities, Temperature-controlled supply chain and hatcheries

Market Snapshot

Revenue in ('000 Crore ₹)

Industry	Global		CAGR	India		CAGR	NER		CAGR
	FY25	FY47		FY25	FY47		FY25	FY47	
Fisheries	₹ 2,740.5	₹ 9,335.3	5.7%	Value	₹ 195.8	₹ 1,562.0	Value	₹ 7.8	₹ 93.4
				% of Global	7.1%	16.7%	% of India	4.0%	5.9%

Strategic Infrastructure & Investments

▪ Processing Units: Modern fish processing facilities

▪ Cold Storage: Temperature-controlled supply chain

▪ Hatcheries: Breeding centers for indigenous species

▪ R&D Centers: For disease management and productivity

Varieties, Use-cases & Product Forms

Major NER Varieties

▪ Indigenous freshwater species (45% of India's varieties)

▪ Pengba (Manipur) - Near extinction, revival potential

▪ Ornamental varieties (85% of India's exports)

▪ Chocolate Mahseer (Arunachal) - Premium sports fishing

▪ Amur Carp - Climate resilient species

Value-Added Products

▪ Processed & frozen fish/fillets

▪ Canned fish (tuna, sardines, mackerel)

▪ Fish pickles & ready-to-eat

▪ Surimi & imitation seafood

▪ Fish oil (edible, nutraceutical, omega-3)

▪ Fish protein hydrolysates & powders

▪ Fish meal & aquafeed/animal feed

▪ Collagen, gelatin & chitosan extracts

▪ Dried, smoked & salted fish products

▪ Shellfish value-add

▪ Pearls & ornamental fisheries products

▪ Algae & seaweed-based products

▪ Bioactive compounds for pharma/ cosmetics

▪ Aquaculture by products: biofertilizers, biodiesel, biogas

Government Policy & Support

▪ PMMSY Enhanced Allocation: ₹2,114 crore for NER with 90% central share

▪ NER Fish Production Development Program: 20% cost markup for infrastructure projects

▪ Blue Revolution 2.0: Focus on ornamental fish exports and cold-water fisheries

▪ Fish Farmer Producer Organizations: 501 approved under PMMSY in NER

Export Potential & Market Access

Top Export Destinations India



USA



Japan



China



VNM



Thailand

Key HS Codes

0306.17

Frozen shrimps and prawns, even smoked, whether in shell or not

0307.43

Cuttle fish and squid, frozen, with or without shell

0303.89

Frozen fish, n.e.s.

0303.89

Frozen fish, n.e.s. (excl. Filets)

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi



1. Current scenario: Fisheries in North-East India

Inland fisheries constitute a significant and expanding component of the North Eastern Region's agricultural economy, with annual production reaching ~6.04 lakh tonnes in FY23, around 5% of India's total output⁶². Growth has been steady, with the sector recording a CAGR of 5.38% over the past decade from a base of 4.03 lakh tonnes in 2014-15⁶³. Assam remains the dominant contributor at roughly 4.4 lakh tonnes, supported by an extensive system of beels, wetlands, ponds, and riverine resources, while Tripura and Manipur serve as the next major producing states⁶⁴. Aquaculture productivity is gradually improving, with select clusters achieving yields above 3 tonnes per hectare per year, signalling the potential for broader productivity gains under the right technical and institutional support systems.

Institutional backing through the Pradhan Mantri Matsya Sampada Yojana, the National Fisheries Development Board, and state fisheries departments has helped drive sector expansion. Yet supply-demand imbalances persist in certain states. Manipur continues to face an estimated deficit of 22,000 MT, met largely through imports, underscoring the gap between production growth and local market requirements; a challenge that demands both

enhanced domestic production and improved intra-regional distribution systems.

Despite the sector's upward trajectory, value retention remains constrained. Post-harvest losses of 20-25% stem from inadequate cold-chain capacity, limited icing and storage facilities, and insufficient processing infrastructure at aggregation and distribution points. The majority of fish is sold fresh, with minimal downstream processing, restricting farmer margins and heightening exposure to price volatility and seasonal fluctuations in demand. Low mechanisation levels and fragmented producer networks further limit operational efficiency and market integration, while flood and climate risks affecting capture fisheries introduce additional supply variability that the sector is currently ill-equipped to absorb.

Addressing these structural constraints, particularly through cold-chain expansion, processing infrastructure development, and stronger producer organisation, represents the most direct pathway to improving value retention, enhancing market stability, and strengthening the long-term resilience of the North East's fisheries economy.

2. State wise status: Resource availability and processing infrastructure⁶⁵

Table 19: State wise status: Resource availability and processing infrastructure (Fisheries)

State	Resource availability	Processing and industrial infrastructure
Assam	Largest producer (4.43 lakh tonnes) across Brahmaputra beels, ponds, and capture fisheries	Ice plants and small processing units; major cold-chain gaps; new processing projects emerging in Moran
Tripura	0.83 lakh tonnes; high aquaculture productivity (2.7 t/ha); almost nutritionally self-sufficient	Basic ice and slaughter facilities; despite output, ~₹400 crore annual fish imports indicate demand-processing mismatch
Manipur	0.34 lakh tonnes; deficit of 22,000 MT	Limited infrastructure; fresh markets dominate
Meghalaya	0.19 lakh tonnes from stream- and pond-based systems	Mostly cottage-scale operations; early-stage cluster development
Arunachal Pradesh	0.09 lakh tonnes; very low production	Minimal organized infrastructure
Nagaland, Mizoram, Sikkim	Low-output / deficit states (Nagaland 0.09; Mizoram 0.05; Sikkim 0.01 lakh tonnes); dependent on imports; niche organic cold-water species in Sikkim	Basic ice plants; PMMSY-supported hatcheries and fisheries parks

⁶² North Eastern Development Finance Corporation Limited (NEDFi). Fisheries - NER Databank. Accessed December 26, 2025. <https://databank.nedfi.com/ne-resources/fisheries>

⁶³ North Eastern Development Finance Corporation Limited (NEDFi). Fisheries - NER Databank. Accessed December 26, 2025. <https://databank.nedfi.com/ne-resources/fisheries>

⁶⁴ North Eastern Development Finance Corporation Limited (NEDFi). Fisheries - NER Databank. Accessed December 26, 2025. <https://databank.nedfi.com/ne-resources/fisheries>

⁶⁵ North Eastern Development Finance Corporation Limited (NEDFi). Fisheries - NER Databank. Accessed December 26, 2025. <https://databank.nedfi.com/ne-resources/fisheries>



3. Fisheries value chain in the North-East Region

The fisheries value chain in the North Eastern Region mirrors the pattern observed in several other agri-value chains, with participation heavily concentrated at the primary level and limited development of downstream processing relative to the region's production base and market potential.

Primary processing forms the operational foundation of the chain and includes harvesting, sorting, icing, and live transport, resulting in the supply of fresh and chilled fish to local markets. Activity is centred in Assam's extensive network of beels and pond systems, and Tripura's aquaculture clusters. However, even at this basic stage, infrastructure gaps are significant. Limited icing capacity and inadequate cold-chain facilities at the point of harvest directly contribute to the region's 20-25% post-harvest losses, eroding value before fish reaches processors or consumers.

Secondary processing, filleting, gutting, freezing, smoking, and drying is undertaken through a modest network of small-scale processing plants, ice units,

and PMMSY-supported cold-storage facilities. While this industrial base represents initial progress, it remains insufficient in both scale and geographic distribution to absorb the region's production. Consequently, a large share of output continues to be sold fresh, with minimal value-retentive processing.

Tertiary processing, which includes ready-to-eat and export-grade products such as canned fish, IQF fillets, surimi, and other high-value formats, is almost entirely absent within the North East. The limited capacity that does exist for these advanced activities is concentrated outside the region, leading to substantial value leakage from a sector that possesses the production base to support a far more developed processing ecosystem. Strengthening secondary and tertiary processing, together with upgraded cold-chain infrastructure and more organised producer aggregation, provides the most effective lever for improving value retention and elevating the fisheries sector's economic contribution in the North Eastern Region.

4. Comparative state advantages and strategic roles

The fisheries sector's geographic distribution across the North Eastern Region reflects meaningful differences in production systems, species profiles, and market orientations, which together define a set of complementary and non-competing strategic roles for the key contributing states.

Assam, as the region's dominant volume producer, is the natural anchor for cold-chain and processing infrastructure development. Its extensive beel and wetland systems support large-scale production of species such as Rohu, Catla, and Pabda; these varieties are well-established in domestic markets and suitable for organised processing aimed at both regional consumption and outbound trade. Assam's scale, production consistency, and existing aquaculture systems make it the most immediate and high-impact location for investment in secondary processing and cold-chain expansion.

Tripura's strategic role stems from its strong aquaculture productivity credentials. As a leader in managed fish cultivation, the state is well-positioned to develop filleting units and downstream processing capacity capable of supplying organised retail and institutional buyers with consistent, quality-assured product. Its proximity to Bangladesh provides an additional export orientation, creating opportunities for processed fish products to access cross-border markets and enhancing the commercial viability of higher-value processing investments.

Sikkim occupies a distinct and specialised niche within the regional fisheries landscape. Its cold-water species and organic farming orientation align naturally with high-value, tourism-linked and premium domestic market segments. The state's established reputation for environmentally sensitive and organic production strengthens this positioning, making Sikkim better suited to supplying premium consumers and hospitality channels rather than competing on volume.

Beyond these leading contributors, the remaining states offer distinct and evolving roles that warrant sharper articulation. **Meghalaya**, with its network of ponds and farmer cooperatives, has strong potential to scale organised seed production, hatchery systems, and decentralised cold-chain nodes. **Nagaland** possesses favourable agro-climatic conditions for integrated fish-livestock systems and can expand community-managed aquaculture clusters with an emphasis on local consumption and short-haul markets. **Manipur**, with Loktak Lake and its associated wetlands, has unique ecological assets that could support improved capture-cum-culture fisheries under sustainable management frameworks. **Mizoram and Arunachal Pradesh**, though at earlier stages of sector development, can build foundational capacity through hatcheries, feed distribution systems, and basic aggregation infrastructure that reduce import dependence and improve local availability.

Together, these differentiated roles form the basis for a coherent regional fisheries strategy in which scale production, productivity leadership, ecological specialisation, and premium differentiation each find their appropriate geographic expression. This

diversity provides a strong platform for coordinated investment, enabling the North Eastern Region to build a more balanced, resilient, and market-responsive fisheries economy.

5. Downstream fisheries products and industry scope

Table 20: Downstream fisheries products and industry scope

Category	Example products
Fresh and chilled	Whole fish, fillets, steaks
Frozen and processed	IQF fillets, surimi, breaded fish products
Value added	Canned fish, smoked/dried fish, ready-to-eat fish curries
Export oriented	Filleted pangasius/shrimp, fishmeal
Ornamental and Organic	Live ornamental fish, GI/native species

6. Strategic interventions

Advancing the fisheries sector across the North Eastern Region requires a coordinated set of interventions that address infrastructure deficits, strengthen producer organisation, and build the processing and market development capacity necessary to improve value retention along the chain.

The most immediate priority is expanding ice plants, pack houses, and cold chain infrastructure, with Assam and Tripura as the primary investment locations given their production volumes and existing processing foundations. Reducing the post-harvest losses that currently characterise the sector depends directly on improving icing and cold storage capacity at the harvest and aggregation level, and this investment underpins the viability of all downstream processing development. Alongside this, promoting filleting and freezing units in Tripura and select Assam districts would extend the region's secondary processing capacity, enabling a greater share of output to reach organised markets in value-retentive processed forms.

At the producer level, enabling FPO-based beel and pond cluster management with shared mechanisation would improve operational efficiency and market integration for smallholder fish farmers, reducing fragmentation and creating the aggregation discipline necessary to supply processors and organised buyers consistently. Strengthening hatcheries and seed supply systems through PMMSY support would address the agronomic foundation of the sector, improving seed quality and availability to sustain the productivity improvements that have characterised the sector's recent growth trajectory.

In Sikkim, supporting organic cold-water species branding oriented towards tourism and high-value consumer markets would consolidate the state's niche positioning and improve returns for producers in a segment where quality differentiation and provenance carry significant commercial value. Across the region, improving climate-resilient practices for flood-affected capture fisheries would reduce the supply variability that periodically disrupts production and market supply, strengthening the sector's overall resilience in the face of increasing environmental uncertainty.



5.9 Textiles

Figure 26: Textiles product sector snapshot

₹ 15.7

Textiles 

₹ 363.4 ('000 Crore ₹)

Highlights and Context

- Silk production in NER accounts for 22.86% of the total silk production in India. The region produced 7976.03 MT of silk in 2020-2021 . North East accounts for 92.90 % of the total production of shawls, Mekhla Chaddor, Loi, stole, scarf, muffler.
- Over 50 handloom clusters exist in Tripura alone, and

NERTPS and ITTC institutions are driving training, modernization and design support.

- Tourism, GI-based branding and ethnic apparel create strong market potential, but **powerloom capacity and wet-processing remain limited**, constraining scale.

Market Snapshot

Revenue in ('000 Crore ₹)

Industry	Global		CAGR	India		CAGR	NER		CAGR
	FY25	FY47		FY25	FY47		FY25	FY47	
Textiles	₹ 8,586.9	₹ 96,603.2	11.6%	Value ₹ 1,566.0	₹ 26,838.9	13.8%	Value ₹ 15.7	₹ 363.4	15.4%
			% of Global 18.2%	27.8%	% of India 1.0%		1.5%		

Strategic Infrastructure & Investments

- Scale Eri/Muga silk spinning and develop powerloom parks in Assam
- Replicate ITTC design and training facilities across Meghalaya and Manipur
- Modernize artisan clusters in Tripura and Manipur; strengthen yarn supply chains

- Support GI-based branding and tourism-textile platforms to expand market access
- Enable e-commerce channels and cooperative marketing for handloom livelihoods

Varieties, Use-cases & Product Forms

Major NER Varieties

- Idu Mishmi Textiles of Arunachal Pradesh
- Shaphee Lanphee, Wangkhei Phee and Moirang Phee of Manipur
- Tawlhlohpuan of Mizoram
- Mizo Puanchei of Mizoram
- Pawndum of Mizoram
- Ngotekherh of Mizoram
- Hmaram of Mizoram
- Chakshesang Shawl of Nagaland
- Muga Silk of Assam
- Gamosa of Assam

Value-Added Products

Category	Example Products
Silk Fabrics	Muga and Eri sarees, stoles, scarves
Handlooms	Shawls, mekhela chador, tribal woven products
Garments	Ethnic kurtas, fusion wear, home textiles
Value Added	Dyed prints, embroidered fabrics, blended textiles
Tourism and GI	Branded packs, live weaving demonstrations

Government Policy & Support

- Weavers Mudra Scheme:** Benefited ~1.5 lakh handloom weavers in the region, with over ₹100 crore disbursed in 2019-20 in the Northeast alone.
- ATUFS:** Government is implementing the Amended Technology Up-gradation Fund Scheme with an outlay of ₹17,822 crore (2016-2022) to support technology up-gradation in the textile industry.
- Scheme for Integrated Textile Park SITP:** Provides a GoI grant up to ₹40 crore for setting up textile parks with world-class infrastructure.
- PM-Mega Integrated Textiles Regions and Apparel Park PM-MITRA:** Supports Greenfield PM-MITRA parks (up to ₹500 crore per park) and Brownfield PM Parks (up to ₹200 crore per park).

Export Potential & Market Access

Top Export Destinations India	Key HS Codes
 USA	591190: Textile products and articles, for technical purposes, specified in Note 7 to chapter 59, n.e.s.
 UAE	591110: Textile fabrics, felt and felt-lined woven fabrics, coated, covered or laminated with rubber, leather or other material..
 AUS	591140: Filtering or straining cloth of a kind used in oil-presses or for similar technical purposes, incl. that of human hair
 BRA	591132: Textile fabrics and felts, endless or fitted with linking devices, of a kind used in papermaking or similar machines, e.g. for paper pulp or asbestos-cement, weighing >= 650 g/m²
 DEU	

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi



1. Current scenario: Textiles in North-East India

The North Eastern Region occupies a position of national cultural and economic significance in India's textile ecosystem, accounting for 22.86% of the country's total silk output and producing 7,976 MT of silk in 2020-21. Its dominance is even more pronounced in handloom fabric, where the region contributes 92.90% of national production⁶⁶ across categories such as shawls, mekhla chador, loi, stoles, scarves, and mufflers. Muga silk, the GI-tagged golden silk of Assam, is produced exclusively in the North East, conferring a unique provenance and premium market potential unmatched elsewhere in the country. Tripura alone hosts more than 50 handloom clusters⁶⁷, underscoring the geographic breadth and depth of the region's textile base.

Institutional support through the North Eastern Region Textile Promotion Scheme and the Integrated Textile Tourism Centre has advanced training, modernisation, and design capabilities. The emergence of Eri and Muga spinning plants, including facilities with capacities of up to 450 kg per day⁶⁸, indicates gradual movement toward semi-organised production, though the sector remains primarily handloom-driven. Rising demand linked to tourism, GI-based branding, and ethnic apparel is expanding market opportunities. However, constraints in

powerloom capacity, wet-processing facilities, and finishing infrastructure continue to limit scalability beyond artisanal production volumes.

Structural challenges also weigh on the sector's growth trajectory. Raw silk shortages and outdated looms constrain productivity across the handloom ecosystem, while weak yarn supply chains and limited design support diminish quality consistency and reduce market responsiveness. The lack of adequate powerloom and wet-processing capacity sustains dependence on bulk, unbranded sales that capture only a fraction of the value achievable through finishing, branding, and differentiated product development. Market linkages remain narrow, concentrated largely in local and ethnic-focused channels, with limited penetration into mainstream domestic retail or export markets.

The central strategic challenge for the region lies in broadening market access while preserving the cultural integrity and GI credentials that define its textile heritage. Building modern processing capacity, strengthening branding and design ecosystems, and enhancing market integration can together enable the region to unlock the full economic value of its unique textile traditions.

2. State wise status: Resource availability and processing infrastructure⁶⁹

Table 21: State wise status: Resource availability and processing infrastructure (Textiles)

State	Textile resource availability	Processing and industrial infrastructure
Assam	Largest Muga/Eri silk base; highest handloom households (1,269,506)	Eri spinning plant (Kharuajan - 450 kg/day), clusters such as Sualkuchi; textile parks emerging
Manipur	High density of handloom households; tribal weave heritage (221,855)	Block-level clusters, cooperative weaving centers
Tripura	50+ handloom clusters, ~22,000 weavers (137,455 households)	Cooperative societies; yarn supply and state schemes
Arunachal Pradesh	Apatani and Monpa weaves; limited silk (93,314 households)	Basic cooperative units
Meghalaya	Eri silk focus (Ryndia); niche Muga (42,755 households)	ITTC Nongpoh - training, design, tourism; silk processing
Nagaland	Tribal handlooms; emerging Eri (42,411 households)	Cottage clusters; SEZ potential
Mizoram	Bamboo-silk blends; handloom households (27,402 households)	Village-level clusters
Sikkim	Limited production (697 households)	Niche, tourism-driven textile products

⁶⁶ Rising Northeast. *Textile, Handloom & Handicraft Sector Profile* (May 2025), RisingNortheast.in PDF. <https://risingnortheast.in/wp-content/uploads/2025/05/Textiles-Sector.pdf>

⁶⁷ North Eastern Development Finance Corporation Limited (NEDFi). *Handloom - Tripura Resources*, NER Databank. <https://databank.nedfi.com/tripura-resources/handloom#:~:text=Summary for%20domestic%20or%20ritual%20purpose>

⁶⁸ North Eastern Handicrafts & Handlooms Development Corporation Ltd. *NEHDC inaugurated the largest Eri Silk Spinning Plant in Northeast India at the Integrated Textile Park in Mushalpur, Baksa district, Assam*. <https://nehdc.com/news-and-events/nehdc-inaugurated-the-largest-eri-silk-spinning-plant-in-northeast-india-at-the-integrated-textile-park-in-mushalpur-baksa-district-assam>

⁶⁹ Office of the Development Commissioner for Handlooms, Ministry of Textiles, Government of India. (2019). *Fourth All India Handloom Census 2019-20* (Census report). Government of India.



3. Textiles value chain in the North-East Region

The textiles value chain in the North Eastern Region is distinctive, shaped by artisanal production systems and GI-linked raw materials that confer both cultural identity and premium market potential. Yet, commercial development remains concentrated at the upstream stages.

Primary processing forms the base of the chain and includes cocoon reeling and the spinning of Eri and Muga silk into raw yarn and hand-spun threads. These activities are embedded within household and community production systems in Assam and Meghalaya. The emergence of organised spinning plants marks an important step toward semi-industrial yarn supply. However, raw silk shortages and the largely artisanal structure of this stage continue to limit the consistency and volume of yarn available to downstream weavers.

Secondary processing; dyeing, weaving, and printing—is carried out through handloom clusters, Integrated Textile Tourism Centres, cooperative networks, and yarn-support schemes across the region. This stage represents the heart of the North

East's textile identity, where the technical skill of weavers and the cultural distinctiveness of local traditions are translated into finished fabric. While the handloom-driven system preserves craft value, it also constrains throughput, limits quality standardisation, and is hampered by inadequate wet-processing infrastructure that prevents the region from achieving finishing quality at scale.

Tertiary processing; garmenting, branding, ethnic apparel, home textiles, and e-commerce-driven product development remains nascent. Tourism-textile hubs, which offer a natural intersection between the region's cultural heritage and its growing visitor economy, are yet to be fully realised as commercial opportunities. Most textiles continue to be sold unbranded or minimally packaged, with high-margin activities such as design, finishing, and retail branding taking place outside the region. Targeted improvements in this stage, particularly through digital enablement, brand development, and tourism-driven retail, can materially enhance value retention and expand the market footprint of the region's textile products.

4. Comparative state advantages and strategic roles

The geographic distribution of the textiles sector across the North Eastern Region reflects a rich diversity of weaving traditions, raw-material specialisations, and market orientations, together creating a layered and complementary set of strategic roles for the key states.

Assam serves as the core anchor of the regional textile economy. As the home of Muga and Eri silk and the Sualkuchi weaving ecosystem – one of India's most established handloom centres – it spans the full upstream value chain from silk yarn production to weaving. Its GI-linked raw materials, institutional depth, and production scale position Assam as the natural hub for silk-based textile development, quality standardisation, and larger-scale production initiatives.

Manipur and Tripura complement Assam's anchor role through their dense artisan bases and strong potential for scaling ethnic garments and home textiles. Both states are well positioned as processing and cluster-development nodes where investments in loom modernisation, design services, and organised market linkages can translate artisan skill into competitive product lines suitable for domestic retail and export markets.

Arunachal Pradesh represents an emerging opportunity grounded in its distinctive indigenous

weaving traditions, including Apatani and Monpa styles, which carry strong cultural identity and premium market appeal. Structured cluster development in the state would provide the organisational and infrastructure framework needed to bring these traditions into more organised commercial production while safeguarding their cultural integrity.

Meghalaya's role is oriented toward design innovation and tourism-linked market development, supported by the Integrated Textile Tourism Centre (ITTC) in Nongpoh – a joint initiative of the Ministry of Textiles and the state government. The centre functions as a multifunctional hub combining heritage displays, skill-development facilities, and visitor engagement spaces, enabling artisans and enterprises to test new designs and finishing techniques, particularly in Eri-based textiles. This ecosystem strengthens Meghalaya's ability to serve design-conscious and premium consumer segments while leveraging tourism-driven demand for distinctive textile products.

Nagaland occupies a similarly distinctive niche: its tribal handloom traditions, strong design differentiation, and small-batch, high-craft production create a compelling value proposition for premium domestic and export markets that prioritise



provenance, craft identity, and limited-edition collections.

Together with **other emerging states**, these differentiated roles point to a regional textile strategy in which cultural heritage, geographic specialisation,

and market differentiation reinforce one another. This diversity provides a strong foundation for a coordinated, sector-wide value-chain development approach that preserves the region's unique identity while enhancing its economic potential.

5. Downstream textiles products and industry scope

Table 22: Downstream textiles products and industry scope

Category	Example products
Silk fabrics	Muga and Eri sarees, stoles, scarves
Handlooms	Shawls, mekhela chador, tribal woven products
Garments	Ethnic kurtas, fusion wear, home textiles
Value added	Dyed prints, embroidered fabrics, blended textiles
Tourism and GI	Branded packs, live weaving demonstrations

6. Strategic interventions

Advancing the textiles sector across the North Eastern Region requires interventions that strengthen the productive base, improve processing capacity, and build the market access mechanisms through which the region's distinctive textile heritage can generate sustained economic returns.

At the production and processing level, scaling Eri and Muga silk spinning and developing powerloom parks in Assam would address two complementary constraints simultaneously, expanding raw yarn supply and increasing the region's capacity to produce fabric at volumes suited to organised retail and export markets. Modernising artisan clusters in Tripura and Manipur and strengthening yarn supply chains would improve productivity and output quality across the region's densest weaving bases, reducing the input-side bottlenecks that currently limit artisan throughput and design consistency.

Replicating ITTC design and training facilities across Meghalaya and Manipur would extend the innovation and skills development infrastructure that has demonstrated value in existing centres, building design capability and technical knowledge across a broader artisan base. This investment is particularly

important for states where the transition from traditional production to market-oriented product development requires structured institutional support rather than incremental adaptation.

Building market access and brand recognition is equally central to the sector's development. Supporting GI-based branding and tourism-textile platforms would formalise the premium identity of the region's most distinctive textiles, creating commercially recognised product narratives that command higher margins in domestic and international markets. Enabling e-commerce channels and cooperative marketing for handloom producers would widen market reach beyond the local and ethnic niche that currently defines the sector's commercial boundaries, connecting artisan clusters directly to mainstream consumer markets and reducing dependence on intermediary-dominated distribution. Together, these interventions form a coherent programme that moves the sector from artisan-scale production toward a more organised, brand-differentiated, and market-integrated textile economy while preserving the cultural and craft identity that defines its distinctive value.



5.10 Pharmaceuticals

Figure 27: Pharmaceuticals product sector snapshot

₹ 21.8

Pharmaceuticals

₹ 745.2 ('000 Crore ₹)

Highlights and Context

NER holds around 50 percent of India's plant biodiversity and is positioned for phyto-pharmaceuticals, biotech and botanical extracts, though the industrial base remains nascent .

Sikkim is the region's established formulation hub, hosting more than 40 manufacturing units (Sun, Cipla, Zydus, Alkem) enabled by tax incentives and SEZ-linked export orientation.

The region hosts ~126 biotech hubs, supported by DBT and NER-BPMC (~₹180 crore annual allocation) and the Phyto-Pharma Mission for medicinal plants .

Medicinal plants underpin strong potential for AYUSH, nutraceuticals, botanical extracts and biotech value chains.

Market Snapshot

Revenue in ('000 Crore ₹)

Industry	Global		CAGR	India		CAGR	NER		CAGR
	FY25	FY47		FY25	FY47		FY25	FY47	
Pharma-ceuticals	₹ 13,920.0	₹ 1,01,887.6	9.5%	Value ₹ 435.0	₹ 7,468.2	13.8%	Value ₹ 21.8	₹ 745.2	17.4%
				% of Global 3.1%	7.3%		% of India 5.0%	11.4%	

Strategic Infrastructure & Investments

Expand formulation parks and SEZ-linked export nodes in Sikkim

Scale API manufacturing and build QC/testing labs in Assam

Support Meghalaya and Arunachal Pradesh with phytopharma-oriented FPCs and incubators

Strengthen biotech-industry commercialization pipelines

Establish skill-development and GMP-compliance training for NER workforce

Varieties, Use-cases & Product Forms

Major NER Varieties

Manimuni / Brahmi (Centella asiatica) - Neuroprotective herb

Tejpat / Indian Bay Leaf (Cinnamomum tamala) - Aromatic spice, cardio-digestive medicinal use

Sarpagandha - Cardiovascular alkaloid source

Jatamasi - Perfumery base, alpine medicinal herb

Value-Added Products

Category	Example Products
Generics	Tablets, syrups, injectables, APIs
Phytopharma	Herbal extracts, curcumin-based products, anti-inflammatory botanicals
Biotech	Vaccines, diagnostics, bio-inputs
Value Added	Nutraceuticals, wellness supplements, AYUSH products
Export	Branded generics for Southeast Asia and Africa

Government Policy & Support

Production-Linked Incentive (PLI) Scheme (₹15,000 crore): supports domestic manufacturing of high-value drugs—complex generics, biopharmaceuticals, anti-cancer drugs—while incentivising global-standard production and investment.

Strengthening of Pharmaceuticals Industry (SPI) Scheme (₹500 crore): boosts pharma clusters and MSMEs through interest subvention, capital subsidies, and creation of shared R&D and testing facilities.

Infrastructure & Research Boost (NIPER Guwahati): invests in pharmaceutical education, research, and innovation, with facilities like the PARAM Embryo supercomputer enhancing drug R&D capacity.

Export Potential & Market Access

Top Export Destinations India		Key HS Codes
	USA	3004: Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put . .
	GBR	
	ZAF	3002: Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera .
	FRA	
	CAN	3003: Medicaments consisting of two or more constituents mixed together for therapeutic or prophylactic

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi

1. Current scenario: Pharmaceuticals in North-East India

The North Eastern Region holds a significant natural advantage in the pharmaceuticals and life sciences sector, possessing nearly 50% of India's plant biodiversity—a foundation that positions the region strongly for phyto-pharmaceuticals, botanical extracts, nutraceuticals, and biotechnology value chains⁷⁰. This biodiversity endowment, combined with the region's deep AYUSH and medicinal-plant heritage, creates a distinctive and largely untapped commercial opportunity that differentiates the North East from the more conventional pharmaceutical manufacturing centres elsewhere in the country.

Institutional infrastructure to support sector development is present and steadily expanding. Sikkim serves as the region's most developed formulation hub, with more than 40 manufacturing units enabled by tax incentives and SEZ-linked export orientation. Assam is emerging as an industrial anchor, marked by the establishment of the region's first API plant in Guwahati alongside biotechnology and testing facilities that signal early progress toward upstream pharmaceutical manufacturing capability. The region also hosts ~126 biotech hubs supported by the Department of Biotechnology and the NER Biotechnology Programme Management Cell, which receives an annual allocation of ~INR 180 crore⁷¹. Complementing this is the Phyto-Pharma Mission,

which supports medicinal plant cultivation and value-chain development across the region.

Despite these institutional foundations, industrial development remains nascent relative to the region's natural resource potential. Manufacturing scale is modest compared to established pharmaceutical hubs such as Hyderabad and Gujarat, and active pharmaceutical ingredient capacity remains insufficient, sustaining a high reliance on imports. Infrastructure gaps including limited advanced testing laboratories, quality control systems, and cold chain facilities for botanical materials, constrain both production quality and regulatory compliance. Skill shortages in pharmaceutical manufacturing, coupled with low commercialisation rates of research and development output, further limit the region's ability to translate its biodiversity assets and institutional investments into commercially viable products.

Bridging the gap between natural resource advantage and industrial capability represents the central strategic challenge and opportunity for the sector. Strengthening API and formulation capacity, expanding testing and certification infrastructure, and building targeted skill ecosystems will be essential to positioning the North Eastern Region as a meaningful player in India's evolving pharmaceutical and life-sciences landscape.

2. State wise status: Resource availability and processing infrastructure

Table 23: State wise status: Resource availability and processing infrastructure (Pharmaceuticals)

State	Pharma resource availability	Processing and industrial infrastructure
Sikkim	Manufacturing-led pharma hub; Strong pharma presence; tax-driven investment destination	45 formulation units, export-oriented generics; WHO-GMP plants; pan-India sourcing of inputs
Meghalaya	Bio-resource / phytopharma hub; rich endemic medicinal biodiversity	Biotech hubs, Integrated Textile Tourism Centre (ITTC) Nongpoh, tribal FPCs; strong potential for extract- and AYUSH-linked value chains
Assam	Processing and transition state with modest aromatic & medicinal crop output (170 MT)	25 pharma units; NER's first API plant (Guwahati); biotech hubs; North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS)-linked clinical and translational research
Arunachal Pradesh	Niche high-value bio-resource state with limited but present production (160 MT)	Research centres and pilot initiatives only; no commercial manufacturing
Nagaland, Mizoram, Manipur, Tripura	Emerging / early-stage bio-resource belt with small but tangible combined output (1,760 MT, led by Nagaland 860 and Mizoram 780MT)	6 pharma units (all in Tripura); otherwise, research centres, pilot distillation/extraction, FPC-led initiatives; no large-scale manufacturing

⁷⁰ Mangsatabam Joybi Singh, Nepram Meerabai Devi, S. Rajesh Singh, & Pebam Babita Devi. "Conservation and Management of Biodiversity in North East Hill Region of India," *Journal of Chemical Health Risks* 13, no. 6 (December 6, 2023). <https://jchr.org/index.php/JCHR/article/view/4447>

⁷¹ Biotech Consortium India Limited (BCIL). *North Eastern Region Biotechnology Programme Management Cell (2010 onwards)*. Accessed December 26, 2025. <https://www.biotech.co.in/en/north-eastern-region-biotechnology-programme-management-cell-2010-onwards>



3. Pharma value chain in the North-East Region

The pharmaceutical value chain in the North Eastern Region spans from biodiversity-rich primary extraction through to formulation and branded product manufacturing, with the region's participation strongest at the upstream end and tertiary value addition concentrated in a single state.

Primary processing forms the natural starting point of the chain, encompassing the cultivation, harvesting, and extraction of medicinal plants to produce crude phyto-compounds and botanical active ingredients. These activities are distributed across Assam, Meghalaya, and Arunachal Pradesh, supported by the region's biotech centres and exceptional biodiversity. While this stage draws directly on the region's most distinctive competitive asset, the extraction and pre-processing infrastructure required to convert raw botanical material into consistent, quality-assured inputs for downstream pharmaceutical formulation remains underdeveloped relative to the scale of the resource base.

Secondary processing which includes the formulation of tablets, syrups, and injectables alongside API synthesis is concentrated primarily in Sikkim. The

state has developed a mature formulation ecosystem enabled by tax incentives and export-oriented industrial policies. Assam is at an earlier but strategically important stage, with pilot-scale API capacity emerging in Guwahati. If expanded, this capability could address one of the sector's most significant structural gaps - the region's limited domestic API production. The geographic concentration of formulation activity in Sikkim, while reflecting genuine industrial progress, also underscores the limited spread of secondary processing capability across the wider region.

Tertiary processing covering branded generics, phyto-pharmaceuticals, nutraceuticals, and export-ready packaged formulations—remains largely outside the North East, with Sikkim's export-oriented units being the principal exception. The displacement of higher-value branding, packaging, and export preparation to established pharmaceutical hubs outside the region represents a major point of value leakage, particularly given the North East's biodiversity strengths and the growing global demand for plant-derived pharmaceutical and nutraceutical products.

4. Comparative state advantages and strategic roles

The pharmaceutical sector's strategic geography in the North Eastern Region reflects a clear differentiation between states with established industrial capacity and those whose comparative advantage lies in biodiversity and primary resource endowments. Together, these roles create a complementary and layered regional value chain.

Sikkim stands as the region's most advanced pharmaceutical hub. Its export-oriented formulation industry enabled by tax incentives and SEZ linkages provides a proven and scalable model for generic pharmaceutical manufacturing. The state's institutional maturity, compliance ecosystem, and export credentials position it as the natural anchor for near-term investment in branded and export-ready formulations, as well as a benchmark for industrial development across the wider region.

Assam functions as a processing and transition anchor, bridging the region's upstream botanical resources with downstream pharmaceutical manufacturing. Guwahati's emergence as the site of the North East's first API plant, coupled with its growing biotechnology and testing infrastructure, establishes it as the pharmaceutical gateway for the region. Assam is well-positioned to evolve into a mid-stream processing hub capable of reducing

dependence on externally sourced active ingredients. Its scale, connectivity, and industrial ecosystem make it the most viable location for building deeper pharmaceutical capacity outside Sikkim.

Meghalaya and Arunachal Pradesh occupy complementary biodiversity-driven niche roles. **Meghalaya** serves as the region's bio-resource hub, with its rich medicinal-plant diversity and established research linkages supporting the development of phyto-pharma clusters focused on botanical extracts and nutraceuticals.

Arunachal Pradesh, with its exceptional floral diversity across high-altitude and forest ecosystems, represents a high-value sourcing zone for rare and endemic botanical inputs that command premium positioning in specialty pharmaceutical and nutraceutical markets.

Together with **other emerging states**, these differentiated roles suggest a regional pharmaceutical strategy anchored in the complementarity of industrial capacity, processing infrastructure, and biodiversity strengths. Leveraging this diversity provides a strong foundation for coordinated investment and value-chain development across a geographically expansive and resource-rich region.

5. Downstream pharma products and industry scope

Table 24: Downstream pharma products and industry scope

Category	Example products
Generics	Tablets, syrups, injectables, APIs
Phytopharma	Herbal extracts, curcumin-based products, anti-inflammatory botanicals
Biotech	Vaccines, diagnostics, bio-inputs
Value Added	Nutraceuticals, wellness supplements, AYUSH products
Export	Branded generics for Southeast Asia and Africa

6. Strategic interventions

Realising the pharmaceutical sector's potential across the North Eastern Region requires interventions that simultaneously strengthen industrial capacity in established hubs, build upstream processing infrastructure, and develop the human capital and commercialisation systems necessary to translate the region's biodiversity advantage into viable products.

In Sikkim, expanding formulation parks and SEZ-linked export nodes would consolidate and scale the region's most mature pharmaceutical industrial base, deepening its capacity for generic formulation and export-oriented manufacturing and reinforcing its role as the regional anchor for finished pharmaceutical production. In Assam, scaling API manufacturing capacity and building quality control and testing laboratories in Guwahati would address the most consequential structural gap in the regional value chain, reducing import dependence for active ingredients and establishing the analytical infrastructure necessary for regulatory compliance and market access across both domestic and export channels.

In Meghalaya and Arunachal Pradesh, supporting phyto-pharma oriented farmer producer companies

and incubators would create the organisational and technical infrastructure necessary to systematically develop the botanical resource base into commercially viable extract and nutraceutical supply chains. This intervention bridges the gap between biodiversity endowment and industrial application, providing smallholder collectors and cultivators with processing access, quality systems, and market linkages needed to participate in higher-value segments of the pharmaceutical value chain.

Strengthening biotech-industry commercialisation pipelines across the region would improve the translation of research output from the region's biotech hubs into market-ready products, addressing the current low rate of research commercialisation that limits the return on institutional investment in the sector. Underpinning all of these interventions, establishing skill development programmes and Good Manufacturing Practice compliance training for the regional workforce would build the human capital foundation that pharmaceutical manufacturing requires, ensuring that infrastructure investment is matched by the technical and regulatory capabilities necessary to operate at competitive standards.



5.11 Food processing

1. Current scenario: Food processing in North-East India

The North Eastern Region possesses a broad and diverse agro-horticultural base – spanning fruits such as pineapple, orange, and kiwi, alongside spices, tea, rice, fish, and bamboo-based foods. This diversity provides a strong natural foundation for food-processing development. Yet only a small portion of this output is processed beyond the primary stage, underscoring a persistent gap between the region's raw material abundance and its industrial processing capacity.

Processing activities are dominated by micro and small enterprises, including FPOs, cooperatives, and own-account units, characterised by limited mechanisation and constrained throughput. The policy ecosystem is broadly supportive: the region benefits from high central financial assistance, with capital-expenditure grants of up to 75% under schemes such as PMFME, Agro-Processing Clusters, Mega Food Parks, and PMKSY. State horticulture value-chain action plans similarly prioritise cluster-based collection centres, primary processing centres, and central processing facilities to improve farmer realisation and reduce waste. Despite this enabling framework, infrastructure constraints – across cold chain, logistics, power supply, storage, testing facilities, and market access – continue to limit operational efficiency and restrict the sector's commercial footprint.

Several structural issues compound these infrastructure gaps. Post-harvest losses in fruits, vegetables, fish, and meat remain high due to inadequate pack-houses, cold storage, and refrigerated transport, eroding value before produce reaches processors or consumers. A fragmented supply chain dominated by low-technology micro units limits the consistency, scale, and reliability required to serve organised retail and export markets competitively. Weak branding, packaging, and compliance with FSSAI and export certification standards further restrict access to premium market segments where the region's distinctive produce could command significantly higher returns. An overarching governance challenge lies in the limited convergence and on-ground execution capacity required to implement multiple central schemes in a coordinated manner, resulting in fragmented impact and slower sectoral progress.

Addressing these constraints through integrated infrastructure investment, effective scheme convergence, and targeted market development represents the central priority for unlocking the North East's considerable latent potential in food processing. With coordinated action, the region can translate its agricultural abundance into a more resilient, value-driven, and market-oriented processing ecosystem.

2. State wise status: Resource availability and processing infrastructure⁷²

Table 25: State wise status: Resource availability and processing infrastructure (Food processing)

State	Resource availability	Processing and industrial infrastructure
Assam	Major producer of rice, tea, fish, citrus, banana, spices (13,956 '000 tonnes agriculture output); aggregation hub for NER	1,569 processing units; 1.14 LMT processing capacity; North-East Mega Food Park (Nathkuchi-Tihu) with CPC + 6 PPCs + 19 collection centres; agro-processing clusters, cold-chain and logistics projects
Tripura	Pineapple, jackfruit, bamboo shoots, rubber, rice, vegetables, fish (1,708 '000 tonnes)	105 processing units; 0.07 LMT capacity; cluster-based fruit juice, jackfruit, bakery/snacks units; strong subsidy access under central schemes
Manipur	Rice, vegetables, fish, pork (1,124 '000 tonnes)	30 processing units; 0.59 LMT capacity; small and medium processing units; PMFME-supported enterprises
Nagaland	Rice, vegetables, pork, fish, spices (1,114 '000 tonnes)	20 processing units; 0.69 LMT capacity; early-stage clusters; PMFME-supported micro-units
Arunachal Pradesh	Kiwi, oranges, large cardamom, vegetables (817 '000 tonnes)	27 processing units; 0.53 LMT capacity; small and medium units for jams, juices, snacks; scope for linkage with regional CPCs

⁷² NEDFI, NER Data Bank: Horticulture Production and Agriculture Production; Ministry of Food Processing Industries, Processing Capacity per state; Press Information Bureau 'Existing Food Processing Enterprises' (from Annual Survey of Industries 2018-19, National Sample Survey 73rd round (July 2015- June 2016) MoSPI)

State	Resource availability	Processing and industrial infrastructure
Meghalaya	Pineapple, orange, spices (Lakadong turmeric), vegetables, pork, fish (644 '000 tonnes)	30 processing units; 0.11 LMT capacity; state-level processing programs; small and medium juice, pickle and spice units; training and technical manuals
Mizoram	Vegetables, bamboo shoots, spices (128 '000 tonnes)	0.39 LMT capacity largely from informal / micro processing; PMFME-supported units
Sikkim	Niche horticulture crops, vegetables (128 '000 tonnes)	20 processing units; niche, tourism-linked food products

3. Food processing value chain in the North-East Region

The food processing value chain in the North Eastern Region follows a pattern similar to that observed across individual commodity sectors, with activity concentrated at the primary level and progressively diminishing participation at the secondary and tertiary stages.

Primary processing forms the foundation of the chain and includes sorting, grading, washing, basic cutting and slicing, solar and sun drying, and preliminary chilling or icing for fish and meat. Outputs at this stage - such as cleaned fruits and vegetables, dried spices, chilled fish, and basic milled grains - are produced largely through farm-gate facilities, primary processing centres, and collection centres established under Mega Food Park and Agro-Processing Cluster schemes. While this stage is the most widespread across the region, its effectiveness is constrained by inconsistent drying practices, limited pre-cooling infrastructure, and variable aggregation systems at the farm and village levels.

Secondary processing comprises pulping, juicing, canning, pickling, dehydration, milling, curing, and basic freezing. These activities are undertaken through central processing centres within Mega Food

Parks and agro-processing clusters, as well as mid-scale plants located near state capitals and along major highway corridors. Although this industrial base provides an important step towards organised processing, its scale and geographic reach remain insufficient to absorb the region's diverse and abundant primary output. As a result, a significant share of produce continues to be sold fresh or in minimally processed form.

Tertiary processing which includes branded ready-to-eat and ready-to-cook products, frozen foods, nutraceuticals, and export-grade packaged goods, remains limited within the region. Advanced packaging, finishing, and export-oriented processing continue to take place predominantly in external hubs, resulting in substantial value leakage from a sector whose raw-material diversity and GI-linked products could otherwise support a competitive and differentiated processed-food industry. Developing tertiary-level capacity supported by cold-chain infrastructure, certification systems, and organised market linkages represents the most significant opportunity for enhancing value retention and improving the sector's overall economic contribution.

4. Comparative state advantages and strategic roles

The food processing sector's strategic geography across the North Eastern Region reflects the diversity of its agro-horticultural base, with each state or state grouping offering a distinct combination of raw material strengths, market orientation, and processing development potential that together constitute a complementary regional framework.

Assam's scale, connectivity, and existing industrial infrastructure position it as the regional processing and logistics anchor, hosting central processing centre-based hubs that serve the broader NER distribution network and cold chain system. Its role is less defined by a single commodity than by its capacity to aggregate, process, and distribute across multiple product categories, making it the connective tissue of the regional food processing economy.

Meghalaya and Tripura together form the region's horticulture and niche food cluster, with pineapple, citrus, turmeric, and bamboo shoot products providing the raw material base for value-added processing oriented toward both domestic markets and tourism-linked retail. The consumer-facing and experiential dimensions of their respective market environments create natural demand for differentiated, packaged, and branded food products that these states are well-positioned to develop.

Arunachal Pradesh and Sikkim occupy the premium and organic end of the processing spectrum, with kiwi, orange, and large cardamom providing the foundation for dried, pureed, and GI-branded products targeted at premium domestic and export buyers. Their high-altitude production systems and organic credentials



support a positioning strategy built on provenance and quality differentiation rather than volume.

Nagaland, Manipur, and Mizoram represent the region's emerging protein and spice processing cluster, where pork, fish, chilli, and traditional ethnic foods offer a distinctive and underexploited basis for

ready-to-eat and ready-to-cook product development. The strong cultural identity associated with the food traditions of these states provides a natural branding platform that, combined with appropriate processing and packaging investment, could support meaningful market development in organised domestic retail and diaspora consumer segments.

5. Downstream food processing products and industry scope

Table 26: Downstream food processing products and industry scope

Category	Example products
Fruits and vegetables	Juices, concentrates, jams, pickles, dehydrated slices, frozen pulp
Spices and condiments	Powders, oleoresins, spice blends, marinades, masala mixes
Cereals and staples	Branded rice, flour mixes, breakfast cereals, traditional RTC foods
Fish and meat	Chilled/frozen fillets, smoked/dried foods, ready-to-eat curries, sausages
Niche / Organic / GI	Lakadong turmeric products, kiwi beverages, bamboo shoot pickles, GI-labelled premium items

6. Strategic Interventions

Strengthening the food processing sector across the North Eastern Region requires a set of sequenced and spatially differentiated interventions that address infrastructure deficits, build processing capacity, and develop the market access mechanisms through which the region's agro-horticultural diversity can generate sustained economic returns.

The foundational infrastructure priority is expanding and integrating the primary processing and central processing centre chain, creating a coherent flow from farm-gate collection through district-level primary processing centres to the Assam-anchored central processing hub. This tiered architecture, supported by investment in cold chain facilities, pack-houses, and refrigerated transport for fruits, fish, and meat, would directly address the post-harvest losses that currently erode value across multiple commodity sectors and establish the logistical backbone for organised processing and distribution at regional scale.

At the processing and market development level, building branding, packaging, barcoding, and certification laboratory infrastructure in Tripura, Meghalaya, and Assam would address the quality assurance and market credibility gaps that limit

access to organised retail, premium, and export channels. Developing specialised processing facilities for kiwi, orange, bamboo shoots, and organic GI-linked products in the hill states would enable these higher-value commodities to be processed closer to their production source, improving value retention and reducing the dependence on external processing centres that characterises the sector today.

Strengthening PMFME-supported FPO capacity through shared machinery arrangements and business development services would improve the commercial viability of micro and small processing units, enabling a broader base of producer organisations to participate effectively in organised value chains. Enabling cluster-level e-commerce and retail market linkages would extend the commercial reach of processed food products beyond local and ethnic market channels, connecting the region's distinctive and GI-backed produce to premium consumer segments that are increasingly accessible through digital platforms. Together, these interventions constitute a coherent and integrated programme that progressively moves the region's food processing sector from subsistence-oriented primary activity toward a more commercially developed, brand-differentiated, and market-integrated industrial base.

5.12 High-Mix Manufacturing

Figure 28: High-mix manufacturing product sector snapshot

₹ 34.8		High Mix Manufacturing 		₹ 361.7 ('000 Crore ₹)					
Highlights and Context									
- High-mix, low-volume manufacturing categories – aerospace and defence MRO, UAVs, electronics EMS, medical devices and precision engineering – are gaining traction in the region. - Assam leads with aerospace/defence policy initiatives, including ₹50 crore Advanced Integration & Testing (AIT) proposals and MRO Policy 2025 targeting three world-class facilities.			- Nagaland and Tripura leverage SEZ-based policies and proximity to Act East corridors; Guwahati electronics labs and PPPs position the region for EMS assembly. - Youth-skill potential is strong due to ITI skilling programmes, yet sector-ready technical talent and tooling infrastructure remain limited.						
Market Snapshot			Revenue in ('000 Crore ₹)						
Industry	Global		CAGR	India		CAGR	NER		CAGR
	FY25	FY47		FY25	FY47		FY25	FY47	
High Mix Manu- facturing	₹ 11,310.0	₹ 69,897.7	8.6%	Value	₹ 1,740.0	₹ 16,903.5	Value	₹ 34.8	₹ 361.7
				% of Global	15.4%	24.2%	% of India	2.0%	2.5%
Strategic Infrastructure & Investments									
- Operationalise Assam AIT and MRO projects; upgrade clean-room and power infrastructure - Activate Nagaland and Tripura SEZs with EMS anchor units and CNC-skill workforce pipelines			- Establish ITI-to-industry apprenticeship pathways and OEM vendor-development programs - Build regional certification/testing labs for aerospace/electronics to reduce mainland dependency						
Varieties, Use-cases & Product Forms									
Major NER Varieties			Value-Added Products						
- Rubber Components - (Automotive seals, gaskets, anti-vibration parts - NER's natural-rubber advantage for high-mix, low-volume production) - Bamboo Products - (Construction materials, furniture, textiles, packaging - multi-category manufacturing from endemic bamboo) - Electronics Assembly - (Automotive components, sensors, testing services - ancillary to Tata semiconductor ecosystem in Assam) - Food Processing Equipment - (Pineapple/citrus lines, fermentation units - machinery tailored to NER agri-value chains)			Category		Example Products				
			Aerospace / Defence		UAV components, satellite subsystems, MRO spares				
			Electronics EMS		PCB housings, connectors, heat sinks				
			Medical Devices		Implants, casings, diagnostic housings				
			Precision Engineering		CNC-milled components, sheet-metal assemblies				
Government Policy & Support			Export Potential & Market Access						
PLI Scheme (~₹1.97 lakh crore): spans key sectors (electronics, telecom, medical devices, auto components, specialty steel, food, etc.), creates ~12 lakh jobs nationally, and allows eligible units anywhere, including the Northeast, to apply. Make in India & Industrial Ecosystem Push: supports industrial parks, plug-and-play facilities, testing labs, R&D support, and export promotion through incentives, trade fairs, and buyer-seller meets. PLI Disbursements & Manufacturing Impact: over ₹21,500 crore disbursed by mid-2025, reinforcing firms expanding high-mix production capacity. MSME & Cluster Development Support: offers capital subsidies, testing/quality infrastructure, and technology upgradation, with higher funding thresholds and relaxed norms for NE states (up to 90% grant in hilly/NER areas under select schemes).			Top Export Destinations India		Key HS Codes				
				HKG	854231: Electronic integrated circuits as processors and controllers, whether or not combined with . .				
				KOR					
				VNM	854239: Electronic integrated circuits (excl. such as processors, controllers, memories and amplifiers)				
				USA					
	UAE	854232: Electronic integrated circuits as memories							

Source: IMARC Group, Mordor Intelligence, Estimates from NEDFi



1. Current scenario: High-Mix Manufacturing in North-East India

High-mix, low-volume manufacturing represents a strategically relevant frontier for the North Eastern Region, encompassing segments such as aerospace and defence MRO, unmanned aerial vehicles (UAVs), Electronics Manufacturing Services (EMS), medical devices, precision engineering, customised furniture, and high-fashion apparel and accessories. While these industries remain at an early stage in the region, policy momentum, Act East connectivity, and a young, expanding workforce provide a credible foundation for long-term industrial growth.

Importantly, the high-mix model aligns well with the region's hilly terrain, where uniform large-scale manufacturing footprints are not feasible. Its inherent flexibility allows production to be distributed across smaller, modular sites – supporting diversification of manufacturing activity. Comparable models, such as multi-storey “flatted factories” used in Singapore and other land-constrained geographies, demonstrate how compact, vertically structured facilities can successfully host precision engineering, electronics assembly, and design-driven industries.

Assam is currently the most advanced state in this space, anchoring several high-profile initiatives. These include proposed investments of INR 50 crore in advanced integration and testing facilities, the Assam MRO Policy 2025 aimed at establishing three world-class maintenance hubs, and the upcoming Semiconductor Assembly and Test (OSAT) facility at Jagiroad, which opens downstream opportunities

across electronics and module-level manufacturing. Nagaland and Tripura complement Assam's role through SEZ-linked policy frameworks and proximity to Act East trade corridors. Guwahati's electronics laboratories and public-private partnerships strengthen EMS readiness, while Tripura and Nagaland are well suited for modular assembly and finishing operations in customised furniture and high-fashion products, supported by shorter routes to consumption centres and cross-border markets.

The sector's prospects are reinforced by a strong youth demographic and expanding ITI-based skilling pathways. However, several constraints continue to shape near-term competitiveness: limited availability of sector-ready technical talent in CNC machining, clean-room electronics, and industrial-grade finishing; inconsistent power supply and industrial utilities across most states; shallow local supply chains for tooling, consumables, and PCB-related inputs; and logistics cost pressures for furniture and other bulky items unless production is located near consumption markets.

Addressing these gaps through targeted infrastructure development, structured skilling programmes, and deeper supply-chain integration will determine the pace at which the region can convert its strategic positioning – and the geographic advantages of a distributed, high-mix model – into durable, high-value manufacturing activity.

2. State wise status: Resource availability and processing infrastructure⁷³

Table 27: State wise status: Resource availability and processing infrastructure (High-Mix Manufacturing)

State	Manufacturing resource potential	Industrial / Processing infrastructure
Assam	Strong industrial talent base, logistics access, entry-point for South-East Asia; 1,458,241 MSMEs, by far the largest manufacturing and services base in the NER	TSAT facility, Jagiroad - INR 27,000 crore OSAT project (production expected 2026; ~48M chips/day capacity, advanced packaging); Guwahati EMS labs; proposed UAV/MRO integration
Tripura	Export-facing geography (Bangladesh), labour availability; bamboo textile and rubber-linked enterprise base; 308,998 MSMEs	Bodhjungnagar and Santirbazar industrial estates; scope for finishing, assembly, and light manufacturing of furniture and fashion goods
Manipur	Strong artisan and micro-manufacturing ecosystem; tribal design language and handloom-garment base; 173,443 MSMEs	Small-scale garment and accessory clusters; decentralised production units; digital designer networks
Nagaland	Bamboo-wood resource base; skilled youth for assembly and light fabrication; 72,704 MSMEs	Ganeshnagar SEZ (125 acres) – suitable for furniture assembly, agro-processing, and precision fabrication

⁷³ Ministry of Micro, Small & Medium Enterprises, Government of India. State wise Udyam registrations. https://dashboard.msme.gov.in/Udyam_Statewise.aspx



State	Manufacturing resource potential	Industrial / Processing infrastructure
Meghalaya	Craft-led and agri-linked micro-enterprise base; tourism-aligned production; 70,903 MSMEs	Small industrial estates; food processing, handicraft and design-led clusters; scope for scale-up through common facilities
Mizoram	Boutique artisan capacity; micro-enterprises in bamboo, garments and food products; 50,937 MSMEs	Cottage garment, bamboo and food-processing units; PMFME-supported micro enterprises
Arunachal Pradesh	Strategic location for UAV, defence-linked and frontier manufacturing; 47,086 MSMEs	Early-stage PPP exploration for UAV-related workshops and repair facilities; limited industrial estates
Sikkim	Niche, high-quality micro-enterprise base; tourism-linked production; 35,256 MSMEs	Small-batch manufacturing and cottage units; limited large-scale industrial processing

3. High-Mix Manufacturing value chain in the North-East Region

The high-mix manufacturing value chain in the North Eastern Region spans multiple technically distinct product categories, yet follows a common structural pattern: the region's participation is strongest at the component- and assembly-stage activities, while tertiary value addition and branded market development remain limited.

Component and base-material manufacturing constitutes the first stage of the chain, covering CNC machining, sheet-metal fabrication, bamboo and wood processing, and yarn-to-fabric conversion across general manufacturing categories. In semiconductors, this stage includes chip-level OSAT operations through the upcoming TSAT facility, along with substrate packaging. Activity at this stage is anchored primarily in Assam through its TSAT facility and electronics-manufacturing laboratories, while Nagaland and Tripura serve as natural bases for wood- and bamboo-derived component production due to their raw-material availability and emerging cluster infrastructure.

Assembly and finishing represents the second stage, encompassing furniture assembly, sanding, finishing, and upholstery; apparel stitching, pattern making, screen printing, and accessory finishing; and

electronics PCB assembly, device sub-assembly, and UAV module integration. The industrial base for these activities is distributed across Assam for EMS and OSAT-linked assembly, Tripura and Nagaland for furniture and fashion assembly operations, and Manipur and Meghalaya for fashion-finishing activities. This stage offers the region its most immediate manufacturing scalability opportunity: existing skill bases, coupled with emerging infrastructure, can be organised into structured production capacity without requiring the full ecosystem maturity demanded by more complex upstream manufacturing.

Tertiary value addition and branding which includes modular-furniture design and export packaging, high-fashion branding and direct-to-consumer e-commerce, and semiconductor module bundling and power-electronics integration – remains limited across the region. Early-stage exceptions exist in Tripura and Shillong, but most branding, export preparation, and higher-order integration activities continue to take place outside the North East. This displacement reflects persistent ecosystem gaps in design capability, export logistics, and market-development infrastructure, and constrains the region's ability to capture the full value of its manufacturing base.

4. Comparative state advantages and strategic roles

The geographic distribution of the high-mix manufacturing sector across the North Eastern Region reflects a differentiated set of industrial capabilities, resource endowments, and trade-corridor advantages, together supporting a coherent and non-competing set of strategic roles.

Assam serves as the region's primary industrial anchor for high-mix manufacturing. With the TSAT OSAT facility, electronics-manufacturing services infrastructure, and defence MRO policy initiatives, the

state has positioned itself as the hub for semiconductor assembly, EMS operations, and aerospace and defence maintenance. Assam's scale, connectivity, and institutional depth also enable it to function as the region's hub-and-spoke supply-chain centre—aggregating inputs, coordinating logistics, and providing testing and quality-assurance capabilities that downstream assembly operations across the North East can rely upon.



Nagaland's role is shaped by the combination of its SEZ policy framework and abundant bamboo and wood resources, making it well suited for precision assembly and furniture-manufacturing operations. SEZ-linked regulatory advantages and material availability support cost-effective production of wood- and bamboo-based product lines. Its Act East connectivity further strengthens the state's potential to develop export-oriented assembly operations targeting ASEAN markets.

Tripura's comparative advantage lies in its proximity to Bangladesh, offering a natural and cost-efficient export corridor for high-fashion and furniture-finishing operations. The state's role as a finishing and export-preparation hub leverages its artisan and assembly skill base, combined with its strategic location as the most accessible point for cross-border trade. This makes Tripura the most immediately viable location for manufacturing activities where commercial competitiveness depends on efficient access to external consumer markets.

Beyond these leading contributors, the remaining states offer distinct and evolving roles that complement the regional ecosystem. **Meghalaya**, supported by the Integrated Textile Tourism Centre (ITTC) in Nongpoh, can diversify into design-enabled, small-batch manufacturing – particularly in

high-fashion apparel, accessories, and lifestyle goods – where creativity and brand value matter more than production scale. **Manipur** possesses a strong base of engineering institutes and can evolve as a niche hub for prototyping, UAV assembly, and light-engineered components.

Mizoram's compact urban centres and relatively strong industrial infrastructure position it well for clean-room-oriented small electronics assembly and medical devices. **Arunachal Pradesh**, with its wood resources and emerging road connectivity, is suited for modular fabrication workshops and micro-clusters for custom furniture and precision wood products.

Sikkim, with its experience in regulated manufacturing environments, offers a future-ready niche in specialised small-batch medical devices and high-precision assembly.

Together, these differentiated roles support a distributed, mutually reinforcing high-mix manufacturing ecosystem across the North Eastern Region. This model aligns naturally with the region's terrain, which limits large-scale factory footprints but favours modular, flexible manufacturing formats. By leveraging these complementary strengths, the region can advance toward a resilient industrial base that aligns with its geographic realities while maximising market-linked opportunities.

5. Downstream high-mix manufacturing product scope

Table 28: Downstream high-mix manufacturing product scope

Category	Example products
Furniture	Modular bamboo-wood furniture, hotel furnishings, flat-pack furniture
Apparel and Fashion	Designer tribal apparel, scarves, contemporary fusion wear
Accessories	Bamboo/leather-alt handbags, jewelry, belts, footwear
Electronics / Semiconductors	Chip packaging (OSAT), PCB modules, routers, IoT devices
Aerospace and Defense	UAV arms, satellite casing components, MRO parts
Medical Devices	Casings, diagnostic housings, implants

6. Strategic interventions

Realising the high-mix manufacturing sector's potential across the North Eastern Region requires a set of interventions that build industrial ecosystem depth, develop specialised production zones, and position the region for participation in higher-value segments of global and domestic manufacturing value chains.

A foundational intervention is building the supply chain ecosystem around the TSAT OSAT facility in Assam, developing PCB plants, substrate manufacturers, chemical suppliers, and chip-packaging input providers that transform a single

anchor facility into a self-reinforcing industrial cluster. This ecosystem development is the precondition for the region's semiconductor ambitions to generate sustained downstream value rather than remaining an isolated assembly node dependent on externally sourced inputs.

Complementing this, establishing an Assam hub and Tripura-Nagaland spoke model for assembly and bulky goods furniture finishing would create a coherent regional manufacturing architecture that distributes production activity according to each state's

comparative advantage while maintaining logistical and supply chain integration.

Launching high-fashion manufacturing zones in Shillong, Imphal, and Agartala, anchored by design schools and e-commerce export infrastructure, would develop the region's fashion and apparel potential into an organised industrial proposition with both domestic and cross-border market reach. The co-location of design capability and export facilitation within these zones is particularly important, as it addresses both the creative and commercial dimensions of a sector where brand identity and market access are as consequential as production quality.

Incentivising cluster-led CNC and precision tooling training through ITI-industry partnerships would build the technical workforce pipeline that manufacturing scale in aerospace, electronics, and precision engineering requires, addressing the skilled labour gap that currently constrains sector development across multiple categories.

Developing multimodal freight solutions for bulky furniture logistics into metropolitan markets, through rail containers and dedicated North East freight corridors, would address the logistics cost disadvantage that limits the commercial viability of furniture manufacturing in the region. Underpinning all of these interventions is a strategic imperative to position the North East not merely as a chip-export zone but as an integrated semiconductor-to-consumer electronics region, where semiconductor assembly connects forward into packaged electronics and ultimately into branded consumer products.

This integration of semiconductors, devices, and design within a single regional value chain would represent the most transformative and durable outcome of the sector's development, anchoring high-value manufacturing activity within the region rather than allowing it to disperse to more industrially developed centres elsewhere.



5.13 Digital/IT Hubs

1. Current scenario: Digital and IT Hubs in North-East India

The North Eastern Region is emerging as an important frontier for digital and information technology development in India, propelled by policy investment, expanding digital infrastructure, and a strengthening innovation ecosystem. Assam contributes to this momentum through initiatives such as Assam Startup, the IIT Guwahati Research Park, and the North East Centre for Technology Application and Reach, which together foster innovation across artificial intelligence, agri-tech, healthcare, and logistics. Tripura hosts the region's largest IT hub and a state IT policy that has enabled notable e-governance efficiencies, generating savings of ~INR 50 crore annually – demonstrating the tangible public-sector value of sustained digital infrastructure investment.

Digital-enabling infrastructure continues to expand through BharatNet rollout, 5G corridor development, STPI-supported electronics clusters, and PM-DevINE funding amounting to INR 6,600 crore for digital and connectivity infrastructure. Private investment interest in the region now stands at around INR 4.3 lakh crore, reflecting rising confidence in the North East's digital economy prospects, even as the translation of this interest into scaled enterprises and operational services remains at an early stage.

Several structural constraints influence the sector's development trajectory. A digital divide, including notably low female internet usage in parts of Assam and Meghalaya, limits both inclusivity and the effective scale of digital participation. Infrastructure gaps outside major urban centres, particularly in power reliability, high-speed fibre connectivity, and availability of co-working spaces, constrain the wider geographic spread of digital-economy activity. Regional startups face challenges in scaling due to limited funding access, narrow market reach, and inadequate investor networks, while a skills mismatch between educational-institution output and IT-industry requirements restricts the supply of sector-ready talent.

Addressing these interconnected constraints through targeted infrastructure investment, skills development, and robust startup-ecosystem support will be central to unlocking the region's digital-economy potential and positioning the North East as a meaningful contributor to India's broader technology-led growth story.

2. State wise status: Resource availability and digital infrastructure

Table 29: State wise status: Resource availability and digital infrastructure (Digital / IT Hubs)

State	Digital / IT resource base	Digital infrastructure
Assam	Largest startup ecosystem; IIT Guwahati academic innovation	The Nest incubator, STPI Guwahati, research park and startup mission; more than 1,000 incubator applications processed
Tripura	State IT push with AI and 5G adoption	Airtel regional data center; largest NER IT hub; IT Policy 2022 driving digital administration
Meghalaya	NECTAR-led digital application zones; domain-based innovation	Digital agri/weaving tech pilots; emerging digital hubs
Other NER States	Youth skilling through ITIs and BharatNet fibre rollout	Incubators, shared workspaces via PM-DevINE and state schemes

3. Digital and IT Value Chain in the North East Region

The digital and IT value chain in the North Eastern Region progresses from early-stage product development to commercial deployment and enterprise-scale services, with the region's strongest participation currently at the ideation and prototyping stage and commercial-scale activity concentrated in a limited number of centres.

Primary digital development includes ideation, prototyping, and software or application development,

supported by a growing network of incubation and research institutions. Assam Startup, the IIT Guwahati incubator, and NECTAR-linked institutions serve as the principal hubs at this stage, offering physical infrastructure, mentorship, and research linkages essential for early-stage digital ventures. This is the most developed layer of the regional ecosystem, reflecting sustained institutional investment in innovation and entrepreneurship support.

Secondary development covering testing, cloud deployment, and the scaling of SaaS and IT-enabled services is supported by Software Technology Parks of India (STPI) hubs, regional data centres, and an expanding base of co-working and accelerator spaces. This phase represents the critical transition from prototype to market-ready product. While enabling infrastructure exists, its scale and geographic reach remain insufficient for the growing pool of ventures emerging from the region's incubation ecosystem. The concentration of data-centre capacity and STPI facilities in only a few locations limits the ability of firms outside state capitals to access specialised technical and commercial support essential for effective scaling.

Tertiary development, which includes commercialisation, enterprise solutions,

export-oriented IT services, and long-term managed-services delivery, remains concentrated primarily in Assam and Tripura, with other states still at earlier stages of participation. The displacement of higher-value commercial and export-oriented activity to more established IT hubs outside the region reflects both the scale limitations facing regional enterprises and the market-access gaps that constrain their ability to compete for national and global enterprise contracts.

Building this stage of the value chain within the region through export facilitation, enterprise-market linkages, and strengthened commercial IT-services capability represents the most significant opportunity to enhance the digital economy's overall contribution to the North Eastern Region.

4. Comparative state advantages and strategic roles

The digital and IT sector's strategic geography across the North Eastern Region reflects meaningful differences in institutional depth, infrastructure maturity, and domain specialisation, with each state's role shaped by its existing assets and the opportunities inherent in its economic and social context.

Assam serves as the region's startup and innovation anchor. The research ecosystem provides a strong deep-tech pipeline, supporting advancements in artificial intelligence, agri-tech, healthcare, logistics, and other high-complexity domains. Its concentration of incubation centres, research institutions, and early-stage venture-support infrastructure positions Assam as the natural hub for sophisticated digital product development and the commercialisation of research-linked technology ventures.

Tripura's strategic role is rooted in its data-centre infrastructure and established IT hub, which together position the state as the region's principal node for IT-enabled services, back-office operations, and digital service delivery. Its proven e-governance track record, combined with data-centre capacity, creates a strong platform for expanding into business-process services and managed IT services for both public-sector and private-enterprise clients.

Meghalaya's role is oriented toward domain-specific digital development. The state's agri-tech, healthcare, and tourism sectors provide a focused application environment for digital solutions tailored to local challenges. This alignment with Meghalaya's broader economic profile offers a viable pathway for digital ventures that compete through contextual expertise rather than scale, leveraging local sector knowledge to create differentiated solutions.

For the remaining states—Nagaland, Manipur, Mizoram, Arunachal Pradesh, and Sikkim—the pathway to deeper participation in the digital economy begins with consolidating foundational infrastructure and strengthening talent pipelines. **Nagaland** has demonstrated early momentum through digital governance reforms and community-driven innovation programmes, positioning it well for service-delivery platforms and citizen-centric applications. **Manipur**, with its strong base of engineering education and youth-led digital entrepreneurship, holds potential for niche capabilities in gaming, cybersecurity, and content-creation ecosystems.

Mizoram's compact urban form and relatively high digital adoption make it well suited for piloting urban-tech solutions, including digital public services, mobility management, and municipal automation. **Arunachal Pradesh**, given its challenging terrain and dispersed settlements, can emerge as a test bed for frontier applications such as satellite-based connectivity, remote service delivery, and resilient digital infrastructure architectures. Sikkim, with its established record in regulated sectors such as pharmaceuticals and organic agriculture, can specialise in digital tools for compliance-driven industries, health-tech, and sustainability-linked monitoring systems.

A coordinated regional approach that links these emerging ecosystems with the more mature digital environments of Assam, Tripura, and Meghalaya would accelerate integration into the broader value chain while allowing each state to build on its specific comparative strengths. Such an approach ensures not only balanced regional development but also a more resilient and diversified digital economy for the North Eastern Region—one where scale, specialisation, and contextual innovation coexist within a shared strategic framework.



5. Downstream digital and IT product scope

Table 30: Downstream digital and IT product scope

Category	Example outputs
Software and ITeS	SaaS apps, custom software, BPO/KPO
Agri-tech	Farm-monitoring tools, supply-chain digital systems
GovTech	e-Governance platforms, AI-administration tools
Data and AI	Data center services, analytics
EMS / Embedded	PCB design, embedded systems software

6. Strategic interventions

Advancing the digital and IT sector across the North Eastern Region requires interventions that simultaneously deepen the innovation ecosystem in established centres, extend digital infrastructure to underserved areas, and build the human capital and market access mechanisms through which regional digital ventures can achieve commercial scale.

In Assam, scaling the Startup ecosystem through expanded investor access, structured accelerator programmes, and strengthened industry pipelines would consolidate the region's primary innovation anchor and improve the rate at which early-stage ventures transition from prototype to commercially viable enterprise. This investment in the commercialisation pathway is as important as the incubation infrastructure itself, addressing the funding and mentorship gaps that currently limit startup progression beyond the early development stage.

In Tripura, activating the IT hub and data centre ecosystem for enterprise hosting and IT-enabled services would translate existing infrastructure into operational commercial capacity, positioning the state as a viable location for back-office, managed services, and regional digital service delivery. This intervention requires both demand-side activation through

enterprise client development and supply-side investment in workforce capability and service delivery standards.

Expanding BharatNet to last-mile connectivity across all North Eastern districts would address the geographic concentration of digital economy benefits that currently limits participation to state capitals and larger urban centres. This infrastructure investment is the precondition for meaningful digital inclusion and the geographic spread of remote work, freelancing, and digital entrepreneurship opportunities across the region. Complementing this, creating digital skills missions specifically targeting women and youth, tied to remote work and freelancing market opportunities, would address both the gender dimension of the digital divide and the skills mismatch that limits the employability of the region's youth in the IT sector.

Enabling national market linkages for NER startups through venture capital roadshows and corporate procurement programmes would address the market access constraints that prevent regionally developed products and services from achieving national or global scale; thus connecting the region's innovation ecosystem to the funding and commercial partnerships necessary for sustained growth.

5.14 Tourism

1. Current scenario: Tourism in North-East India

Tourism in the North Eastern Region is inherently a cross-regional sector whose benefits scale most effectively through coordinated planning rather than state-wise development in isolation. Visitor flows naturally traverse state boundaries, and the strongest outcomes in destination development, transport connectivity, accommodation, and tourism services materialise when these elements are aligned at the regional level. Fragmented, uncoordinated investments depress utilisation rates, limit private-sector participation, and dilute employment multipliers; whereas a centrally anchored, cross-NER approach enables demand aggregation, reduces transaction costs, and supports shared connectivity and digital-platform infrastructure that individual states cannot develop independently.

Against this structural backdrop, the sector has recorded meaningful and accelerating growth. The North Eastern Region welcomed more than 80 lakh visitors between April and February 2024-25, with particularly strong momentum in Mizoram (114%), Manipur (116%), Arunachal Pradesh (99%), and Meghalaya (73%)⁷⁴.

This trajectory is supported by initiatives such as the Swadesh Darshan tourism circuits, PRASHAD religious-tourism projects, UDAN-linked air-connectivity improvements, and NEC master plans focused on eco- and adventure-tourism development.

Thirty-three tourism circuits have been identified across the region – including nine priority routes such as Kaziranga-Majuli, Tawang-Bomdila, and Loktak-Imphal – providing a structured framework for product development and infrastructure investment. PM-DevINE's INR 6,600 crore allocation for airport upgrades, road development, and regional logistics further strengthens the enabling environment.

Despite this positive trajectory, the region's international tourism footprint remains underdeveloped. Foreign tourist arrivals remain at roughly 2 lakh, around 2% of the national total reflecting persistent global visibility challenges and connectivity limitations. Several structural constraints continue to shape the sector's development. Air and road connectivity beyond major urban centres is still inadequate, limiting the geographic distribution of tourism activity and reducing visitor dwell time. The supply of quality hotels, eco-resorts, and standardised homestays lags behind rising demand, particularly for higher-value traveller segments. Security and perception challenges in select geographies require sustained communication strategies and on-ground improvements. Additionally, linkages between tourism and local economic systems – such as handicrafts, food, souvenirs, and community enterprises – remain weak, limiting the employment multipliers and inclusive-growth potential that a well-integrated tourism economy can generate.

2. State wise status: Tourism resource base and infrastructure⁷⁵

Table 31: State wise status: Tourism resource base and infrastructure

State	Tourism resource availability	Tourism enabling infrastructure
Assam	Wildlife (Kaziranga), river islands (Majuli), Kamakhya temple; 7.6 million tourists	International airport; safari circuits; resorts along key wildlife zones
Sikkim	Buddhist circuits, trekking; 1.6 million tourists	Organic tourism and wellness clusters
Meghalaya	Living-root bridges, caves, waterfalls (Cherrapunji); 1.6 million tourists	Shillong hotel base; growing adventure operators; strong arrivals
Arunachal Pradesh	Tawang monastery, Ziro Valley, Mechuka; 0.8 million tourists	UDAN airports (incl. Donyi Polo); eco-camps expanding
Tripura	Ujjayanta Palace, Neermahal palace; 0.7 million total tourists	Agartala airport; heritage site upgrades
Mizoram	Hills, lakes, serenity; 0.4 million tourists	Aizawl hotels; village homestay ecosystem
Nagaland	Hornbill Festival, tribal cultural landscape; 0.1 million tourists	Kohima-Dimapur tourism corridor; festival infrastructure
Manipur	Loktak Lake, Imphal heritage; 32,000 tourists	Emerging circuits extending toward Moreh trade zone

⁷⁴ North Eastern Development Finance Corporation Ltd. (NEDFi). NEDFi Databank. <https://databank.nedfi.com/>

⁷⁵ North Eastern Development Finance Corporation Ltd. (NEDFi). NEDFi Databank. <https://databank.nedfi.com/>



3. Tourism value chain in the North-East Region

The tourism value chain in the North Eastern Region progresses from foundational site preparation to the development of branded and commercially packaged visitor experiences. At present, capacity is strongest at the primary and secondary stages, while higher-value tourism products remain underdeveloped.

Primary development forms the base of the chain and includes site identification, basic amenities, trail development, and the training of community guides. These activities make natural and cultural attractions accessible to visitors, creating the raw experiential assets upon which downstream tourism activity depends. This stage is advancing across the region through central and state scheme support, though the quality and consistency of basic amenities and site management vary widely across destinations, influencing visitor experience and the viability of commercial operators that rely on reliable on-ground infrastructure.

Secondary development encompassing homestays, tour operators, local food experiences, and craft-based visitor engagement is the stage at which community participation and economic distribution are most visible. Supported by Swadesh Darshan 2.0

circuit clusters and community-based infrastructure development, this layer has seen meaningful progress. Homestay networks and local tourism enterprises have expanded in certain destinations; however, the broader supply of standardised, quality-assured accommodation and curated experiences remains inadequate to meet the expectations of higher-value domestic and international travellers.

Tertiary development, which includes branded tourism packages, MICE (meetings, incentives, conferences, and exhibitions) events, and internationally marketed visitor offerings, remains at an early stage across the region. The absence of professionally packaged and globally distributed tourism products limits the region's ability to attract foreign visitors and premium domestic travellers who depend on structured itineraries and consistent service standards. Strengthening this stage through destination branding, package development, and improved access to international markets—represents the most significant opportunity to enhance the sector's overall economic contribution and position the North East as a recognisable tourism destination on the global stage.

4. Comparative state advantages and strategic roles

The tourism landscape of the North Eastern Region is defined by an extraordinary diversity of natural, cultural, and experiential assets, with each state offering a distinct and largely non-competing visitor proposition. Together, these create a compelling multi-destination regional portfolio well suited to coordinated, circuit-based tourism development.

Assam functions as the region's primary gateway, combining wildlife tourism anchored by Kaziranga and Manas with riverine and spiritual experiences that draw visitors into the wider North East. Its connectivity infrastructure and established tourism brand position it as the entry point through which regional visitor flows are initiated and dispersed across neighbouring states.

Sikkim occupies the premium end of the tourism spectrum, offering mountain landscapes, Buddhist spiritual heritage, wellness-oriented retreats, and a sustainable luxury positioning that appeals to high-value travellers seeking immersive, nature-based experiences. **Meghalaya** attracts a younger, adventure-oriented demographic, with its caves, waterfalls, living-root bridges, and short-stay circuits well suited to domestic youth travel and weekend tourism from major metropolitan centres.

Arunachal Pradesh provides a high-altitude premium proposition that blends frontier landscapes, adventure trekking, and Buddhist spiritual destinations such as Tawang. It appeals to travellers seeking both physical challenge and cultural depth. **Tripura's** tourism identity is rooted in heritage and spirituality, with royal palaces, archaeological sites, and cross-border Buddhist circuits offering rich historical experiences with natural resonance for Bangladeshi visitors.

Mizoram offers a compelling slow-tourism proposition centred on tribal immersion, festivals, music, hill towns, and a well-developed homestay culture—ideal for travellers seeking authentic, community-based experiences away from high-footfall destinations.

Nagaland's tourism economy is anchored by the Hornbill Festival and its tribal heritage, where experiential village tourism provides a model for culturally grounded engagement that directly benefits local communities. **Manipur** presents a multi-dimensional visitor proposition spanning Loktak Lake's ecological significance, classical performing arts, martial traditions, and event-led tourism, combining natural, cultural, and sporting dimensions in a single destination.

Taken together, these eight distinct yet complementary destination identities provide the North East with a tourism portfolio of exceptional depth and differentiation. This diversity creates a

strong foundation for a coordinated, multi-destination marketing strategy and shared infrastructure development that can amplify the region's collective tourism potential.

5. Tourism products and experience scope

Table 32: Tourism products and experience scope

Category	Examples
Wildlife and Eco	Safaris, birding, river rafting, forest treks
Culture & Heritage	Hornbill Festival, monasteries, tribal villages
Adventure	Caving, paragliding, rock climbing, zip-lines
Value Added	Homestays, ethnic cuisine markets, handicraft retail
MICE and Spiritual	Conventions, Buddhist and pilgrimage tourism

6. Strategic interventions

Advancing tourism across the North Eastern Region requires a set of interventions calibrated to each state's destination profile and development stage, while simultaneously strengthening the cross-regional infrastructure and value chain linkages through which the sector's economic benefits are most broadly distributed.

Connectivity remains the most fundamental enabler of tourism growth across the region. Expanding airport and road infrastructure, and anchoring quality accommodation investment through luxury and mid-segment resort development in Assam and Meghalaya, would improve the region's ability to attract and retain higher-value visitors whose spending generates the most significant multiplier effects across local economies. In Arunachal Pradesh and Mizoram, developing homestay clusters alongside road infrastructure improvements would extend tourism capacity to destinations that are currently constrained by both accommodation supply and access, enabling the slow and immersive tourism models that these states are best positioned to offer.

In Nagaland and Manipur, strengthening festival infrastructure and improving tourism-security coordination would address the twin priorities of enhancing the visitor experience at high-profile cultural events and managing the perception and safety considerations that currently limit these states' ability to attract broader visitor segments. In Tripura and Sikkim, scaling heritage restoration programmes and developing digital booking and visitor management platforms would improve both the quality of the tourism product and the accessibility of reservation and itinerary planning systems for domestic and international travellers.

Across all states, building tourism-linked value chains connecting food, crafts, guide services, and local experiences to the visitor economy is essential to ensuring that tourism revenue circulates within communities rather than accruing primarily to external operators and platforms. This integration of local economic systems into the tourism value chain represents both the most equitable and the most sustainable pathway to realising the sector's full potential as a driver of inclusive growth across the North Eastern Region.



5.15 Minerals

1. Current scenario: Minerals in North-East India

The North Eastern Region hosts a diverse and strategically important mineral base that spans coal, limestone, petroleum, and natural gas, alongside deposits of graphite, mica, and minor metals. Assam and Meghalaya remain the principal mining states: Assam's endowment is concentrated in petroleum, natural gas, coal, and limestone, while Meghalaya holds substantial reserves of limestone and coal as well as kaolin, granite, glass sand, bauxite, and uranium. Beyond these established extractive categories, the Geological Survey of India has identified the North East as an emerging frontier for critical minerals, with ongoing exploration for rare earth elements, vanadium, nickel, cobalt, chromite, and bauxite across Arunachal Pradesh, Assam, Nagaland, Meghalaya, and Manipur. Several blocks are progressing toward auction for strategic mineral development, reflecting growing national interest in the region's untapped resource potential.

However, sectoral development unfolds within a complex environmental, social, and governance context. The region's forested, high-rainfall hill terrain is ecologically sensitive, and mineral extraction carries significant risks to forest cover, watershed systems,

and biodiversity. Meghalaya's historical challenge of unsafe, informal coal mining has resulted in bans and prolonged litigation, underscoring the imperative for formal, responsible, and regulated mining practices as the basis for any future expansion. Infrastructure challenges, particularly limited rail and road connectivity for mineral evacuation, impose high logistics costs and constrain the commercial viability of operations in remote locations. Issues related to land rights, royalty distribution, and securing social licence for mining further complicate the operating environment, requiring transparent, inclusive governance arrangements that balance community interests with economic objectives.

Taken together, these factors create a sector characterised by both significant resource potential and substantial structural and environmental constraints. Unlocking this potential will require a development approach that is strategically ambitious yet environmentally and socially responsible, ensuring that extraction activities strengthen regional development while safeguarding ecological integrity and community well-being.

2. State wise status: Resource base and processing infrastructure⁷⁶

Table 33: State wise status: Resource base and processing infrastructure (Minerals)

State	Mineral resource availability	Processing and industrial infrastructure
Meghalaya	Very large limestone (~15,100 MT), coal (~576 MT), kaolin, bauxite, granite, uranium; highest mineral output in NER (~₹505 crore)	Multiple cement plants and lime manufacturers along southern belt; coal mining restricted since 2014
Mizoram	Minor minerals and construction materials; limited diversity but high reported mineral value (~₹258 crore)	Small extraction of aggregates; no major industrial mineral-processing nodes
Assam	Coal, petroleum, natural gas, limestone, clay, glass sand, sillimanite; significant mineral output (~₹81 crore)	Oil and gas belts (Dibrugarh-Naharkatia-Moran), refineries, gas processing; scope for cement and chemicals in accessible corridors
Arunachal Pradesh	Coal, graphite, mica, oil (Namchik-Namphuk), REE, vanadium and other critical-mineral targets; moderate mineral output (~₹56 crore)	Limited organized mining; early-stage exploration blocks moving toward auction
Tripura	Natural gas, limestone, construction materials; limited mineral value (~₹7 crore)	Gas-linked small industries; limited downstream mineral utilization
Sikkim	Thin coal seams, minor materials; chromite (broader context); low reported mineral output (~₹2 crore)	Small extraction of aggregates; no major industrial nodes
Manipur	Limestone and coal; very low mineral output (~₹0.3 crore)	Very limited formal extraction; terrain and access constraints
Nagaland	Coal, limestone, tin, minor minerals; lowest reported mineral output (~₹0.2 crore)	Small-scale coal and limestone mining; potential for local construction-material clusters

⁷⁶ North Eastern Development Finance Corporation Ltd. (NEDFI). Mineral resources – NER Databank <https://databank.nedfi.com/ne-resources/mineral-resources>

3. Minerals value chain in the North East Region

The minerals value chain in the North Eastern Region spans from primary extraction to downstream manufacturing, with the region's industrial participation strongest at the extraction and basic processing stages, while higher-order value addition remains largely located outside the region.

Primary extraction forms the foundation of the chain and includes exploration, drilling, quarrying, and stockpiling across the region's major mineral belts. Outputs at this stage – run-of-mine coal, limestone boulders, crude petroleum, natural gas, and raw industrial minerals – are generated primarily in the Meghalaya-Assam limestone and coal belts, the oil and gas fields of upper Assam, and the smaller deposits of Nagaland and Arunachal Pradesh. This is the most established stage of the value chain; however, informal and unregulated extraction has created regulatory and reputational challenges that must be addressed to support a credible, formalised mining ecosystem.

Secondary processing involves crushing, sizing, washing, beneficiation, and the fractionation of petroleum and natural gas. This stage is supported by an existing industrial base comprising cement plants

in Meghalaya and Assam, lime kilns, refineries and gas-processing units in Assam, and stone-crushing clusters across the mineral belt. Cement manufacturing is particularly significant, providing a well-established downstream use for the region's limestone resources. Despite this, processing capacity remains unevenly distributed and insufficient to absorb the full volume of extractable mineral output, limiting the depth of value addition within the region.

Tertiary and downstream manufacturing – including cement derivatives, clinker, concrete products, chemicals, fertilisers, glass, ceramics, petrochemicals, and emerging rare-earth and graphite-based products – remains predominantly located outside the North East. The shift of higher-order processing to external industrial centres reflects both the region's limited market scale and the absence of the broader industrial ecosystem required for complex downstream manufacturing. As critical-mineral exploration advances and strategic mineral blocks move toward auction, establishing at least a foundational layer of downstream processing within the region will become critical for improving value retention, enabling economic diversification, and positioning the North East within emerging national mineral strategies.

4. Comparative state advantages and strategic roles

The minerals sector's strategic geography in the North Eastern Region reflects a clear differentiation between states with established extractive and processing industries and those whose significance lies in emerging and critical-mineral potential. Each state's role is shaped by the nature of its resource endowment and the maturity of its industrial base.

Meghalaya serves as the region's limestone and cement backbone. Its high-quality calcium-oxide reserves form the raw-material foundation for one of the North East's most developed downstream manufacturing industries. Cement production represents the most mature example of an integrated mineral-to-manufactured product value chain in the region, and continued investment in this sector offers a proven pathway for value retention, industrial employment, and supply-chain stability.

Assam's role is anchored in hydrocarbons. Its refineries, gas-based power generation, and chemical-processing potential make it the region's most industrially significant mineral economy. Decades of investment have built a strong institutional and infrastructural base for petroleum and natural-gas processing. The opportunity to expand into gas-based chemical and fertiliser industries represents a meaningful avenue for downstream value addition that builds directly on existing capabilities.

Nagaland and Manipur function as support nodes for cement, lime, and construction-material clusters. Their coal and limestone deposits contribute to regional supply chains that serve both state-level construction demand and the wider industrial ecosystem. **Arunachal Pradesh** stands out as the region's most significant emerging mineral frontier; its endowment of rare-earth elements, vanadium, graphite, and other battery-metal resources positions it as a strategically important zone for exploration and eventual extraction, especially as national and global demand for critical minerals continues to rise.

Tripura's role centres on clean-industry development. Its natural-gas resources provide the feedstock potential for power generation, fertiliser production, ceramics, and other gas-linked industries that could form the nucleus of a distinctive industrial cluster—one that is less extractive in character and better aligned with the region's environmental profile.

Together with **other emerging states**, these differentiated roles form a coherent regional minerals strategy in which established extractive centres, processing hubs, and critical-mineral frontiers reinforce one another, enabling the North Eastern Region to build a balanced, diversified, and forward-looking mineral economy.



5. Downstream mineral-based products scope

Table 34: Downstream mineral-based products scope

Category	Examples
Construction and Cement	Cement, clinker, lime, concrete products
Energy and Fuels	Gas-based industries, petrochemicals, power
Glass and Ceramics	Glassware, tiles, sanitaryware
Industrial Minerals and Chemicals	Refractories, fertilizers, chemical-grade lime
Critical Minerals and Advanced Materials (Emerging)	REE concentrates, graphite anodes, vanadium-based energy materials

6. Strategic interventions

Realising the mineral sector's economic potential across the North Eastern Region requires interventions that balance resource development with environmental responsibility, improve logistics infrastructure, and build the regulatory frameworks necessary for socially and ecologically sustainable extraction.

The most immediate priority in established mining states is modernising extraction practices with robust environmental safeguards in Meghalaya and Assam, where the historical challenge of informal and unregulated mining requires a clear transition toward formally governed, environmentally compliant operations. Developing controlled limestone, coal, and chemical clusters in these states would consolidate extractive activity within managed industrial zones, improving both environmental oversight and the conditions for downstream value addition. In Arunachal Pradesh, Nagaland, and Manipur, fast-tracking critical mineral exploration and block auctions would accelerate the translation of geological potential into investable opportunities, positioning the region to participate in the growing national and global demand for battery metals, rare earth elements, and other strategic minerals.

Investing in mineral evacuation infrastructure, through road and rail links, multimodal logistics

corridors, and conveyor systems, would address the high transport costs that currently constrain the commercial viability of extraction in remote and difficult terrain. This infrastructure investment is foundational to the sector's competitiveness and is a precondition for attracting private investment in both extraction and downstream processing. Building regulatory, monitoring, and benefit-sharing mechanisms that align mining activity with community interests would address the social licence constraints that have historically complicated mineral development in the region, ensuring that resource extraction generates tangible and equitably distributed economic benefits for affected communities rather than externalising its costs onto local populations and ecosystems.

In Tripura, supporting gas-linked light industries in power generation, fertiliser production, and ceramics would develop the state's natural gas endowment into a foundation for clean and diversified industrial activity. Developing clean construction material clusters in smaller states would similarly leverage locally available mineral resources to meet regional infrastructure demand, creating a practical and near-term avenue for value addition that does not require the industrial scale or ecosystem depth that more complex downstream manufacturing demands.



CHAPTER

06

Borders as opportunity

A development framework
for India's NE borders



6.1 Context: Why Border Villages Matter

Border villages constitute critical nodes in India's spatial development architecture and regional integration strategy, shaped by their proximity to international boundaries and their role as gateways for cross-border trade, tourism, cultural exchange, and connectivity. Embedded within a national rural landscape of ~6.6 lakh villages, now covered by mobile connectivity in over 95% of settlements, these frontier habitations occupy locations of heightened strategic and developmental significance along 15,106.7 km of land borders and 11,098.8 km of coastline. Their presence strengthens India's territorial continuity while enabling economic outreach and people-to-people linkages with neighbouring nations.

Despite this strategic relevance, border villages face distinct development challenges arising from fragile terrain, climatic vulnerabilities, low population density, limited connectivity, and uneven service delivery. These constraints suppress participation in regional value chains, restrict access to markets, and limit the reach of education, healthcare, and welfare services. Demographic pressures are reinforcing these vulnerabilities. Several border regions—such as ~1,800 settlements in Uttarakhand—are witnessing sustained population decline as residents migrate to urban centres in search of better livelihoods, education, and healthcare. This demographic thinning disrupts traditional economic ecosystems based on agriculture, animal husbandry, forest-based livelihoods, and artisanal crafts, thereby weakening the socio-economic fabric of frontier communities.

Infrastructure gaps continue to remain the primary constraint to unlocking this potential. Frontier settlements frequently face limited access to quality roads, stable electricity, telecommunications, and digital networks—factors that influence market participation, mobility, resilience during emergencies, and the viability of essential services such as schools, healthcare facilities, and public administration. When combined with low population densities, harsh terrain, and climatic exposure, these gaps reinforce cycles of economic stagnation and outmigration.

Conversely, targeted capital investments, value-chain-oriented infrastructure, and integrated service delivery can create sustainable economic anchors that incentivise communities to remain and thrive in border regions. Border villages also possess substantial untapped potential as engines of regional tourism, heritage preservation, and cross-border economic exchange. Their pristine landscapes, indigenous cultural richness, and trans-Himalayan or riverine geographies offer opportunities for adventure tourism, eco-tourism, homestay-based hospitality, artisanal markets, and nature-based experiences.

Successful emerging examples, such as Kaho in Arunachal Pradesh, demonstrate how tourism-led models can create employment, promote cultural continuity, and strengthen local economies. These frontier communities can therefore serve as natural hubs for agriculture-based value chains, artisanal clusters, regulated cross-border trade, and cultural exchange—contributing to inclusive growth while preserving heritage and environmental assets.

Taken together, these factors underscore the need to approach border villages not as peripheral habitations but as pivotal sites of national presence, economic opportunity, and regional integration. Addressing these gaps requires an integrated policy approach that enhances physical connectivity, diversifies livelihoods, strengthens digital and social infrastructure, and creates conditions for sustainable population retention. Investments in all-weather roads, resilient power systems, reliable telecommunications, and digital platforms can reduce isolation and expand access to state services.

Simultaneously, targeted interventions for high-value horticulture, organic agriculture, handicrafts, eco-tourism, and cross-border commerce can transform local economies and attract private investment. Such a comprehensive approach positions border villages not merely as remote endpoints but as “first villages” – gateway settlements that embody both security imperatives and national development aspirations.



6.2 NER's geopolitical and strategic role

NER occupies a uniquely strategic position, sharing over 5,484 km of international borders with Bangladesh (1,880 km), Myanmar (1,643 km), China (1,346 km), Bhutan (516 km), and Nepal (99 km). NER's direct connectivity with these countries positions it as India's principal gateway to Southeast Asia, reinforcing its importance for cross-border trade, connectivity, and regional integration initiatives.⁷⁷

Figure 29: NER international border matrix

International border matrix		
	China	Arunachal Pradesh, Sikkim
	Bangladesh	Tripura, Mizoram, Meghalaya, Assam
	Nepal	Sikkim
	Myanmar	Arunachal Pradesh, Mizoram, Nagaland, Manipur
	Bhutan	Arunachal Pradesh, Assam, Sikkim

Arunachal Pradesh

Shares 1,126 km with China (LAC), 520 km with Myanmar, and 217 km with Bhutan, spanning high-altitude passes to forested lowlands. Its location anchors the Indo-Bhutan-Myanmar trijunction and India's presence in the Eastern Himalayas, requiring differentiated approaches to connectivity, infrastructure, and community empowerment across distinct border sectors.

Assam

Borders Bangladesh (267 km) and Bhutan (266 km), forming vital economic and connectivity arteries for the NER's logistics and commercial engagement with South Asian markets and transit routes. The

Bangladesh border facilitates bilateral trade, cross-border energy cooperation, and people-to-people exchanges, while the Bhutan border supports hydropower collaboration, tourism linkages, and strategic coordination. Assam's location as the central hub of NER positions it as the primary logistics and commercial gateway for international engagement.

Sikkim

Despite its compact geographical footprint, exercises outsized strategic importance through its borders with China (220 km)⁷⁸, Nepal (98 km), and Bhutan (31 km)⁷⁹. The state oversees critical access routes to the Tibetan plateau, including the historic Nathu La pass, while serving as a tri-junction node connecting South Asian and Himalayan geographies.

Sikkim's border architecture directly influences India's strategic depth in the Eastern Himalayas, border trade dynamics with China, and coordination mechanisms with Nepal and Bhutan on transboundary resource management, disaster resilience and regional security.

Nagaland and Manipur

Manage more than 600 km of the India-Myanmar border—Nagaland alone accounts for ~215 km—placing them at the operational forefront of the Act East Policy through integrated check posts and calibrated cross-border engagement. Nagaland's location supports enhanced coordination mechanisms along the India-Myanmar frontier while enabling controlled cross-border mobility for indigenous communities with historical ties across the border.

Mizoram and Tripura

Mizoram shares borders with both Bangladesh (318 km)⁸⁰ and Myanmar (510 km)⁸¹, enabling dual-front coordination on trade facilitation, environmental management, and infrastructure.

Tripura's extensive 856 km border with Bangladesh⁸² establishes it as one of the most strategically significant states for bilateral trade, transit infrastructure, and energy cooperation. Tripura's border architecture reduces the logistical distance

⁷⁷ Ministry of Home Affairs, Government of India, "North East Division," Ministry of Home Affairs, <https://www.mha.gov.in/en/commoncontent/north-east-division>

⁷⁸ Ministry of Home Affairs, Government of India, *Management of Indo-China Border* (05 May 2017), https://www.mha.gov.in/sites/default/files/INDO%20CHINA_05052017.pdf

⁷⁹ Water Resources & River Development Department, Government of Sikkim, *Projects*, <https://www.sikkim-waterresources.gov.in/projects.html>

⁸⁰ Ministry of Home Affairs, Government of India, *Unstarred Question No. 1175 : Fencing of Land Border with Bangladesh* (Answered 11 Feb. 2025), <https://www.mha.gov.in/MHA1/Par2017/pdfs/par2025-pdfs/LS11022025/1175.pdf>

⁸¹ Consulate General of India, Sittwe, *India-Myanmar Relations*, <https://www.cgisittwe.gov.in/page/india-myanmar-relations/>

⁸² Ministry of Home Affairs, Government of India, *Unstarred Question No. 1175 : Fencing of Land Border with Bangladesh* (Answered 11 Feb. 2025), <https://www.mha.gov.in/MHA1/Par2017/pdfs/par2025-pdfs/LS11022025/1175.pdf>

between the NER and international markets, while strengthening people-to-people connectivity across a historically interlinked cultural landscape.⁸³

Domestic Border Considerations

Beyond international borders, NE states share extensive inter-state boundaries that create both challenges and opportunities for coordinated planning, development, and efficient management of resources and transportation networks. These internal borders within the region require harmonized approaches to infrastructure development, resource sharing, inter-state commerce, and administrative coordination to prevent fragmentation and enable seamless regional integration.

Stakeholder consultations with the committee for the NER vision plan 2047 have highlighted the strategic importance of designated border villages as defined by each State, reflecting differentiated priorities and development needs across diverse border contexts from high-altitude Himalayan villages to riverine settlements and forested borderlands.

Coordinated development of these inter-state border zones is essential for optimizing regional connectivity, preventing jurisdictional disputes, and ensuring that administrative boundaries do not become barriers to economic integration and resource mobilization across the NER.

Figure 30: NER border matrix and strategic villages

Domestic Border Matrix	Top strategic border villages
ARUNACHAL PRADESH: AS, NL	552 under VVP 1 & 2
ASSAM: AR, NL, MZ, MN, ML,	20 Border Villages
MANIPUR: NL, AS, MZ	143 under VVP2
MEGHALAYA: AS	4 Border Villages
MIZORAM: AS, MN, TR	8 Border Villages
NAGALAND: AS, MN, AR	245 Border Villages, 45 under VVP 2
SIKKIM: No NER state, only WB	58 under VVP 1 & 2
TRIPURA: AS, MZ	80 Border Villages under VVP

6.3 Infrastructure, Service Delivery and Community Integration

Connectivity as the base layer

Connectivity forms the operational base for broader development outcomes. All-weather road access under PMGSY influences market participation, emergency access, and service delivery reliability. In NER's context, multimodal integration is particularly significant. PM Gati Shakti enables spatial coordination across highways, railways, inland waterways, and airports, improving logistical linkages for frontier districts. Projects such as Kaladan illustrate how alternative corridors can reduce geographic isolation and expand trade access.

Energy and digital foundations

Reliable electricity supply and telecommunications infrastructure reinforce these gains. Electrification initiatives such as Saubhagya, along with digital

infrastructure under BharatNet and Digital India, enable agro-processing, cold storage, telemedicine, digital payments, and e-governance services. The PM-DevINE initiative provides dedicated support for infrastructure acceleration within NER, acknowledging region-specific geographic and administrative challenges.

Infrastructure expansion generates multiplier effects. Road access supports cold chain development for perishable horticulture. Telecommunications infrastructure enables e-commerce participation for artisanal and agricultural producers. Transport nodes attract warehousing, processing, and logistics activities, gradually diversifying local economic structures.

⁸³ Ministry of Home Affairs, Government of India, "Fencing and floodlighting for better vigil along borders," Press Information Bureau, February 9, 2010, <https://www.pib.gov.in/newsite/erecontent.aspx?relid=57720&req=3&lang=2>



Market-linked livelihoods

Economic viability in border villages depends on strengthening market-linked livelihoods. NER's agro-climatic range supports high-value horticulture (e.g., kiwi, dragon fruit, organic vegetables, medicinal herbs). Producer cooperatives, aggregation platforms, organic certification, and processing infrastructure add value beyond primary production.

Tourism presents complementary opportunities. Natural landscapes, biodiversity assets, and indigenous cultural traditions attract experiential travel demand. Structured tourism development – through homestay standards, guide training, sanitation systems, and digital marketing – can support local employment while maintaining environmental and cultural integrity.

Artisanal value chains (weaving, bamboo products, specialty teas, handicrafts) and regulated cross-border trade further diversify income sources. Digital platforms expand market access and initiatives such as the "One Village One Product" provides an organizing framework for identifying location-specific specializations and scaling them through coordinated branding and market access strategies.

Social infrastructure as a demographic stabiliser

Social infrastructure remains closely linked to demographic stability as socio-economic development anchors livelihoods locally. Infrastructure improvements enhance both civilian mobility and institutional reach. Diversified income opportunities reduce dependence on informal economic activity.

Education (teacher availability, digital classrooms, residential facilities), healthcare (PHCs, tele-medicine connectivity, mobile health units, Ayushman Bharat), drinking water, sanitation, housing, and financial inclusion reduce vulnerability and encourage settlement stability.

When core services approach functional parity with urban standards, incentives for out-migration moderate. In this sense, social infrastructure investments operate not only as welfare provisions but also as long-term demographic stabilizers.

Convergence & institutional delivery

Coordinated initiatives such as the Vibrant Villages Programme align development priorities with administrative and security objectives through existing state and district governance structures. Effective implementation depends on convergence rather than parallel programme structures.

PM Gati Shakti enables spatial alignment of transport, energy, digital, and logistics investments. Sectoral missions—PMGSY, Saubhagya, Digital India, Ayushman Bharat, Jal Jeevan Mission, and PM-DevINE—are most effective when synchronized at the district level through integrated planning frameworks.

Community Integration

Village-level action plans and district monitoring systems help ensure saturation coverage across welfare schemes. Institutional coordination between central ministries, state departments, district administrations, and gram panchayats reduces fragmentation and improves delivery efficiency. The emphasis remains on community needs within existing platforms rather than creating separate bureaucratic structures.

Border settlements operate at the intersection of development and security considerations. Active and stable populations contribute to territorial continuity and local vigilance. Community participation in structured engagement mechanisms strengthens coordination with security agencies while maintaining robust civilian settlements and local governance autonomy.

6.4 NER's border villages: Challenges and Opportunities

Critical gaps and spatial gradients

Last-mile connectivity, bandwidth reliability, seasonal road access, and power quality remain uneven in mountainous and remote terrain, shaping settlement viability and private investment attractiveness. These conditions intersect with distinct structural dynamics.

Population mobility toward urban centres reflects differential access to jobs, higher education, and healthcare. Outmigration raises per-capita costs undermining the economic case for service provision. As facilities become harder to sustain, service withdrawal can trigger reinforcing cycles of depopulation driven by shrinking local opportunity sets. Conversely, targeted economic anchors and reduced effective distance to markets can stabilise populations and restore essential services.

Terrain-specific infrastructure

Gaps in terrain-adaptive connectivity directly constrain market integration and slow sectoral growth pathways. Notable terrain specific infrastructure requirements in NER include

- i. **High-altitude Arunachal Pradesh:** cold-climate engineering and ropeway systems to overcome elevation gradients; cold-chain logistics to unlock horticulture and adventure tourism.
- ii. **Riverine Assam (Brahmaputra basin):** elevated corridors and resilient bridges to integrate agricultural markets and strengthen fisheries value chains.
- iii. **Forest terrains (Mizoram, Nagaland):** ecologically sensitive forest roads to activate bamboo, timber, and non-timber forest product commercialisation while preserving ecosystems.

Delivery constraints

Implementation effectiveness varies widely across NER. Capacity constraints at district and block levels, inter-departmental coordination challenges, procurement difficulties in remote areas, land acquisition and forest clearance constraints, as well as uneven community participation mechanisms collectively slow delivery. While notable progress has been achieved – e.g., road construction under PMGSY convergence, off-grid electrification, and mobile connectivity expansion – the scale and pace remain insufficient relative to developmental and strategic imperatives.

Climate and environmental risks

Erratic rainfall, extreme events, erosion, and glacial lake outburst floods disrupt livelihoods and damage

infrastructure, while unsustainable extraction and weak watershed management reduce resilience. Climate-resilient agriculture, ecosystem-based watershed management, and connectivity investments that reduce isolation can reverse demographic decline while building environmental sustainability.

Border governance and formal trade

Strengthened border governance unlocks economic dividends beyond security outcomes. Formal cross-border trade infrastructure—integrated check-posts with digital customs clearance, phytosanitary facilities, and bonded warehousing—lowers transaction costs relative to informal channels, broadens the tax base, and creates formal employment in logistics, warehousing, and trade facilitation.

Enhanced institutional presence in border areas – through permanent civil administration offices, police stations, and judicial facilities – reduces contract enforcement costs, enables formal credit access, and fosters conditions for private sector investment in agro-processing, tourism, hospitality, and retail. Community-security coordination (e.g., Border Area Development Committees) turns communities into governance partners, improving programme effectiveness and reducing administrative costs.

Taken together, these structural realities have direct implications for economic resilience, demographic stability, and long-term regional integration. Sustainable outcomes will come from coordinated, sequenced attention to connectivity, livelihoods, social services, and institutional delivery—rather than siloed interventions.

A pragmatic pathway is to

- i. Deliver terrain-adaptive connectivity that closes critical last-mile gaps
- ii. Couple this with market infrastructure and essential services that anchor population
- iii. Strengthen border governance, formal trade infrastructure, and institutional presence to crowd in private investment
- iv. Mainstream climate resilience and ecosystem stewardship.

Transitioning NER border villages toward stability and sustainable development will require enhanced allocations, strengthened coordination mechanisms, community-centric implementation, and continuity of effort aligned with Viksit Bharat@2047.



6.5 Way Forward: NER Border Village analysis, proposed proforma and checklist

To effectively operationalize development of vibrant NER border villages, we recommend commissioning a comprehensive progress analysis across all target border villages in the NER, conducted in collaboration with the eight NER state governments and relevant local governance institutions

After reviewing the key Government of India schemes relevant to border-area development in the North

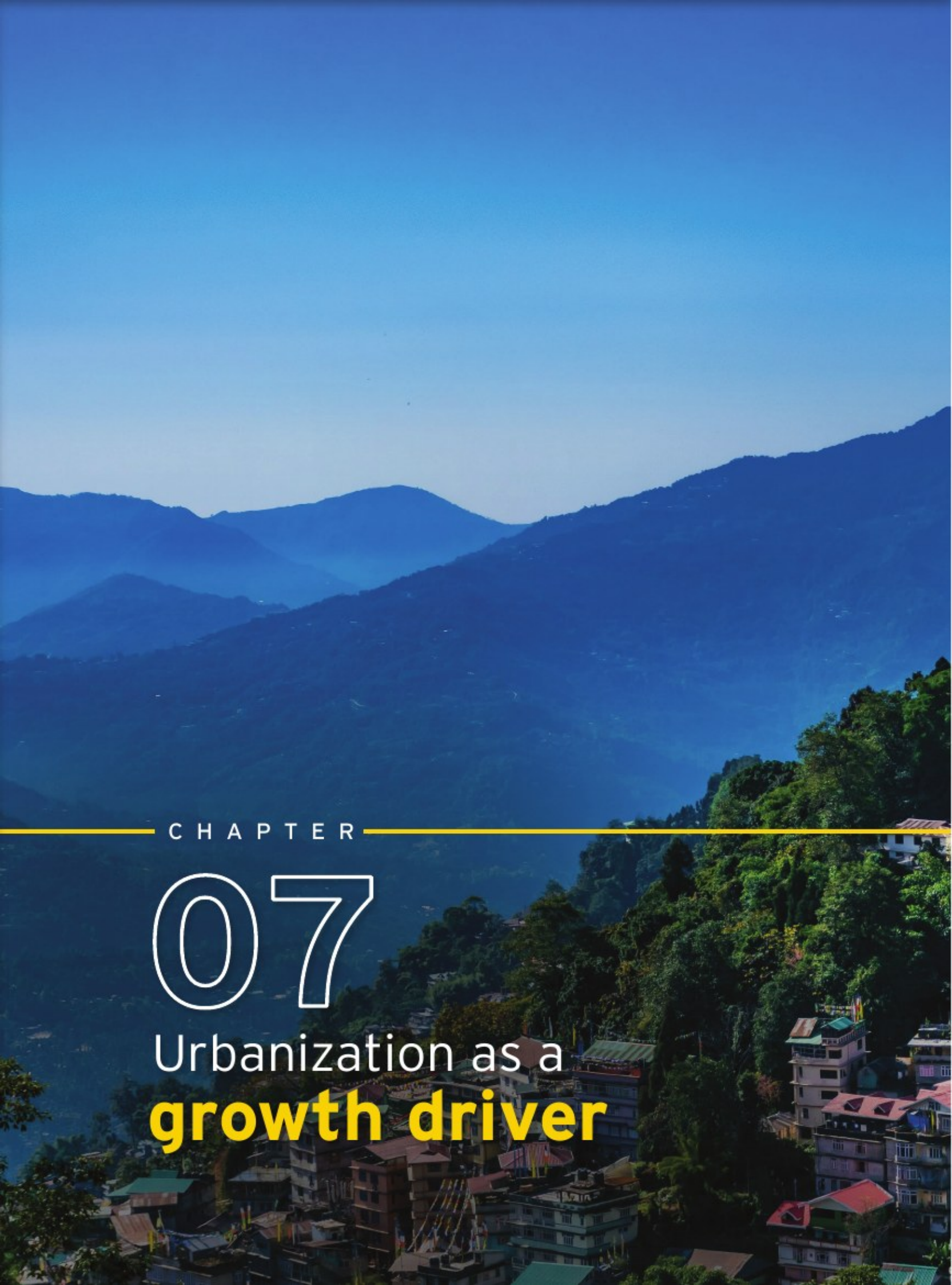
Eastern Region – including the Vibrant Villages Programme (VVP-I and VVP-II), the Pradhan Mantri Gram Sadak Yojana (PMGSY), the Border Area Development Programme (BADP) and the North East Special Infrastructure Development Scheme (NESIDS) focused on strengthening regional infrastructure – this proforma is proposed as a consolidated tool to capture village-level progress aligned with these initiatives.

Table 35: NER Border Village analysis, proposed proforma and checklist

	Indicator	KPI Target
Enhance Living Standards	Road Connectivity Coverage	% Villages With All-weather Road Access
	Grid + Renewable Power Access	% Households With 24x7 Electricity From Grid/Solar
	Drinking Water and Sanitation	% Households With Piped Water + Toilets
	Mobile/TV Penetration	% Villages With Telecom/Satellite TV
Economic & Livelihood Growth	SHGs/Cooperatives Per 1,000 Population	# Active SHGs/Coops Per Village
	Skill Development Coverage	% Population Trained/ Employed Via VVP
	Tourism Income & Visitor Footfall	% Increase In Annual Tourist Visits/Income
	Product Diversification	# Villages With Agro/Medicinal Product Clusters
Security and National Integration	Local Security Engagement	% Border Population Enrolled In Security Efforts
	Crime/Vigilance Stats	Reduction In Cross-border Incidents/Year
	National Event Participation	# Border Residents At National Integration Events
Integrated Social Development	Digital Classroom Ratio	% Students In SMART Enabled Schools
	Welfare Scheme Saturation	% Eligible Hhs Covered Across Schemes
	Financial Inclusion Metric	% Adults With Bank, Aadhaar, & Insurance
	Community Event Frequency	# Outreach Events/Year Per Village
Saturation & Convergence	Scheme Coverage Score	% Schemes With Saturation (>=95%) Per Village
	Convergence Review Frequency	# Meetings/Year With Gram Panchayat/District
	Action Plan Update Compliance	% Villages With Live Action Plan And Monitoring and Evaluation

This diagnostic exercise can establish a quantitative baseline of current performance levels against defined characteristics, indicators, and service delivery parameters. Together, these KPIs form a comprehensive, outcome-linked checklist to guide implementation, enable convergence, and enable continuous progress assessment.

The assessment would help identify critical deltas between existing conditions and desired standards, enabling the development of a data-driven, phased transformation roadmap with prioritized interventions tailored to each village's contextual requirements. This foundational analysis can be immensely useful in transforming border zones of NER.



CHAPTER

07

Urbanization as a
growth driver



7.1 Current urbanization scenario in NER

Urbanization in NER states has lagged that of the country for reasons including geography, proportion of tribal population, settlement patterns, and economic structure. NER's urban population increased from ~15.5% in 2001⁸⁴ to a projected 21.2% in 2021⁸⁵, a growth rate of nearly 3%. This is significantly higher than the overall population growth rate of around 1.6% and slightly above the national urbanization growth rate of about 2.6%. However, the overall urbanization level of the entire region remains below the national average of 35%. Urbanization has been uneven across states for reasons including variation on the same themes as NER when compared to India. Mizoram and

Sikkim are relatively more urbanized, supported by a higher concentration of population in state capitals and a stronger role of manufacturing and service sector activities. In contrast, Assam and Arunachal Pradesh record low levels of urbanization and remain below the national average, reflecting a large rural base, dependence on agriculture and dispersed settlement patterns.

The table⁸⁶ below presents the growth of urbanization across NER states from 2001 through 2011 to projected levels in 2021.

Table 36: Growth of urbanization across NER states from 2001 through 2011 To projected levels In 2021 (in thousands)

State	Urban population 2001	Urban population 2011	Urban population 2021 (Projected)	CAGR (2001-2021)	Urban % of total population (2011)	Urban % of total population (2021*)
Arunachal Pradesh	223	315	386	2.8%	22.8%	25.2%
Assam	3,389	4,385	5,368	2.3%	14.1%	15.3%
Manipur	571	834	1,009	2.9%	29.2%	31.9%
Meghalaya	453	596	676	2.0%	20.1%	20.6%
Mizoram	441	572	663	2.1%	52.1%	54.5%
Nagaland	353	572	941	5.0%	28.9%	42.9%
Sikkim	60	76	304	8.4%	12.4%	44.9%
Tripura	543	961	1,505	5.2%	26.2%	37.0%
NER Total	6,033	8,311	10,852	3.0%	18.3%	21.2%

Despite relatively low urbanization levels, major cities in NER have strengthened their economic and administrative roles. Cities such as Guwahati, Imphal, Agartala and Aizawl have emerged as important service and commercial centers for their states and

hinterlands. Guwahati, in particular, has consolidated its position as the primary urban and economic hub of the region, while other state capitals continue to expand in scale and function.

⁸⁴ Census of India

⁸⁵ 2021 Projections based on estimates from Ministry of Health and Family Welfare (2019). Population projection for India and states, 2011-36, Report of the Technical Group on Population Projection, November 2019

⁸⁶ Based on Census of India and Projections from Ministry of Health and Family Welfare (2019). Population projection for India and states, 2011-36, Report of the Technical Group on Population Projection, November 2019



Table 37: Major urban centres of NER: Population trends and industrial base

City	State	Pop. 2011 ⁸⁷	% of state (2011)	Pop. 2025 (projected ⁸⁸)	Major industries
Guwahati	Assam	963	3.1%	1,398	Oil refining, Trade/Services, Food processing
Agartala	Tripura	400	10.9%	584	Education, Government administration, Handicrafts
Imphal UA	Manipur	419	14.7%	662	Handloom textiles, Agriculture processing, Trade
Aizawl	Mizoram	293	26.8%	415	Bamboo products, Government services, Tourism
Shillong	Meghalaya	143	4.8%	520	Education, Tourism, Light manufacturing
Dimapur	Nagaland	123	6.2%	190	Trade/Commerce, Timber processing, small industries
Gangtok	Sikkim	100	16.4%	140	Tourism, Pharmaceuticals, Organic farming
Itanagar	Arunachal Pradesh	59	4.3%	100	Hydro power, Government admin, Construction
Silchar	Assam	173	0.6%	230	Paper mills, Tea trading, Education
Jorhat	Assam	153	0.5%	210	Tea processing, Education/Research, Aviation
Nagaon	Assam	147	0.5%	210	Paper mills, Agriculture processing, Trade
Dibrugarh	Assam	140	0.4%	200	Oil and gas, Tea industry, Aviation

While some states and cities have made notable progress, the overall trajectory of urbanization across NER could be critical in unlocking its development potential. Stronger urban centers can act as economic magnets, support productivity and generate opportunities that extend beyond city boundaries. An accelerated urban transition that is integrating the region more effectively within the region, with the rest of India, and the global economy is a critical element of achieving developed status.

Significance of urbanization in development and GDP growth.

Although definitions and metrics of urbanization differ across regions, the core idea remains consistent. Urbanization is defined by the concentration of population in cities, higher population density and the increasing engagement of a significant share of the workforce in non-agricultural activities. Together,

these factors drive structural economic and social transformation.

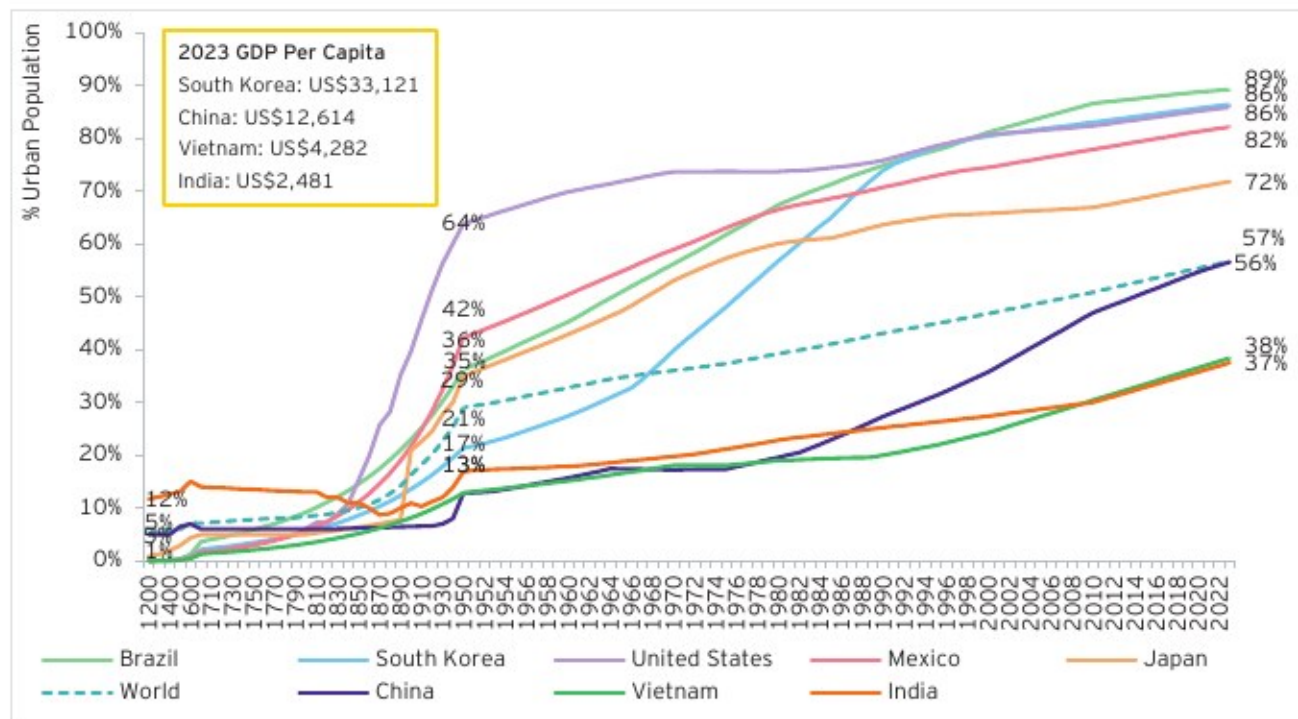
Urbanization creates economies of scale by clustering people, enterprises and institutions, reducing costs and improving productivity. Urban centers also generate spillover development in surrounding areas, leading to the expansion of peri-urban and regional economic systems. These dynamics strengthen linkages between urban and rural areas and support diversified growth.

For India, and particularly NER, urbanization can be a powerful driver of development, sustainability and self-reliance. Global experience highlights the role of urbanization in economic progress. Early urbanization supported growth in the US and the UK, followed by Japan and South Korea. More recently, China and Indonesia have leveraged large-scale urbanization to accelerate growth and integration into global value chains.

⁸⁷ Census of India

⁸⁸ Projected Population based on United Nations Population Prospects, State Government Documents, Census of India Projections

Figure 31: China attains world average urbanization; China's urbanization and per capita GDP levels crossed India's in 1988-1993. Inputs from NER states do not indicate focus on urbanization.



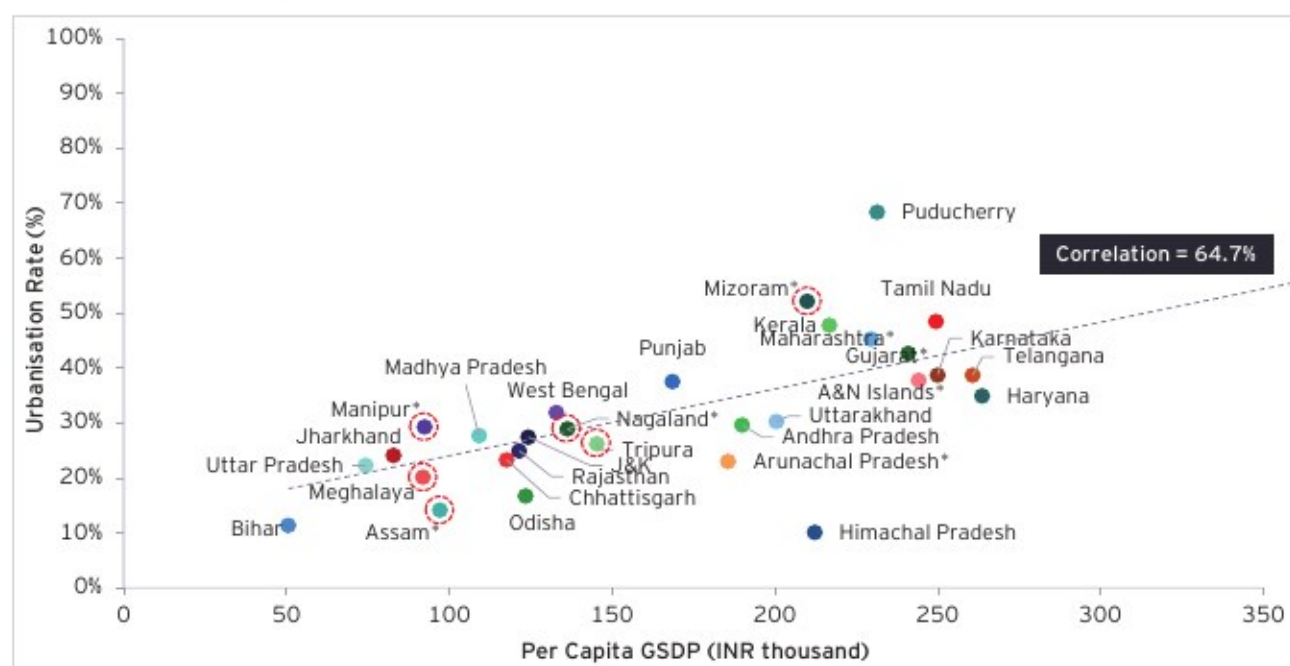
Source: HYDE Database, World Bank

Empirical evidence points to a strong correlation between levels of urbanization and per capita GDP. As the share of urban population rises, per capita GDP tends to increase, reflecting higher productivity, greater value addition and more diversified economic activity. Cities function as economic magnets,

sustaining complex local economies while contributing disproportionately to national and state output. Urbanization can also improve quality of life by expanding access to education, healthcare, housing and cultural opportunities, provided growth is well planned and inclusive.



Figure 32: High correlation between per capita GSDP and urbanization rate suggests greater focus needed on urban development to accelerate GSDP growth in NER



Note: Urbanisation Rate is for 2011. Per Capita GDP is for FY21 * denotes data for Per Capita GSDP for resp. state is for FY20
Source: Census of India 2011, MOSPI

Urbanization also facilitates the shift of labor from agriculture to manufacturing and services, while supporting productivity gains in agriculture. This structural transformation is essential for sustained income growth and economic diversification. Cities provide platforms where such transformation can

occur through clustering of industries, skill development and innovation. Investments in transport, energy, digital networks and urban services enable cities to attract investment, support mobility of labor and goods and integrate with regional and global markets.



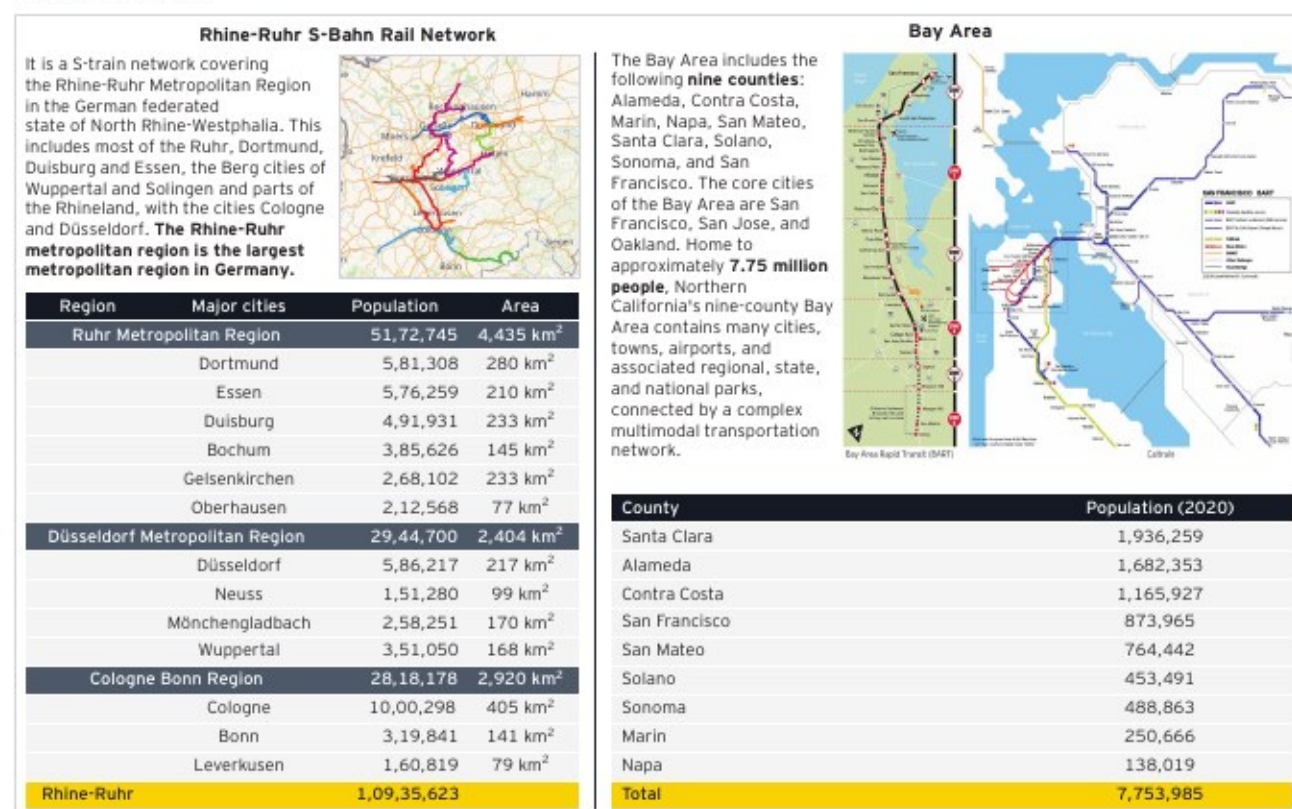
Case studies highlighting effective urbanization strategies:

1. Rhine-Ruhr S-Bahn Rail Network and San Francisco Bay Area Regional Transit

Table 38: Rhine-Ruhr S-Bahn rail network / Bay Area city / county populations

Location	Rhine-Ruhr Metropolitan Region, Germany and San Francisco Bay Area, USA
Brief overview	Multiple medium-sized cities function as a single large metropolitan economy through high-capacity regional transport networks. Strong connectivity enables daily commuting, shared labor markets, and economic integration without reliance on a single dominant core city.
Intervention areas	- Regional rail-based mass transit systems - Integrated multimodal transport planning - Polycentric regional planning - Inter-jurisdictional coordination
Impact areas	- Improved regional mobility - Integrated labor and economic markets - Agglomeration benefits across cities - Balanced regional development
Key outcomes	- Rhine-Ruhr emerged as Germany's largest metropolitan region - Bay Area connects nine counties serving about 7.75 million people
Learnings for NER	- Cities can grow as clusters rather than isolated units - Regional corridors can simulate large-city advantages - Polycentric models suit dispersed and hilly regions

Figure 33: Global examples: Simulating larger cities to drive higher efficiencies with smaller agglomerations - creating urban economic corridors



Source: The Regional Association of Ruhr Website



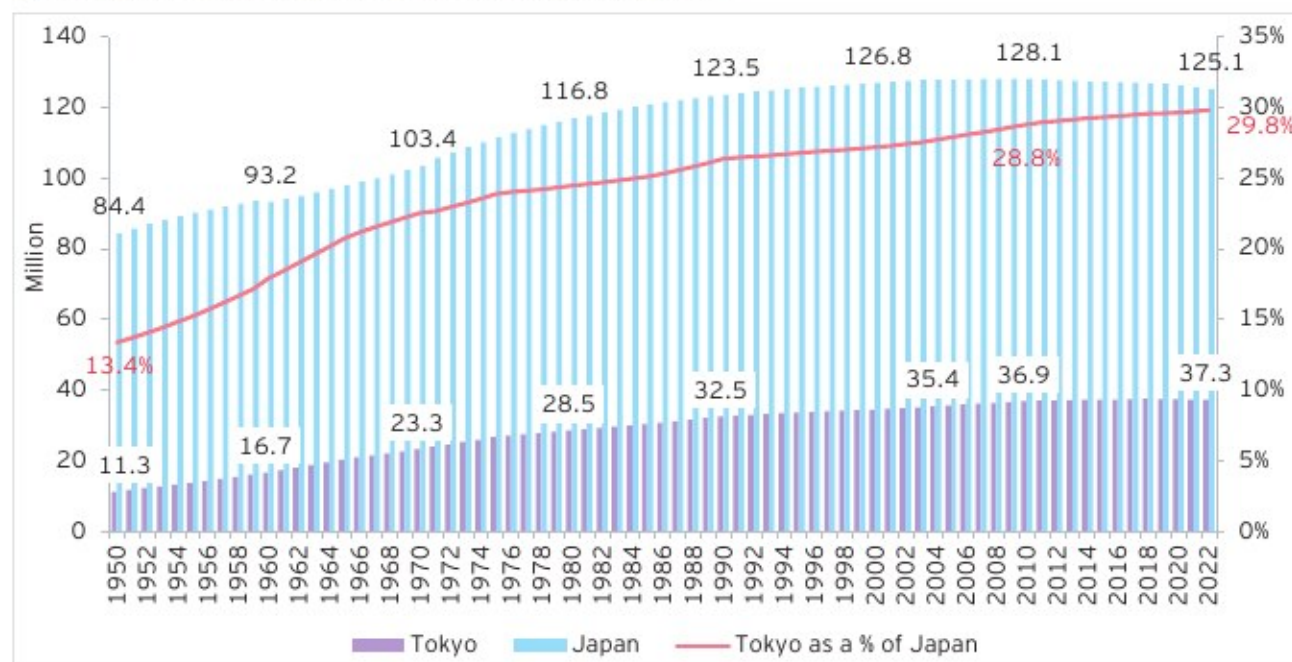
2. Tokyo's population growth amid national population decline

Table 39: Key indicators of Tokyo case study

Location	Tokyo Metropolis, Japan
Brief overview	While Japan's population has been declining due to ageing and low fertility, Tokyo continues to grow by attracting internal migrants and global talent. Concentration of jobs, education, services and infrastructure has increased Tokyo's share of the national population over time.
Intervention areas	- Concentration of employment and economic activity - Extensive public transport systems - High-density mixed-use development - Strong social and urban infrastructure
Impact areas	- Population stability and growth - Rising share of national population - High economic productivity - Efficient infrastructure utilization
Key outcomes	- Tokyo population is about 14 million⁸⁹ - Greater Tokyo region about 37 million people⁹⁰ - Around 30% of Japan's population concentrated in one metro region
Learnings for NER	- Strong urban hubs can counter regional population decline - Internal migration responds to opportunity concentration - Compact, transit-oriented growth improves service delivery

Despite an overall decline in Japan's population, Tokyo has experienced a steady increase in its population over the years

Figure 34: Tokyo's population growth amid national population decline



Source: UN Population Prospectus, World Bank

⁸⁹ World Bank Open Data

⁹⁰ United Nations Population Prospects



3. Dubai's growth from a small town to a global urban hub

Figure 35: Dubai 'then vs. now' urban development images



Table 40: Key indicators of Dubai case study

Location	Dubai Emirate, United Arab Emirates
Brief overview	From a small trading town in the 1970s, Dubai transformed into a global city through early and sustained investments in ports, airports, and connectivity infrastructure. This enabled economic diversification and attracted a large expatriate population, positioning Dubai as a major global hub.
Intervention areas	- Large-scale port infrastructure - Expansion of international airports - Economic diversification into trade, tourism, and logistics - Business-friendly regulations and free zones
Impact areas	- Rapid population growth driven by expatriates - Global logistics and aviation leadership - Reduced dependence on oil - Strong global investment inflows
Key outcomes	- Population growth from a few hundred thousand in the 1970s to over 4 million - One of the world's busiest international airports and ports - City GDP estimated at US\$110-120 billion annually⁹¹
Learnings for NER	- Early infrastructure investment shapes long-term urban success - Connectivity attracts talent and capital - Diversification anchored in infrastructure increases resilience

Strengthening urbanization is therefore central to enabling cities to function as engines of inclusive and sustainable growth, particularly for India and NER.

Need for urbanization in NER, current weaknesses, target areas, and sector-wise impact

NER continues to exhibit relatively low levels of urbanization compared to the national average,

despite steady growth over the past two decades. This limited urban transition contrasts with the region's substantial economic, strategic and demographic potential. A strategic location at the crossroads of South and South-East Asia positions the region well for urban led development, provided existing structural constraints are addressed.

⁹¹ Government of Dubai 2024



The table below highlights underlying reasons for the relatively low level of urbanization in NER:

Table 41: Key reasons for low urbanization in NER

Key reasons for low urbanization in NER	Brief explanation
Difficult terrain and fragile ecology	- Mountainous, landslide-prone and seismically active areas in states like Arunachal Pradesh, Sikkim and Mizoram make roads, bridges and high-rise buildings costly and risky, so only a few valleys support sizeable towns. - Hilly belts around cities such as Aizawl and Gangtok face erosion and slope-stability issues, which restrict dense construction and industrial estates, limiting city growth.
Weak connectivity to national markets	- For years, the region relied mainly on the narrow Siliguri Corridor, as a result moving goods to major metros involved long, congested routes that raised transport costs. - Even Guwahati, the main gateway city, has struggled to attract large manufacturing because weak highway and rail links historically made exporting tea, oil and other products less competitive.
Late and thin industrialization	- Unlike older industrial hubs such as Mumbai or Kolkata, NER industrialized late and only in a few pockets, so large factory belts that could anchor big cities never emerged. - Activity is concentrated around very few centers like Guwahati, while many cities remain underpenetrated.
High dependence on agriculture and allied activities	- A very high share of households depends on farming, plantations and allied sectors, so livelihoods remain tied to villages and small market towns. - Even around Guwahati, many families use the city mainly as a trading and service hub while keeping tea or paddy land in nearby rural belts, reducing permanent urban migration.
Complex land tenure and acquisition	- Community and clan-based land systems in many hill states make it difficult to assemble large, contiguous parcels for urban expansion. - Around towns such as Shillong and Dimapur, customary ownership and fragmented titles slow creation of new layouts, industrial parks and transport corridors, increasing project costs and delays.
Conflict, instability and perceived risk	- Insurgency and ethnic tensions in states like Manipur, Nagaland and parts of Assam have historically discouraged private investors from locating major projects in cities such as Imphal or Dimapur. - In Arunachal Pradesh, security challenges and special-security regimes in some border districts create perceptions of security risk and extortion, which deter long-term investment and urban-scale infrastructure in nearby towns.
Under resourced urban local bodies	- Municipalities in cities such as Agartala, Itanagar and Silchar often have weak finances and technical capacity, leading to gaps in water supply, drainage, roads and waste management. - When services are unreliable, the quality-of-life gap between these towns and surrounding villages remains small, so there is less pull for people to settle permanently in the cities.
Perception urbanization is inconsistent with tribal culture	- Many tribal communities value village-based social structures, common land and customary institutions, due to which large, anonymous cities are sometimes seen as threats to identity and traditions. - In Mizoram, Nagaland and Meghalaya, families often maintain homes in ancestral villages or small towns even when youth study or work in Shillong, Aizawl or Guwahati, which slows sustained urbanization.

Urbanization has the potential to influence all major sectors of the regional economy. In agriculture, stronger urban centers can create reliable markets,

improve value chains and support diversification while enabling productivity gains and labor transition.



The table below presents the potential sector-wise impacts of urbanization in NER.

Table 42: Potential sector-wise impacts of urbanization in NER

Sector	Impact of urbanization
Agriculture and Allied Sectors	- Decline in seasonal and disguised unemployment as surplus rural labor shifts into urban construction, transport, retail and small industries. - Larger, more efficient land holdings when some families move to towns, enabling mechanization and commercial farming. - Higher rural wages and more value addition through agro-processing units near cities for tea, spices, fruits and vegetables. - Greater scope for high value crops and allied sectors (dairy, poultry, fisheries, horticulture) due to better markets and cold chains around urban centres. - Improved irrigation, storage, roads and logistics from urban led infrastructure investments, reducing postharvest losses.
Industry	- Higher industrial output and economies of scale in food processing, bamboo products, tea, petro-based units and light manufacturing around major cities. - Better access to national and export markets via improved logistics hubs, highways, railheads and airports. - More formal employment, higher skills and better wages as factories and organized units cluster in urban/peri-urban areas. - Lower logistics costs and stronger industrial ecosystems with suppliers, maintenance services, finance and startups collocated near clusters. - Faster technology adoption and productivity gains through proximity to training institutes and technical services in cities
Services	- Better living standards through improved housing, healthcare, education, utilities and digital connectivity in growing cities. - Expansion of high value and futuristic services such as IT/ITeS, creative industries, higher education, specialized healthcare and logistics. - Greater ability to retain local talent and attract skilled migrants to the region. - Boost tourism and hospitality, with more visitors and professionals drawn to well-connected urban hubs. - Higher inflow of private investment and wider opportunities in retail, finance, business services and public administration.

A calibrated approach to urbanization can therefore act as a catalyst for balanced sectoral development and long-term economic transformation in the region.



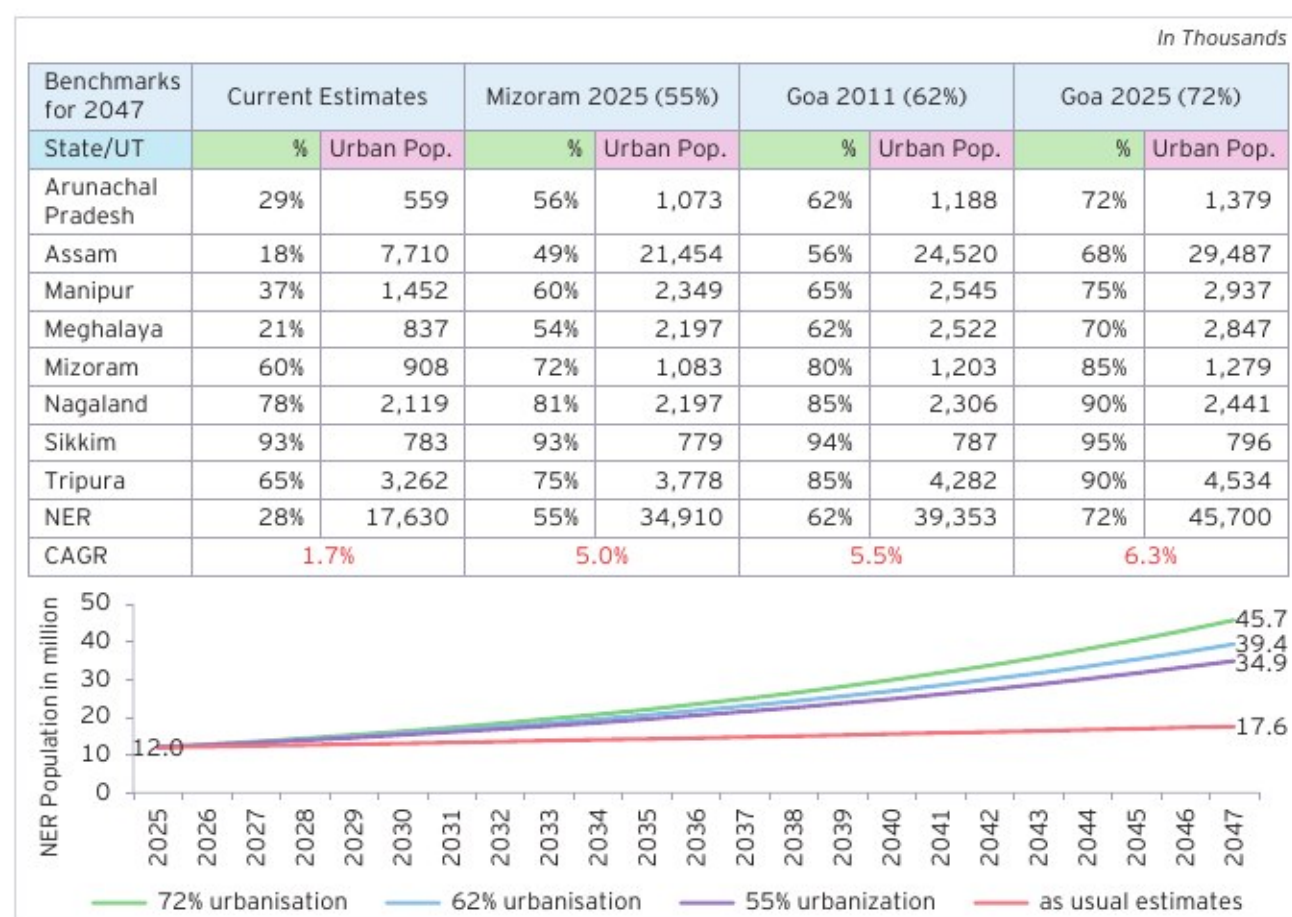
7.2 Envisioned urbanization trajectories for Viksit NER

The vision for Viksit NER includes a focus on integrated urbanization. The region is envisaged to achieve about 55% urbanization by 2047, a level comparable to the current projected urbanization of Mizoram. Reaching this target would require accelerating the urban population growth rate from around 1.6% to nearly 5%, enabling stronger agglomeration benefits, better integrated urban development and improved quality of life. Higher urbanization would also support improving competitiveness of enterprises, boost employment, and strengthen state economies.

While Mizoram provides a relevant regional benchmark for this transition, Goa offers a longer-term aspirational pathway, having reached about 62% urbanization in 2011⁹² and an estimated 72% by 2025⁹³. Moving towards such a trajectory requires clear milestones and focused strategies around city development, connectivity and economic diversification. Planned and inclusive urbanization can be central to transforming NER into a dynamic and growth-oriented region by 2047.

Figure 36: Benchmarks and projections for 2047 – Urbanization in NER

Benchmarks	-	Current Estimates	Mizoram 2025	Goa 2011	Goa 2025
Years	2025	2047 (as usual estimates)	2047 (55% urbanization)	2047 (62% urbanisation)	2047 (72% urbanisation)
NER Urban Population %	23%	28%	55%	62%	72%
Required CAGR	-	1.7%	5.0%	5.5%	6.3%



Source: Ministry of Health and Family Welfare (2019). Population projection for India and states, 2011-36, Report of the Technical Group on Population Projection, November 2019, EY Analysis

⁹² Census of India

⁹³ Projections based on estimates from Ministry of Health and Family Welfare (2019). Population projection for India and states, 2011-36, Report of the Technical Group on Population Projection, November 2019

For urbanization to drive economic transformation in NER, cities must reach critical mass. Larger cities generate stronger agglomeration benefits by concentrating talent, capital and institutions, which enables higher productivity and greater value addition.

Small and fragmented urban centers limit these advantages and constrain the development of competitive industries. Developing million plus cities, supported by strong regional connectivity, is therefore essential for sustained and integrated growth.

Even at accelerated urban population growth of 6% annually in all capital cities, NER will have only one million+ city by 2035 that may move from 48th to 25th rank

Table 43: Top 20 cities in India / Top 23 cities in NER

Top 20 Cities in India			Top 23 Cities in NER					
Rank	City	Population 2025	Rank in India	Rank in NER	City	State	Population (2025)	Accelerated CAGR 2035
1	Mumbai	1,26,91,836	48	1	Guwahati	Assam	8,99,094	16,10,140
2	Delhi	1,09,27,986	157	2	Aizawl	Mizoram	2,65,331	4,75,167
3	Bengaluru	51,04,047	190	3	Imphal	Manipur	2,23,523	4,00,296
4	Kolkata	46,31,392	203	4	Agartala	Tripura	2,03,264	3,64,015
5	Chennai	43,28,063	285	5	Silchar	Assam	1,52,393	1,85,766
6	Ahmedabad	37,19,710	316	6	Dimapur	Nagaland	1,35,860	2,43,305
7	Hyderabad	35,97,816	325	7	Shillong	Meghalaya	1,32,842	2,37,900
8	Pune	29,35,744	356	8	Dibrugarh	Assam	1,22,155	1,48,906
9	Surat	28,94,504	481	9	Kohima	Nagaland	92,113	1,12,285
10	Kanpur	28,23,249	496	10	Tinsukia	Assam	89,373	1,08,945
11	Jaipur	27,11,758	623	11	Jorhat	Assam	69,033	84,151
12	Navi Mumbai	26,00,000	671	12	Bongaigaon	Assam	64,902	79,115
13	Lucknow	24,72,011	700	13	Dhuburi	Assam	62,525	76,218
14	Nagpur	22,28,018	706	14	Sibsagar	Assam	62,104	75,704
15	Indore	18,37,041	744	15	Tezpur	Assam	58,851	71,739
16	Patna	15,99,920	744	16	Tezpur	Assam	58,851	71,739
17	Bhopal	15,99,914	771	17	Diphu	Assam	57,097	69,601
18	Ludhiana	15,45,368	801	18	Karimganj	Assam	55,290	67,398
19	Tirunelveli	14,35,844	817	19	Wokha	Nagaland	54,010	65,838
20	Agra	14,30,055	843	20	Lunglei	Mizoram	52,728	64,275
			873	21	Goalpara	Assam	50,759	61,875
			919	22	Churachandpur	Manipur	47,774	58,236
			983	23	Itanagar	Arunachal P	44,971	80,536

Source: World Population Review FY2025. Note: Accelerated CAGR for 2035 taken as 6% for cities marked in blue, and 2% of remaining cities

The region can aim to develop one mega city, preferably Guwahati, given its favorable terrain, central location and strong links with the rest of India. Guwahati can anchor the regional urban system, complemented by the growth of other million plus cities across NER. This approach mirrors the experience of Tokyo, where the urban agglomeration

has continued to expand by absorbing surrounding cities and strengthening regional linkages, even as national population growth has slowed down. The example highlights how well-connected urban regions with sufficient critical mass can continue to grow by functioning as integrated economic systems.



Guwahati can grow to 10 million+ agglomeration by 2047 representing ~20% of Assam and ~15% of NER relative to Hyderabad at 29% of Telangana today

Table 44: Tokyo vs. Guwahati - Earthquake exposure and urbanization comparison

Metric	Tokyo (Greater Area)	Guwahati (Metro Area)
Population (2025 est.)	37.04 million	1.224 million
Earthquake Frequency (M ≥ 4.0, past 10 yrs)	2,599 quakes (~259/year; ~21/month - i.e., one every ~1 day)	189 quakes (~18.9/year; ~1.6/month - i.e., one every ~19 days)
Magnitude Distribution (last decade)	Magn 4: 2,390 (92%)- Magn 5: 198 (8%)- Magn 6: 8 (0.3%)- Magn 7: 3 (<0.1%)	Magn 4: 168 (89%)- Magn 5: 19 (10%)- Magn 6: 2 (1%)- No M ≥ 7
Historic High-Magnitude Events	Several M 6-7 events; none M 8+ in past decade; worst was M 6.9 in 2016	Two M 6+ quakes (incl. 2021 M 6.0, 2021 M 6.1); historic M 8.7 in 1950 killed ~4,800 in Assam
Estimated Losses	Regular moderate damage; large-scale loss avoided due to preparedness (earthquake codes, retrofits); no major losses in past decade.	2021 quake caused structural damage and 2 indirect deaths; 1950 quake cost ~4,800 lives and significant infrastructure loss
Seismic Zone / Risk Profile	High risk-situated at triple plate junction; frequent quakes but stringent building codes and extensive preparedness.	Moderate-to-high risk-lies near Main Himalayan Thrust and Kopili Fault; historic potential for very large quakes; urban growth increasing vulnerability.
Population Density & Urban Structure	Extremely dense megacity; sophisticated infrastructure, emergency planning, and disaster response systems.	Smaller metro, growing at ~2% annually; rapid urbanization with mixed compliance to seismic-safe building standards.

Earthquake Exposure:

- Tokyo experiences earthquakes far more often-averaging ~259 quakes of M 4+ per year (~one daily) vs. ~19/year for Guwahati.

Magnitude & Damage:

- Tokyo's quakes tend to be lower to moderate (mostly M 4-5); high-magnitude events (>M 6) are rare, and Argentina-response is strong.
- Guwahati, though less frequent, has experienced more powerful quakes historically (M 6+ into M 8.7), with severe impacts like the 1950 calamity.

Population Infrastructure:

- Tokyo: ~37 million with seismic-resilient infrastructure, robust codes, drills, and emergency systems.
- Guwahati: ~1.2 million with growing urban sprawl but building code adherence and retrofitting are inconsistent-vulnerability rising.

Economic/Preparedness Gaps:

- Tokyo invests heavily in disaster mitigation and insurance.
- Guwahati would benefit from focused preparedness: structural retrofits, urban planning, early warning systems, public awareness.

Strong connectivity is key to overcoming geographic dispersion. Integrated transport networks, such as Germany's S Bahn systems and the regional rail networks of the San Francisco Bay Area, allow multiple cities to operate as a single economic cluster. For NER, efficient rail, road and digital links between Guwahati and emerging cities can help create a unified urban system, support integrated value chains and enhance the region's competitiveness.

Investment requirements for urbanization in NER and potential multiplier effects

Achieving the targeted urbanization levels for a Viksit NER requires sustained and well sequenced investment. These investments not only create physical infrastructure but also generate multiplier effects that increase economic output over time.

Figure 37: Investment required for accelerated urbanization scenario in NER

Estimated additional space required per person			Investment required to stimulate acceleration urbanization= Commercial + Residential				
Area type		Average additional space per person (sq ft)	Commercial= Per Person Additional Commercial Space x Estimated Increase in Population since 2025 x Average India Workforce Participation Rate x Average Rate of Commercial Construction				
Commercial (Including Industrial)		120	Residential= Per Person Additional Residential Space x Estimated Increase in Population since 2025 x Average Rate of Residential Construction				
Residential Area		150	In Thousand Crore INR				
Estimated average rate of construction			Urbanisation % in 2047				
Property type		Average rate (INR per sq ft)	Notes	28% (Current pace)	55%	62%	72%
Commercial/Industrial		₹ 3,000	Average including tier 1 to tier 4 cities				
Residential		₹ 3,500	Weighted average across all city tiers				
Workforce participation across cities							
City category	Population range	Estimated workforce participation rate (%)					
Tier 1 cities	> 1 million	~75% - 78%					
Tier 2 cities	100,000 to 1 million	~50% - 65%					
Tier 3 cities	20,000 to 100,000	~45% - 60%					
Tier 4 and below	< 20,000	~40% - 55%					
All India average	All population	~50%					

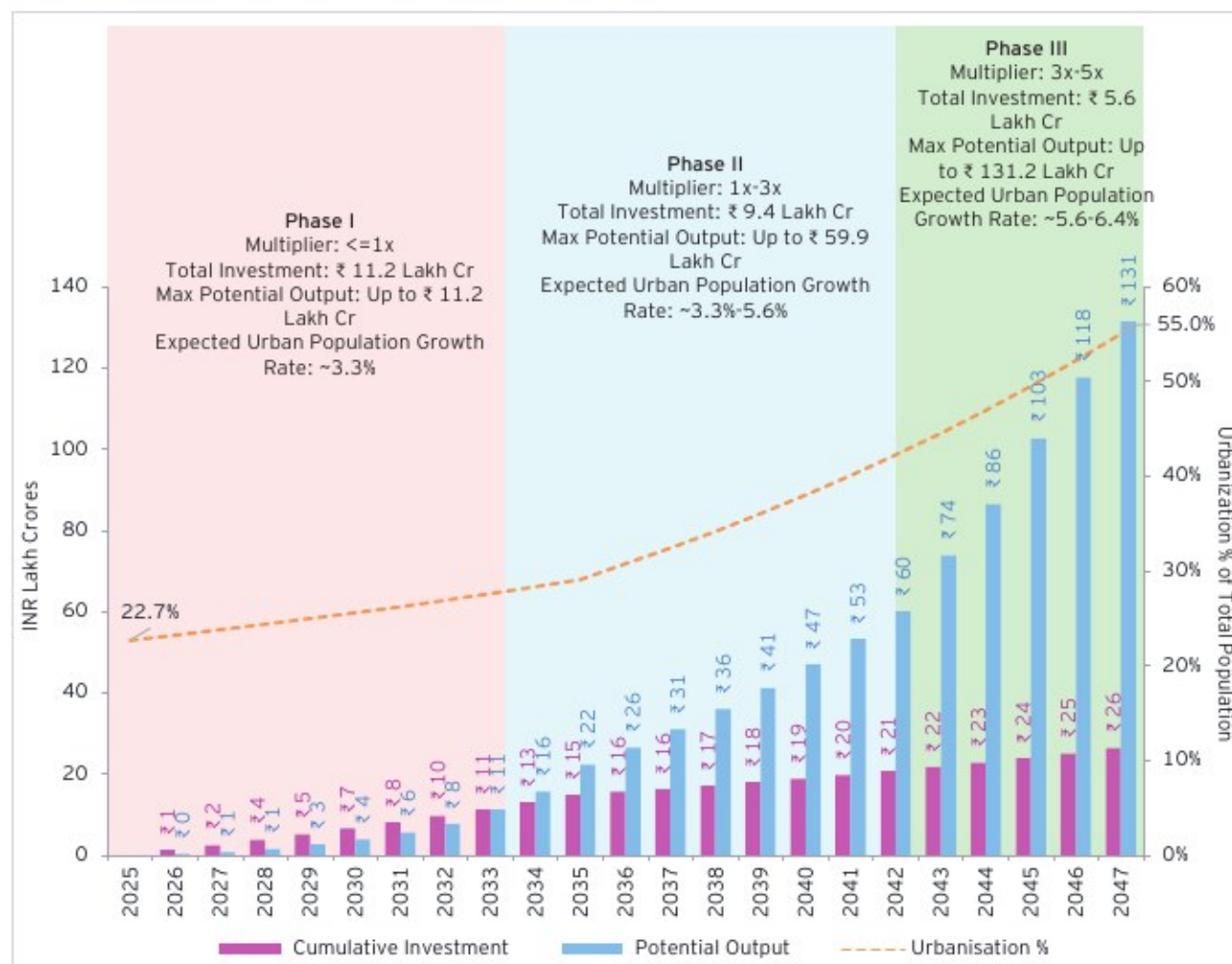
Source: PLFS, JLL, Cushman Wakefield, Economic Times, PIB, Industry Reports, EY Analysis



As urban systems mature, these multiplier effects rise, reflecting improved productivity, higher incomes and stronger consumption linkages. The investment

strategy for the region is therefore structured in three phases, aligned with the evolving impact of urbanization investments.

Figure 38: Potential impact of urbanization investment on NER GDP



2047 numbers have been projected based on 2021-2036 growth rates

Source: Ministry of Health and Family Welfare (2019). Population projection for India and states, 2011-36, Report of the Technical Group on Population Projection, November 2019, EY Analysis, World Bank, Economic Surveys, RBI

Phase I: Foundational investments with limited multipliers ($\leq 1x$)

The first phase focuses on building core urban infrastructure and institutional capacity. Investments during this stage are directed towards basic urban services such as water supply, sanitation, housing, roads and initial connectivity. At this stage, multiplier effects remain limited due to implementation lags, capacity constraints and the focus on asset creation rather than economic activation. These investments are essential to create the base for future growth but typically generate modest short-term economic spillovers.

Phase II: Expansion and connectivity with moderate multipliers ($1x-3x$)

As infrastructure quality improves and urban connectivity strengthens, investments begin to generate stronger economic returns. Enhanced transport networks, reliable power, digital infrastructure and improved urban services reduce logistics costs and support manufacturing and service sector growth. Multiplier effects in this phase rise to the range of $1x$ to $3x$, driven by direct, indirect and induced impacts. This phase marks the transition from basic infrastructure creation to broader economic activation across urban regions.



Phase III: Mature urban systems with high multipliers (3x-5x)

In the final phase, urban infrastructure reaches maturity, and cities begin to function as self-sustaining economic engines. Investments at this stage yield high multiplier effects in the range of 3x to 5x due to strong induced effects such as higher employment, rising incomes and expanded consumption. Well established urban systems amplify cumulative economic returns, allowing cities to fully realize the economic potential of urbanization. This phase represents the point at which urban investments deliver their maximum long-term impact for NER.

High-level urban planning interventions for the region

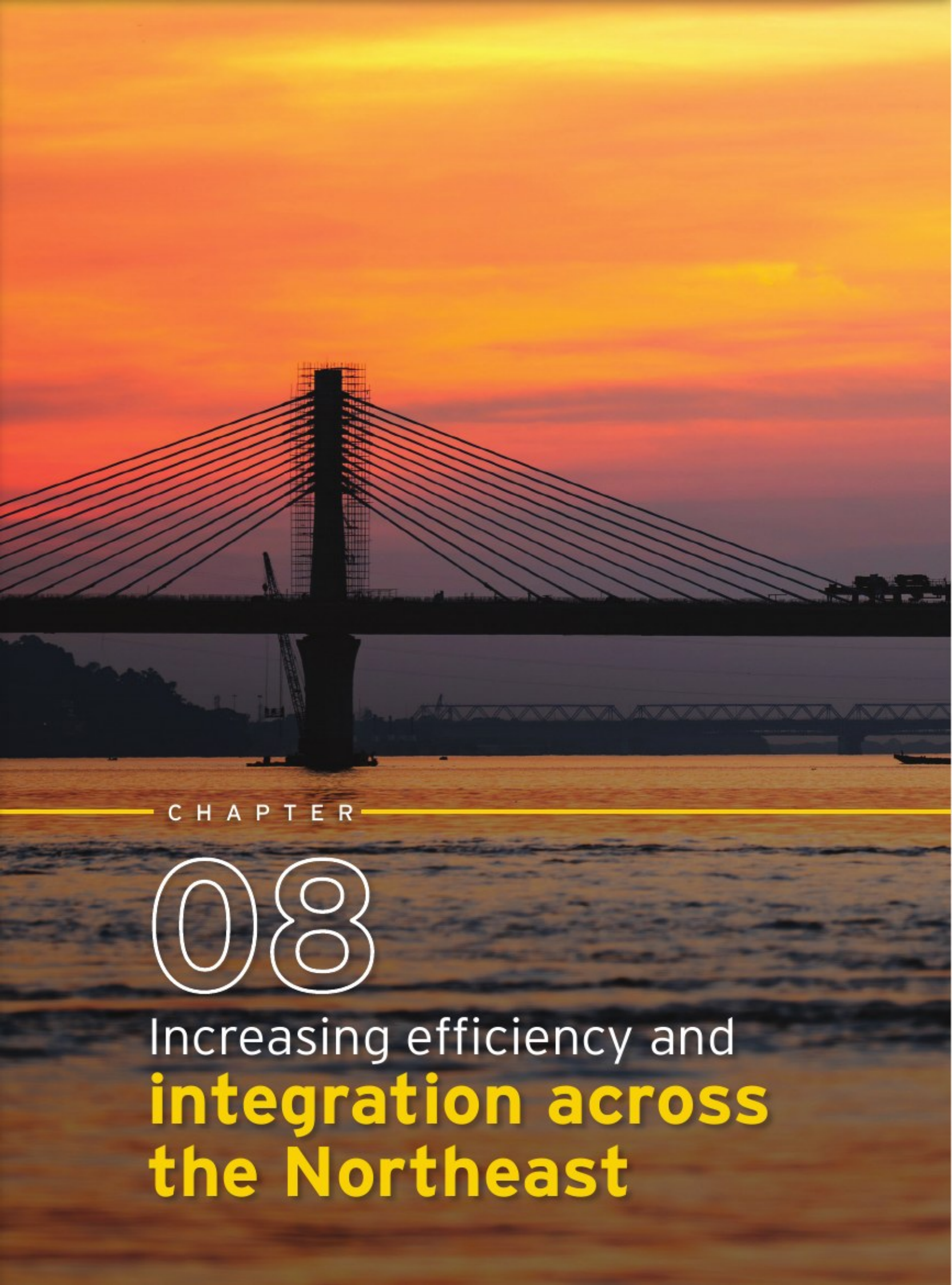
Integrated urbanization can be a key driver of long term and inclusive development in NER, while supporting the objectives of UN's Sustainable Development Goal 11 to create inclusive, safe, resilient and sustainable cities. Compact and well-planned urban growth can help the region benefit from agglomeration efficiencies while balancing environmental protection and social inclusion.

Given the region's settlement patterns and ecological sensitivity, urban planning can focus on strengthening select urban centers rather than spreading growth across numerous small towns. Higher density, mixed land use development, and transit-oriented development can improve economic efficiency, enhance walkability and limit pressure on forests and tribal areas. Integrated urbanization also supports the creation of strong economic clusters and resilient urban systems aligned with sustainability goals.

The table below highlights key recommendations for NER:

Table 45: High-level urban planning interventions for the region

Target area	Recommendation
Role of urbanization in regional development	Use integrated urbanization as a primary driver for achieving a developed NER by leveraging agglomeration efficiencies and building sustainable sources of competitive advantage.
Urban settlement structure	Focus on strengthening larger cities to achieve higher efficiencies rather than dispersing growth across many small agglomerations.
Density and urban form	Promote higher densities for habitation and production to improve efficiency in industry and services while enabling walkable and compact urban environments.
Environment and cultural preservation	Encourage urban densification to limit expansion into forests and environmentally sensitive areas and to protect tribal culture and traditional ways of life.
Industrial and economic clustering	Design urban regions to concentrate complementary and supplementary industries within specific agglomerations instead of evenly distributing activities across cities.
Land use planning in hilly terrain	Adopt flexible and mixed land use planning that integrates residential, commercial, industrial and institutional uses along with natural spaces and transport to attract talent and support competitiveness.

A large cable-stayed bridge is shown in silhouette against a vibrant sunset sky with orange and yellow hues. The bridge's central pylon and its radiating stay cables are prominent. In the background, another bridge and some construction cranes are visible on the water.

CHAPTER

08

Increasing efficiency and
**integration across
the Northeast**



To unlock sustained productivity growth and regional competitiveness by 2047, the Northeast must operate as a single, integrated economic system – enabled by

common digital platforms, coordinated institutions, efficient movement networks, productive asset management, and innovation-to-market mechanisms.

8.1 Why efficiency and integration matter for regional competitiveness

NER stands at a critical juncture where capital deployment alone no longer reliably predicts development outcomes. Under the Gross Budgetary Support (GBS) mandate, wherein 55 non-exempted Central Ministries must allocate a minimum 10% of their allocation to NER, actual expenditure has increased from INR24,819 crore in 2014-15 to INR1,02,749 crore in FY 2023-24.⁹⁴ Despite this substantial infrastructure investment, using Gross State Domestic Product (GSDP) per capita metrics, the regional aggregated per capita income is still about a fifth lower than the national average. This reflects regional efficiencies still lagging relative national production centers, and consequently still cautious private investment.

Efficiency – productive utilization of installed capacity, institutional coordination, and frictionless movement of goods, services, and information – functions as the multiplier that converts latent assets into competitive advantage. Without structural integration across state boundaries and functional silos, investments can remain trapped in isolated pockets, unable to generate the scale economies and network effects essential for sustained productivity growth by 2047.

The productivity gap: Utilization, not assets

Physical infrastructure expansion has been substantial. NER road network density across India increased from ~1,422.6 per 1,000 Sq. Km in 2011-12 to 1,926.0 per 1,000 Sq. Km in 2018-19⁹⁵. For NER, the Pradhan Mantri Gram Sadak Yojana (PMGSY) and state road development schemes have significantly expanded connectivity. The region's installed power generation capacity – inclusive of hydropower, thermal, and renewable sources – has grown substantially. As of April 2022, NER's renewable energy capacity stood at 4,834.6 MW, with hydropower (both large and small) constituting a major chunk of this renewable mix⁹⁶.

The region's aggregate growth trajectory reflects vulnerabilities in asset utilization rather than capacity deficits. Capacity utilization in manufacturing, distribution efficiency in power systems, and throughput on transport networks all remain below national performance benchmarks, revealing fragmented demand aggregation, weak inter-state coordination on industrial policies, and inadequate last-mile connectivity between production zones and transport nodes.

These patterns point to the region's largest immediate productivity frontier: reducing the gap between installed capacity and actual output. Improvements in utilization efficiency – whether in manufacturing plants, power distribution, or logistics networks – would generate substantial productivity gains without requiring proportional new capital deployment.

NER's logistics and connectivity infrastructure presents a clear set of interconnected challenges that, when addressed systematically, can unlock significant economic potential. The following framework identifies priority areas where targeted investment and policy reform can deliver transformative impact:

Diversifying connectivity corridors: The region's current reliance on the Siliguri Corridor creates concentration risk that can be mitigated through developing complementary multi-modal routes. Accelerating operationalization of alternative corridors would enhance resilience and provide redundancy in critical supply chains.

Modernizing rail infrastructure for freight competitiveness: NER's railway network, characterized by legacy meter-gauge lines, currently handles limited freight volumes, resulting in disproportionate dependence on road transport with associated cost penalties. Completing ongoing gauge conversion programs and strategically expanding rail connectivity to industrial clusters and border trade points would enable seamless, high-volume freight movement, reducing logistics on converted routes.

⁹⁴ Ministry of Development of North Eastern Region, Government of India. *Annual Report 2023-24*. <https://www.mdoner.gov.in/static/uploads/2025/08/eca0fe665fb9193d65c68864b0c2e7f19.pdf>

⁹⁵ Ministry of Road Transport & Highways, Government of India. *Basic Road Statistics in India 2018-19*. <https://morth.nic.in/sites/default/files/Basic%20Road%20Statistics%20in%20India-2018-19.pdf>

⁹⁶ Press Information Bureau, Government of India. "Renewable Energy in North Eastern Region." Ministry of Development of North-East Region, 7 Apr. 2022. <https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1814441®=3&lang=2>



Activating border trade infrastructure: NER has extensive international borders with Bangladesh, Bhutan, China and Myanmar, yet only a fraction of Land Customs Stations operate with full functionality. Developing integrated checkpoints equipped with modern facilities – digital clearance systems, warehousing, quality testing labs – at strategically viable locations like Moreh, Dawki, and Sutarkandi, supported by coordinated bilateral investment, can formalize and scale cross-border commerce that currently occurs largely through informal channels.

Building cold-chain logistics ecosystems: The absence of grade-A, temperature-controlled warehousing constrains NER's ability to optimally commercialize its comparative advantage in horticulture, floriculture, and organic products. Establishing multimodal logistics parks with integrated cold-chain infrastructure – through public-private partnerships and viability gap funding where necessary – would reduce post-harvest losses and improve price realization for farmers while enabling access to premium national and export markets.

Leveraging natural waterway assets: NER possesses potentially navigable inland waterways, yet these remain substantially underutilized due to seasonal draft variability and limited terminal infrastructure. Implementing assured-depth dredging programs on priority routes (Brahmaputra National Waterway-2, Barak River) and developing protocol-based cargo handling terminals would convert these natural assets into cost-effective freight corridors, particularly for bulk commodities where waterways offer advantages over road transport.

The cumulative effect of these infrastructure constraints manifests in elevated freight costs driven by fragmented modal choices, limited cargo aggregation, and information asymmetries. Developing integrated digital freight platforms that enable dynamic route optimization, cargo matching, and transparent pricing, combined with strategically located rail-road transfer hubs, can reduce transaction costs and improve end-to-end logistics efficiency. This digital layer becomes increasingly valuable as physical infrastructure improvements come online, multiplying their impact.

These six dimensions are mutually reinforcing: railway expansion increases viability of logistics parks, digital platforms optimize utilization of improved border infrastructure, and waterway development

complements road-rail networks. An integrated, sequenced investment approach that addresses these elements in parallel – rather than in isolation – can progressively transform NER's connectivity disadvantage into competitive advantage, particularly for trade with Southeast Asian markets where proximity matters. The window for such transformation is favorable: national policy focus (PM Gati Shakti, Act East), improved bilateral relations with neighbors, and proven infrastructure financing mechanisms (NaBFID, InvITs) create an enabling environment for sustained, coordinated action over the coming decade.

Integration creates scale in fragmented geography

NER comprises eight states with a combined population of ~53 million distributed across 2,62,179 square km with significant topographical barriers. Current per-state populations vary dramatically: Assam's 36.4 million represents nearly 68% of the region's population, while Sikkim's 0.7 million represents just 1%.⁹⁷ Per capita income, measured by nominal GSDP, exhibits wide inter-state variation across the region. In 2024-25, Sikkim recorded the highest per capita GSDP at INR7,07,181 – reflecting its strong resource base and relatively small population – while Meghalaya's per capita GSDP stood at INR1,74,089.⁹⁸ This variation in per capita income correlates with both natural resource availability and degree of integration into national and global supply chains.

The region's manufacturing profile reflects this fragmentation. NER accounts for a small share of India's total manufacturing output, with average plant sizes in NER manufacturing remaining significantly below national averages. Eight separate state electricity regulatory commissions create fragmented tariff structures, preventing optimization of hydropower surpluses in Arunachal Pradesh and Sikkim to meet deficits in Assam and Tripura. Integration addresses this constraint by creating functional economic scale without geographical consolidation. Research on trade facilitation indicates that reducing cross-border trade time by one day increases exports by ~1%.⁹⁹ An integrated regional power grid with real-time scheduling can reduce aggregate capacity additions through demand-side management and improved utilization of existing generation, yielding substantial capital expenditure

⁹⁷ Table 8: *Projected Total Population by Sex as on 1st March 2011-2036: India, States and Union Territories.* Population Projections for India and States 2011-2036, Report of the Technical Group on Population Projections, National Commission on Population, Ministry of Health & Family Welfare, Government of India

⁹⁸ CMIE (MoSPI)

⁹⁹ Djankov, Simeon, Caroline Freund, and Cong S. Pham. *Trading on Time*. World Bank Policy Research Working Paper No. 3909, World Bank, Washington, DC, 2006

savings. A unified NER Logistics Corporation could consolidate freight demand and operate common-user facilities, reducing per-unit logistics costs through economies of scale.

Efficiency determines external competitiveness

NER's geographic position – bordering Bangladesh, Bhutan, China, Myanmar, and Nepal – positions it as a natural gateway for India's Act East policy. Yet the region's export competitiveness remains constrained not by factor costs but by efficiency deficits. Low labor costs, affordable land, and natural resource access are undermined by poor infrastructure connectivity, high logistics costs from geographic isolation, and unreliable power supply. The efficiency deficit is decisive: For instance, a business might save 20% on labor but pay 40% more in transportation costs and face extended delivery times, making operational inefficiencies, not input costs, the binding constraint on export competitiveness.

India's formal cross-border trade with neighboring countries was ~US\$2.48 billion in 2021¹⁰⁰, with NER accounting for a modest share despite sharing international borders with five countries. Bangladesh dominates current flows accounting for 87% of border

trade, followed by Bhutan at 11%¹⁰¹, revealing vast untapped potential. Key border crossing points include Moreh in Manipur and Zokhawthar in Mizoram for Myanmar trade, and Darranga in Assam for Bhutan trade, alongside multiple land customs stations with Bangladesh across Assam, Meghalaya, Tripura, and Mizoram.

This underperformance stems from efficiency deficits rather than lack of market opportunity. Average dwell time at NER land customs stations exceeds that of major Indian seaports and international land borders in Southeast Asia, reflecting procedural bottlenecks rather than infrastructure constraints. Lack of ISO-certified testing laboratories for product compliance forces exporters to route products through distant certification centers, extending days to export cycles.

Global supply chain integration prioritizes predictability over absolute cost. Delivery reliability, lead time consistency, and compliance certification as more critical decision factors than landed cost. Reducing export clearance time to 24 hours through integrated border procedures, combined with localized testing infrastructure, could materially increase NER export volumes within a short turnaround based on cross-country elasticity studies¹⁰².



¹⁰⁰ Kumarasamy, D., & Nayyar, M. (2023, April 13). *Cross-border trade is the missing piece for India's growth*. East Asia Forum.

<https://eastasiaforum.org/2023/04/13/india-cant-cut-back-on-cross-border-trade/>

¹⁰¹ Taneja, N., Naing, T. H., Joshi, S., Singh, T. B., Bimal, S., Garg, S., Roy, R., & Sharma, M. (2019). *India-Myanmar border trade* (ICRIER Working Paper No. 378). Indian Council for Research on International Economic Relations.

¹⁰² Independent Evaluation Group, World Bank Group. *Trade Facilitation: A Structured Literature Review*. https://ieg.worldbankgroup.org/sites/default/files/Data/reports/tradefacilitation_literaturereview.pdf



8.2 Digital and data backbone: The operating system of integration

The efficiency gains outlined depend fundamentally on information flows – coordination requires visibility, integration demands interoperability, and scale necessitates standardization. A common digital backbone functions as the operating system of regional integration, reducing transaction costs, accelerating decision cycles, and creating network effects that multiply the productivity of physical investments.

Unified platforms reduce transaction frictions

Establishing and operating a business in NER requires navigating multiple state-specific portals for company incorporation, environmental clearances, labor compliance, and tax registration, creating high administrative complexity. This disproportionately burdens MSMEs, which are the backbone of the region's economy. Although NER accounts for only about 1.5% of India's MSMEs, these enterprises contribute nearly 62% of the region's employment, output, and exports¹⁰³. Despite their dominance, MSMEs generate a comparatively lower share of regional manufacturing output than national patterns, reflecting structural and procedural constraints rather than lack of enterprise activity.

By leveraging existing national digital infrastructure – namely MCA21 (Ministry of Corporate Affairs 21, the Government of India's corporate registration and compliance platform), GSTN (Goods and Services Tax Network, the national indirect tax filing and settlement system), and PARIVESH (Pro-Active and Responsive facilitation by Interactive, Virtuous and Environmental Single-window Hub, the Ministry of Environment, Forest and Climate Change's online environmental clearance system) – a proposed Northeast Business Gateway would embed region-specific facilitation and sequencing to transform India's strong regulatory back-end into a front-end ease-of-doing-business interface tailored to NER states. Blockchain-verified digital certificates could allow approvals from one NER state to be recognized across others, so firms don't need to reapply. These certificates are secure digital records stored on a shared, tamper-proof ledger. Other states can instantly verify them, building trust

without paperwork. By cutting duplication and delays, this approach helps businesses scale regionally.

Extending the Unified Logistics Interface Platform (ULIP) to NER land customs stations and inland container depots would enable real-time export clearance tracking, consolidated shipments, and reduced paperwork. ULIP, part of India's National Logistics Policy, has processed over 100 crore API transactions nationwide as of 2025¹⁰⁴, improving cargo visibility and compliance efficiency. Nagaland has initiated ULIP adoption with a workshop in Kohima¹⁰⁵. Scaling ULIP across other NER states could lower logistics costs, enhance regional connectivity, and support faster, more efficient exports.

Automated reconciliation of GST input tax credits – where mismatches remain a persistent issue in interstate transactions – would reduce working capital blockages for NER businesses. This system automatically matches suppliers' uploaded invoices with buyers' claims, identifying discrepancies and ensuring only eligible credits are claimed. While part of the national GST framework, it benefits NER firms, which often trade across multiple states, by freeing up cash flow, reducing compliance disputes, and smoothing regional supply chains.

Interoperable data can enable system-level optimization

Data fragmentation prevents integrated planning. Power Load Dispatch Centres in eight states operate largely independent forecasting models, resulting in inefficient allocation of generation and demand across the interconnected grid. The National Data and Analytics Platform (NDAP) provides a technical blueprint: standardized APIs and common metadata frameworks allow government datasets to be queried without centralized data pooling.

Extending this architecture to NER-specific systems – agriculture marketing committees, state transport corporations, health facility registries, industrial parks – would create a regional data mesh enabling cross-sectoral analytics. A logistics demand forecasting model integrating agricultural production data,

¹⁰³ Government of India. (n.d.). *MSMEs in North East India: Policy Insights for Strengthening Micro, Small & Medium Enterprises in Assam and Mizoram* (Document RNMNAV000073). NITI for States, NITI Aayog Platform. Retrieved [Date], from https://www.nitiforstates.gov.in/public-assets/Policy/policy_files/RNMNAV000073.pdf

¹⁰⁴ Press Information Bureau, Government of India. (2025, March 19). *ULIP surpasses 100 crore API transactions: Enabling seamless, smart, and sustainable logistics* [Press release]. Ministry of Commerce & Industry. Retrieved [Date], from <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2112727&req=3&lang=2>

¹⁰⁵ Directorate of Information & Public Relations, Government of Nagaland. (2025, September 10). *Workshop on Unified Logistics Interface Platform conducted in Kohima*. Retrieved [Date], from <https://ipr.nagaland.gov.in/workshop-ulip-kohima>

manufacturing order books, and seasonal demand patterns could reduce empty backhaul trips and optimize modal allocation.

Real-time dashboards transform governance from reactive to predictive. The PM GatiShakti National Master Plan demonstrates impact: by overlaying 1,600+ infrastructure layers, ministries identify conflicting projects before ground-breaking¹⁰⁶. An NER-specific dashboard would prevent duplication and enable optimal sequencing of inter-state infrastructure projects. Weather and climate data integration offers immediate agricultural productivity gains: improved delivery of timely advisories and API integration with crop advisory systems could reduce losses based on implementation experience in other regions. Here, API (Application Programming Interface) integration allows different software systems – such as weather monitoring platforms and agricultural advisory tools – to communicate seamlessly, exchange data in real time, and trigger automated recommendations, ensuring that farmers receive accurate, location-specific guidance without manual intervention.¹⁰⁷

Digital trust frameworks enable scale

Digital platforms create efficiency only when stakeholders trust their security and privacy. The Indian Computer Emergency Response Team (CERT-In) is the Government of India's national cybersecurity agency under the Ministry of Electronics and Information Technology (MeitY), designated under the IT Act to collect, analyze, and respond to cyber incidents and issue security advisories and guidelines. It operates at the national level, providing incident response, threat alerts, vulnerability advisories, and coordination services across government, industry, and individuals nationwide, including NER.

A unified NER Cybersecurity Operations Centre (CSOC) operating 24/7 for all state digital infrastructure would

centralize scarce cybersecurity expertise and enable real-time threat intelligence sharing. Leveraging lessons from sub-national models such as Maharashtra Cyber, which handles thousands of incidents annually and coordinates real-time responses with advanced SOC and forensic tools¹⁰⁸, a regional CSOC could reduce average breach detection times and improve coordination across NER.

Aadhaar penetration in the Northeast has reached meaningful scale, with Mizoram at 98% and most states above 90% enrolment¹⁰⁹. Nationally, e-KYC transactions grew 24% year-on-year to 47.2 crore in November 2025¹¹⁰, creating a strategic window to modernize service delivery across NER's fragmented administrative landscape. A phased approach targeting urban centers and sectoral pain points would yield early wins, including banking and NBFC onboarding in key cities, MSME formalization through GST registration and MUDRA loans, and welfare scheme rationalization using Aadhaar-based beneficiary databases while retaining alternative ID pathways for vulnerable groups.

The opportunity is real but requires patient, differentiated execution. A state-by-state co-design process – respecting tribal governance structures, political sensitivities, and infrastructure realities – can deliver meaningful efficiency gains in welfare targeting, financial inclusion, and regulatory compliance over a horizon of 5–7 years. Success would depend on building demonstration effects in high-readiness contexts before scaling, maintaining hybrid systems during transition, and coupling digital mandates with tangible last-mile investments. This strategic approach balances modernization ambitions with the institutional nuances of NER's complexity demands.

¹⁰⁶ Government of India. *PM Gati Shakti National Master Plan* <https://pmgatisakti.gov.in/pmgatisakti/login>

¹⁰⁷ Ramya, B., Kumar, A., Verma, S., & Santosh, S. S. (2024). *Agro-Advisory Services: Real-Time Weather and Crop Management Support for Farmers*. Retrieved from https://www.researchgate.net/publication/387749844_Agro-Advisory_Services_Real-Time_Weather_and_Crop_Management_Support_for_Farmers?_cf_chl_tk=dPO_dmwBvbhtOsSengKQc9SzN.quotpJUrXZElabms-1766506342-1.0.1.1-131Doi58_7p6MHvW0ubpjQRQnbh8pJca_okrZhzi9No

¹⁰⁸ Directorate of Maharashtra Cyber. *Maharashtra Cyber Crime Portal - Home*. Retrieved [Date], from <https://mhcyber.gov.in/home>

¹⁰⁹ Unique Identification Authority of India. (2025). *Aadhaar Saturation Report (State/UT-wise Aadhaar saturation as of 30 Nov 2025)*. <https://www.uidai.gov.in/images/AadhaarSaturationReport.pdf>

¹¹⁰ Press Information Bureau, Government of India. (2025, December 2). *UIDAI records 231 crore Aadhaar authentication transactions in November, 8.47% growth over Nov 2024*. Ministry of Electronics & IT. <https://www.pib.gov.in/PressRelea sePage.aspx?PRID=2197605®=3&lang=2>



8.3 Institutional architecture for regional coordination

Digital platforms provide technical infrastructure for information exchange, but institutions supply the governance structures through which states identify shared priorities, align investment horizons, and establish protocols for cooperation. The Northeast Council, alongside advisory committees and interstate working groups, creates standing mechanisms for regional alignment without centralizing decision-making or diminishing state autonomy.

Regional platforms for strategic alignment

Infrastructure corridors linking multiple states, hydropower projects with interstate transmission requirements, and logistics networks serving regional export markets generate spillovers that single-state optimization cannot capture. Regional coordination operates through a two-tier institutional architecture designed to align state priorities without centralizing decision-making authority.

Statutory regional planning body: NEC

Established under the North Eastern Council Act, 1971 and restructured in 2002 as a statutory Regional Planning Body, the NEC serves as the apex coordination platform for multi-state schemes and projects. The Council comprises Governors and Chief Ministers of all eight Northeast states, with Hon'ble Union Home Minister as Chairman and the Minister of Development of North Eastern Region (MDoNER) as Vice-Chairman. The NEC prioritizes and approves schemes benefiting two or more states, operating through an annual Plenary Session that sets regional priorities and sectoral empowered committees that examine project proposals and coordinate implementation.

The NEC Secretariat maintains technical capacity in project appraisal and regional planning. States conduct quarterly review meetings to monitor progress on NEC-funded initiatives, with NEC representatives participating to track implementation and identify bottlenecks. The Secretariat leverages integrated regional datasets assembled through the digital and data backbone, which functions as the operating system of regional integration, enabling evidence-based discussions on infrastructure and investment priorities, and resource allocation across state boundaries.

The NEC oversees several sectoral implementation agencies, including the North Eastern Development Finance Corporation Ltd. (NEDFi) for enterprise finance; the North Eastern Regional Agricultural Marketing Corporation Ltd. (NERAMAC) for agricultural marketing; the North Eastern Region Community Resource Management Project for Upland Areas (NERCORMS) for community resource management and livelihood development; the North East Cane and Bamboo Development Council (NECBDC) for bamboo and cane development; and the North Eastern Handicrafts and Handlooms Development Corporation Ltd. (NEHHDC), which together execute region-specific programs under the Council's strategic guidance.

Sector-specific coordination: High-Level Task Forces (HLTFS)

Following the 72nd NEC Plenary, MDoNER constituted eight High-Level Task Forces (HLTFS) to accelerate focused action on critical development themes¹¹¹. Each HLTFS is chaired by a Chief Minister from one Northeast state, with Hon'ble MDoNER Minister and three other Chief Ministers as members. The task forces address infrastructure and logistics connectivity, tourism development, agriculture and horticulture value chains, economic corridors, and other priority sectors identified through the NEC consultation process.

HLTFS translate broad regional priorities into actionable implementation roadmaps by integrating inputs from Central Ministries, state governments, and NITI Aayog. The task forces do not supersede sectoral ministries' technical authority but enable regionally significant initiatives to receive collective attention and coordinated execution. Multiple HLTFS meetings have resulted in sector-specific action plans that align state-level policies with regional infrastructure requirements and market access opportunities.

This two-tier architecture – combining the NEC's statutory planning authority with HLTFS' sector-focused execution – creates standing mechanisms for regional alignment while preserving state autonomy in decision-making. Digital platforms provide the technical infrastructure for information exchange, while these institutional platforms supply the governance structures through which states identify shared priorities, synchronize investment horizons, and establish protocols for cooperation on matters with regional implications.

¹¹¹ Press Information Bureau, Government of India. (2025, August 8). Union Minister of DoNER and Communications emphasises comprehensive infrastructure masterplan for NER. Ministry of Development of North-Eastern Region. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2153996®=3&lang=2>

Thematic coordination for system-level consistency

As infrastructure systems scale, thematic coordination enables interoperability, sequencing, and efficient use of shared resources. Power grids span state boundaries, logistics networks require synchronized investments, and river basin management affects water availability across upstream and downstream states.

Logistics and mobility systems: Logistics costs in the Northeast remain elevated due to fragmented infrastructure planning and weak inter-state coordination. Nationally, India's ULIP – launched in 2022 and now integrating 43 systems across 11 ministries – demonstrates how shared digital infrastructure enables real-time visibility and coordinated planning. The HLTF on Logistics and Infrastructure Connectivity in the Northeast provides an existing institutional anchor for such coordination without diluting state autonomy. Building on this framework, a regional logistics and mobility platform could align highway maintenance schedules, harmonize warehouse standards, and synchronize inland container depots with feeder road upgrades – reducing costs through coordination rather than centralization.

Energy integration: NER power system operates within the integrated national grid, coordinated through the North Eastern Regional Load Despatch Centre (NERLDC) under POSOCO (Power System Operation Corporation Limited), but generation is concentrated in hydropower-rich states such as Arunachal Pradesh and Sikkim while demand centers lie elsewhere. While grid synchronization and inter-state transmission planning exist, deeper coordination – such as region-wide demand-side management across State Load Dispatch Centres and long-term power purchase frameworks that internalize regional complementarities – remains limited. Cross-state power banking is not yet institutionalized in the Northeast, though it is actively used in power-surplus-deficit corridors involving Gujarat, Rajasthan, Karnataka, and Tamil Nadu through bilateral banking arrangements and medium-term PPAs, improving asset utilization and reducing peaking capacity needs.

Water resources management: The Brahmaputra-Barak basin spans the entire Northeast and carries substantial annual runoff, supporting a large share of regional agriculture and hydropower generation. While basic hydrological data collection exists through national agencies such as the Central Water Commission (CWC) and the India-WRIS platform (Water Resources Information System), integrated basin-level water accounting that links reservoir operations,

irrigation demand, hydropower scheduling, and ecological flows across states remains limited. As a result, reservoir release decisions, irrigation planning, and downstream water allocation are largely managed in silos, constraining opportunities for coordinated efficiency gains and optimal allocation across competing uses.

Skills and human capital mobility: With a predominantly young population, NER has significant demographic potential and employment rates that vary substantially across states, making labor mobility an important adjustment mechanism. Mutual recognition of vocational qualifications across NER states and standardized skill certification through sector skill councils would improve labor market efficiency. Realtime job matching platforms that dynamically connect job seekers with employers – such as the National Career Service portal and private jobtech apps are accessible to NER users, though these platforms primarily operate at the national level. A regionally tailored platform, aligned with NER's linguistic, sectoral, and geographic labor market nuances, could strengthen responsiveness to local demand, enhance mobility, and improve matches between skill-surplus areas and employment opportunities.

Rules-based frameworks for predictable cooperation

Cross-state business operations in the Northeast face friction from duplicative compliance, fragmented regulatory systems, and uncertain dispute resolution pathways. While Constitutional provisions (Articles 301-307) and national precedents provide a legal foundation for inter-state coordination, the region's challenge is not merely procedural. Effective cooperation requires designing incentives that make regulatory harmonization more attractive than the status quo of revenue protection and administrative autonomy.

Strategically, initial focus can be on high-gain, low-friction sectors that demonstrate the benefits of cooperation, such as reciprocal recognition of professional credentials, multi-state tourism operator licensing, and a common NER Organic Brand with mutually recognized certifications. Success in these domains would build institutional confidence and set visible precedents, creating momentum for more complex arrangements such as industrial licensing, trade taxes, and environmental clearances.

Incentives are essential for wider harmonization. Mechanisms such as a dedicated NER Cooperation Fund, variable-speed participation allowing subsets of states to lead while others join gradually, and



transparent benefit-sharing for cross-state infrastructure projects can align economic interests. Existing constitutional and institutional frameworks – including the NEC – can be strengthened rather than replaced, through improved governance mechanisms, enhanced technical secretariat support, and periodic rotation of facilitation or chairing responsibilities to ensure balanced participation among all member states. A regional standards body within NEC could maintain certification equivalence, conduct audits, and manage liability protocols, ensuring predictability for cross-state economic activity.

Ultimately, reducing inter-state friction in the Northeast is a growth accelerator. Strategic sequencing of early-win cooperation, explicit compensation for states, variable-speed engagement, and strengthened regional institutions can unlock economies of scale, reduce logistics costs and position the region as a gateway to Southeast Asia.

Case study 1: Loktak Hydroelectric Project – Bilateral grid arrangements and the limits of technical success

The Loktak Hydropower Project, a 105 MW (3×35 MW) multipurpose station commissioned in 1983, supplies electricity to Manipur, Nagaland, Assam, Mizoram, Arunachal Pradesh, Meghalaya, and Tripura via 132 kV transmission lines, with delivery points and metering arrangements shared among states. The project established predictable technical protocols for multistate power distribution, with joint meter readings in the presence of NHPC and beneficiary state representatives, creating transparency in energy accounting and fundamentally improving Manipur's power availability from a 3.6 MW peak load in 1971.

Despite this technical success, deeper cooperation stalled in downstream extensions. The 66 MW Loktak Downstream Project faced prolonged delays in signing Power Purchase Agreements because the Manipur government at the time considered the high projected

tariffs (around INR6.17 per unit) to be economically unviable. It resisted signing until August 2020 due to tariff concerns, and broader regional agreements were similarly constrained by cost and lack of transparent, equitable terms.¹¹²

Technical protocols alone are insufficient – transparent benefit-sharing and reasonable cost allocation are essential for sustained cooperation. The Loktak experience shows that cross state infrastructure thrives when gains are visible and risks are distributed equitably; for NER, this underscores the need for explicit compensation mechanisms and transparent tariff determination in regional cooperation frameworks.

Case study 2: Oil India Operations – Royalty sharing and the political economy of resource extraction

Oil India Limited (OIL), a central public sector enterprise headquartered in Duliajan, Assam, plays a significant role in hydrocarbon exploration and production in the Northeast, operating pipelines and supplying crude and gas to energy customers. Assam, which contributes a substantial share of India's crude production, topped the list of states receiving royalty from crude oil and gas in 2024-25, with an estimated INR3,766.01 crore in royalties – far exceeding other producing states like Arunachal Pradesh (INR29.39 crore) – reflecting the strong fiscal returns of hydrocarbon resources in Assam relative to neighboring states.¹¹³

The royalty sharing framework under central petroleum policy and production sharing contracts has created predictable revenue streams for states hosting extraction activities. Especially notable is Assam's evolving role from passive resource supplier to an active stakeholder with equity participation in upstream projects – strengthening its revenue base and aligning economic interests with operational partners.

¹¹² NHPC Limited. *List of projects*. <https://www.nhpcindia.com/welcome/project/>

¹¹³ Oil India Limited. (2025). *Annual Report 2024-25*.

https://www.oil-india.com/files/financial_results_documents/OIL_India_Annual_Report_2024_25.pdf

8.4 Integrated movement systems: From connectivity to throughput

Despite substantial infrastructure expansion, logistics efficiency metrics in NER remain below national benchmarks, and average delivery times to major metros exceed those from comparable distances in other regions. Integrated movement systems – spanning multimodal connectivity, specialized logistics capabilities, and unified market access protocols – convert installed infrastructure capacity into productive throughput.

Seamless multimodal logistics networks

In the Northeast, the prevalence of empty-return trucks reflects structural economic asymmetry rather than mere logistics inefficiency. Connectivity corridors serve predominantly inbound flows, while limited industrialization, perishable agricultural surpluses, and underdeveloped bamboo and handicraft value chains constrain outbound cargo. This imbalance drives up freight costs for all inbound goods, a dynamic highlighted by the DPIIT-NCAER Logistics Cost Assessment (2023-24)¹¹⁴, which shows Northeast-bound cargo faces the highest costs due to infrastructure gaps and empty-mile risks.

The challenge also presents a clear pathway forward: state-wise targets and metrics from the DPIIT-NCAER framework can track reductions in logistics differentials, while digital backhaul matching platforms and aggregator contracts can enhance outbound flows. Coordinated supply-side investments – multimodal nodes, climate-resilient roads, rail and waterways – combined with demand-side measures such as agro-processing zones, UNNATI-2024 incentives, and formalized bamboo value chains, can transform NER's structural freight deficit into an opportunity. By reliably linking production clusters to national and international markets, the region can reduce logistics costs, improve industrial viability, and convert inbound-dominated corridors into balanced, cost-efficient trade channels.

Logistics efficiency depends on minimizing friction at modal interfaces. Global best practice demonstrates that integrated multimodal networks can reduce total logistics costs through optimized modal allocation and reduced dwell times. NER's logistics architecture operates primarily road-centric, with underutilization of rail and waterway capacity despite their cost and

environmental advantages. National Waterway-2 (Brahmaputra), spanning 891 km from Dhubri to Sadiya¹¹⁵, operates with significant unutilized capacity despite carrying critical commodities for the region.

Strategic freight corridors require modal integration. Multimodal terminals on National Waterway-2 may be co-located with rail sidings and highway access, allowing tea, bamboo, and processed foods to consolidate for onward movement via most efficient modes. Physical co-location must be complemented by digital integration through ULIP extension to NER-specific nodes, enabling single-window booking and reducing administrative requirements. Small consignment sizes in the NER prevent efficient utilization of rail and waterway capacity. Regional consolidation centres at key locations enable aggregation into full container loads, reducing per-unit logistics costs substantially.

Last-mile connectivity remains the critical bottleneck. While national and state highways have expanded significantly, connectivity to villages, particularly those in production clusters, requires targeted prioritization. Allocating Pradhan Mantri Gram Sadak Yojana (PMGSY) resources and Vibrant Villages Programme (VVP) toward villages within 10 km of industrial clusters and border villages, export processing zones, and multimodal terminals would maximize economic impact.

Specialized logistics for high-value sectors

Generic infrastructure serves bulk commodities adequately but cannot support high-value, time-sensitive products. Organic agricultural products, processed foods, pharmaceuticals, and handicrafts require temperature-controlled transport and traceability systems.

Cold chain integration: The NER produces substantial volumes of fruits and vegetables annually, but post-harvest losses remain elevated due to inadequate cold chain coverage. By August 2020, the North Eastern states collectively had only 69 cold storages with a combined capacity of 254,201 MT – comprising Arunachal Pradesh (two facilities, 6,000 MT), Assam (39 facilities, 178,096 MT), Manipur (two facilities,

¹¹⁴ National Council of Applied Economic Research & Department for Promotion of Industry and Internal Trade, Government of India. (2025). *Assessment of Logistics Cost in India*.
<https://master-dpiit.digifootprint.gov.in/static/uploads/2025/09/7d467e0f4aee2362e4bf90b84b7a5332.pdf>

¹¹⁵ Ministry of Ports, Shipping & Waterways, Government of India. (n.d.). *National Waterway 2 and 16. Sagar Vidya Kosh*.
https://mopsw.nic.in/sagarvidyakosh/index.php?title=National_Waterway_2_and_16



4,500 MT), Meghalaya (four facilities, 8,200 MT), Mizoram (three facilities, 4,001 MT), Nagaland (three facilities, 7,150 MT), Sikkim (two facilities, 2,100 MT), and Tripura (14 facilities, 46,354 MT)¹¹⁶. Integrated cold chain systems require farm-level pre-cooling facilities, refrigerated transport, multi-temperature warehouses, and reefer container availability. End-to-end integration can reduce wastage substantially, translating to significant annual value preservation. Viability gap funding covering a portion of capital costs for cold chain infrastructure in production clusters, combined with anchor buyer commitments, would de-risk private investment follow successful hub-and-spoke models implemented in other regions.

Pharmaceutical and agri-processing supply chains: NER, with strategic proximity to Southeast Asia, competitive land rates, and low resource costs, has strong potential to become a pharmaceutical hub. While the regional pharmaceutical market is growing, actual manufacturing remains minimal. Realizing this requires specialized logistics – temperature-controlled warehouses, validated transport, continuous monitoring. Such hubs would enable NER manufacturers to meet domestic and ASEAN export standards, reducing wastage and ensuring product integrity.

For processed and organic foods, NER produces high-quality crops like Joha rice and King Chili, yet limited cold chain, pack houses, and certification infrastructure constrain market access. Programs such as MOVCDNER and Sikkim's state organic certification agency provide a foundation, and integrated logistics – GPS tracked transport, segregated temperature-controlled storage, and blockchain-based traceability would enhance quality, enable premium pricing, and open national and international markets.

Unified regional and cross-border market access

Export consignments undergo separate inspections by multiple agencies at origin, transit points, and border crossings, each requiring distinct documentation and adding days to clearance cycles.

Harmonized standards and regional testing infrastructure: Product standards vary across NER states, requiring separate production systems for different markets. Adopting harmonized standards based on international protocols supports international acceptability while enabling single

production systems. Accredited testing laboratories are concentrated in limited locations, forcing exporters to transport samples over significant distances for testing, adding days to export cycles. Establishing NABL-accredited facilities in each state capital covering food safety, textiles, electronics, and construction materials would enable local certification with national recognition. Some states already have accredited labs – for example, Assam's Pollution Control Board central laboratory and the NEHHDC textile testing facility in Guwahati, and Nagaland's State Public Health Laboratory – providing a foundation to expand testing capacity and reduce dependency on external centers.

Integrated trade facilitation: NER conducts a material share of international trade through land customs stations, with average clearance times exceeding those at major seaports. Trade facilitation improvements require:

- Authorized Economic Operator (AEO) programs providing pre-approved status to compliant traders, enabling expedited clearances. Current NER participation in AEO programs remains below potential.
- Integrated inspection facilities replacing sequential checks with single-window simultaneous inspections, reducing processing time substantially based on implementation at other major land ports.

Cross-border data exchange through ASEAN Single Window integration, enabling advanced cargo information sharing. Such integration has reduced cargo clearance time substantially in Southeast Asian trade corridors. Twenty-four-hour operations at major land customs stations requiring shift-based staffing and digitalized processes eliminating paper-based documentation.

Full operationalization of the Bangladesh-Bhutan-India-Nepal Motor Vehicle Agreement remains in the protocol finalization stage, with implementation still pending. It has advanced through ratification by three members and protocol development by India, Bangladesh, and Nepal, but full implementation, including Bhutan's participation and the start of seamless vehicle movement across all four countries remains a work in progress. It could reduce freight transit times and costs substantially, facilitating regional supply chains.

¹¹⁶ Press Information Bureau, Government of India. (2020, September 23). *Cold storage facilities in the country*. Ministry of Agriculture & Farmers Welfare. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1658114®=3&lang=1>

8.5 Asset productivity and lifecycle performance

Comprehensive performance visibility and continuous monitoring

Effective asset management requires continuous visibility into utilization rates, physical condition, and service delivery outcomes. Yet public infrastructure often operates without performance monitoring; data exists fragmentarily within departmental silos, lacks standardization, and remains inaccessible for integrated planning.

Digital Asset Registries provide the foundational data layer. Digital registries for key public assets – especially land records – are being developed under the Digital India Land Records Modernization Programme (DILRMP) and its component, the National Generic Document Registration System (NGDRS), which creates a unified, configurable platform for online property and document registration across states. NGDRS has been adopted or integrated in several NER states such as Assam, Manipur, Mizoram, Meghalaya, and Tripura, with data sharing through API and e-registration workflows that reduce physical visits for citizens¹¹⁷. The National Asset Monetization Pipeline catalogues central government assets with geospatial coordinates, technical specifications, and utilization of metrics. Extending this to NER state assets – roads, bridges, water supply systems, educational facilities, healthcare infrastructure – creates complete inventory enabling portfolio-level analysis. Asset registries could capture functional attributes: design capacity, actual throughput, maintenance history, and remaining useful life.

Beyond static inventories, IoT (Internet of Things) sensors – networks of interconnected devices that collect and transmit real-time data – and Supervisory Control and Data Acquisition (SCADA) systems, which provide centralized monitoring and control of infrastructure operations, offer real-time visibility into equipment loading and efficiency. The Smart Cities Mission demonstrates feasibility: integrated command centers monitoring multiple infrastructure systems simultaneously reduced emergency response times and enabled predictive maintenance. From NER, ten cities were selected: Guwahati (Assam), Imphal (Manipur), Agartala (Tripura), Kohima (Nagaland), Aizawl (Mizoram), Pasighat and Itanagar (both Arunachal Pradesh), Gangtok and Namchi (Sikkim), and Shillong (Meghalaya).

Lifecycle cost optimization

Infrastructure decision-making traditionally emphasizes capital expenditure while underweighting operations and maintenance costs. A road or power transmission line built at significant capital cost requires substantial ongoing maintenance over its design life, yet maintenance budgets often fall short of required levels. Lifecycle Costing in Project Appraisal enables decision-makers to evaluate total cost of ownership – capital plus 20-30 years of operations, maintenance, and decommissioning. Making lifecycle cost optimization an approval criterion enables systematic optimization.

Predictive maintenance enabled by continuous monitoring intervenes when deterioration indicators exceed thresholds. For roads, pavement management systems prioritize interventions where marginal cost per incremental pavement life is lowest. For power equipment, oil quality analysis and thermographic imaging predict failures months in advance, enabling planned shutdowns rather than emergency outages. Predictive maintenance reduces unplanned outages and extends equipment life substantially while improving asset availability.

Dedicated maintenance funding creates sustainable financing. The Central Road and Infrastructure Fund provides precedent: cess on fuel sales generates ring-fenced revenue for highway maintenance. State Road Funds financed by vehicle registration fees, with statutory allocation to maintenance, have proven effective in other states. Similar mechanisms for power sector maintenance funds and water infrastructure maintenance funds would enable predictable funding independent of annual budget cycles.

Outcome-based accountability

Public infrastructure historically operates under input-based contracts specifying construction standards without explicit accountability for service delivery outcomes. Outcome-based accountability aligns incentives with public value creation.

Output-based contracts specify permissible service standards – pavement roughness, maximum outage duration, or water quality parameters – with payment linked to compliance. The Pradhan Mantri Gram Sadak Yojana's performance-based maintenance contracts

¹¹⁷ Press Information Bureau, Government of India. (2023, December 22). *Year End Review 2023: Achievement of the Department of Land Resources* [Press release]. Ministry of Rural Development. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1989671®=3&lang=2>



covering rural roads show superior condition ratings compared to time-based equivalents at similar cost. For power distribution, contracts could mandate aggregate technical and commercial (AT&C) loss reduction trajectories. Rajasthan's distribution franchise model achieved material loss reduction over defined periods through such contracts.

Citizen feedback loops through digital platforms enable citizens to report service deficiencies – pothole

locations through geotagged photos, power outages via mobile apps – creating real-time performance data. Seoul's Call Center model demonstrates impact: citizen complaints automatically generate work orders achieving high first-call resolution and citizen satisfaction¹¹⁸. Kenya's integrated government services platform demonstrates that service delivery ratings improve substantially when citizen feedback mechanisms are embedded in operations¹¹⁹.

8.6 Innovation-to-Market Systems for applied problem-solving

Regional competitiveness depends on translating knowledge into productive applications – converting research insights into agricultural yields, process innovations into manufacturing efficiency, and technological breakthroughs into market-ready products. The NER requires not generic R&D ecosystems but applied, problem-driven innovation systems addressing region-specific constraints. Innovation-to-market systems create institutional mechanisms that identify high-value problems, mobilize technical capacity to develop solutions, and establish pathways from prototype to scale.

Localized innovation capacity

Effective innovation systems begin with problem identification grounded in regional economic structure. The NER requires innovation capacity focused on domains where regional advantages exist – organic agriculture and value-added processing, hydropower and renewable energy integration, herbal pharmaceuticals, bamboo and forest-based industries, and digital service delivery for dispersed populations.

Centers of Excellence concentrating research talent and industry partnerships enable critical mass. The National Bamboo Mission's Bamboo Technology Centre at Guwahati provides processing technology support to numerous enterprises, contributing to sector growth. Scaling requires sector-specific centers, possibly including:

- Himalayan Hydropower Research Institute focused on run-of-river design optimization, sediment management in high-silt rivers, and integration of variable renewable energy with pilot facilities for turbine testing.

- Centre for Organic Agriculture developing climate-resilient varieties, bio-pesticide formulations, and organic certification protocols aligned with international standards with demonstration farms in multiple agro-climatic zones.
- Herbal Medicine Laboratory conducting phytochemical analysis, standardization protocols, and clinical trial coordination with biorepository and GMP pilot facilities.
- Digital Governance Innovation Hub creating solutions for last-mile service delivery – offline-capable mobile applications, vernacular language interfaces, and low-bandwidth video communication for telemedicine with sandbox environments for pilot testing.

Challenge-based research models focus innovation on high-value problems. For NER, challenge themes can include reducing post-harvest losses through low-cost cold chain technologies, improving first-pass yield in handloom weaving, developing point-of-use water quality testing devices at low cost, creating offline-capable digital payment systems, and designing modular building systems meeting safety requirements at reduced cost. Prize-based funding attracts diverse innovators while ensuring accountability for outcomes. Multi-year funding timelines (3-5 years) for prototype development and commercialization pilot phases would establish credible pathways from concept to market.

¹¹⁸ Seoul Metropolitan Government & Seoul Solution. (n.d.). 120 Dasan Call Center: citizen-centered quick response hotline.

<https://www.seoulsolution.kr/en/content/120-dasan-call-center>

¹¹⁹ Sapru, Y. (2020). Augmenting public service delivery through online feedback systems. *Indian Journal of Public Administration*, 66(3), 297-311.

<https://doi.org/10.1177/0019556120958914>

https://www.researchgate.net/publication/346219348_Augmenting_Public_Service_Delivery_Through_Online_Feedback_Systems

Entrepreneurial ecosystems and commercialization support

Innovation succeeds only when promising prototypes reach commercial scale. The Northeast's MSME sector requires specific support in translating innovations into market-ready products and services.

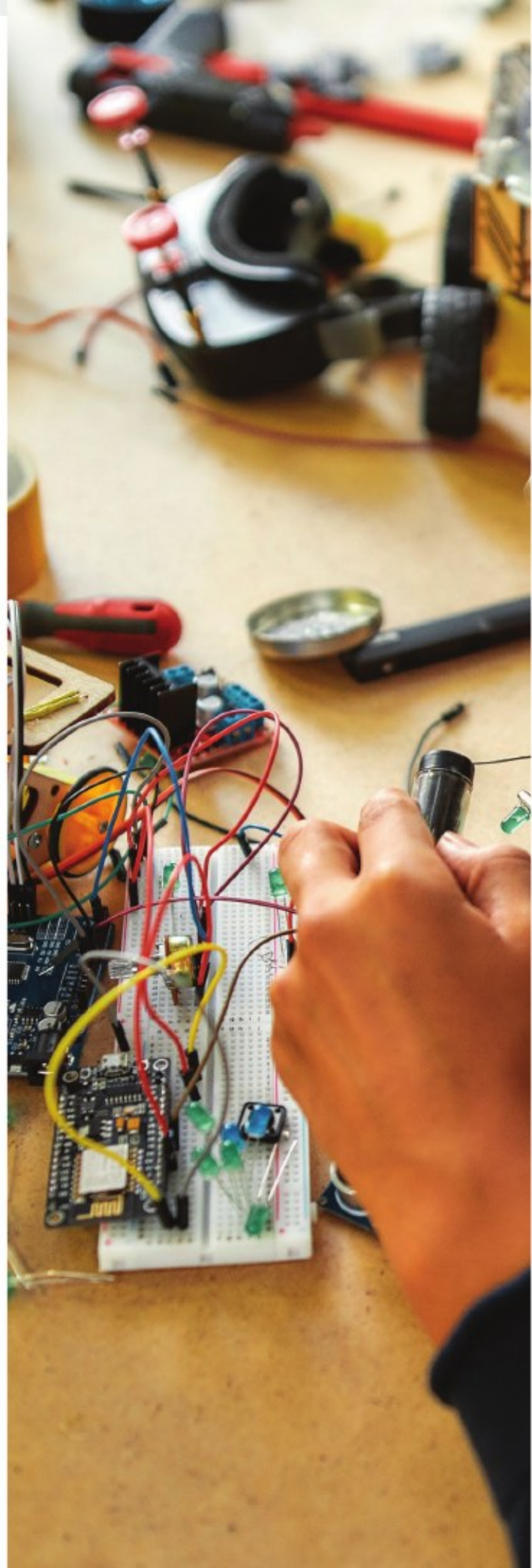
Venture capital and risk capital mechanisms: Northeast-focused venture capital funds addressing the "missing middle" – capital requirements below institutional venture capital thresholds but exceeding traditional bank lending limits – would accelerate innovation commercialization. Partial credit guarantees (PCGs) from development finance institutions could de-risk investment in technology-based ventures in the region.

Innovation hubs and startup incubators: IIT Guwahati and IIM Shillong anchor NER's innovation ecosystem through facilities like IITG-TIC, BioNEST, and IIMSFIE, offering incubation space, mentorship, funding, and sectoral guidance across healthcare, agritech, biotech, tourism tech, and entrepreneurship. Initiatives such as the Northeast Entrepreneurship Fellowship, DPIIT-recognized startups, NEDFi's NEEDS, NEIDS, and UNNATI provide financial support, seed funding, and industrial incentives, while Semiconductor plant in Jagir Road highlights Make in India opportunities. Despite growing alumni bases, systematic mentorship programs connecting successful alumni – especially those in metros or abroad – with NER startups remain underdeveloped. Strategic gaps persist in geographic coverage, sector-specific hubs, and anchor customer linkages, suggesting the need for state-level satellite hubs, structured alumni networks, and coordinated corporate and government partnerships to fully realize the region's entrepreneurial potential.

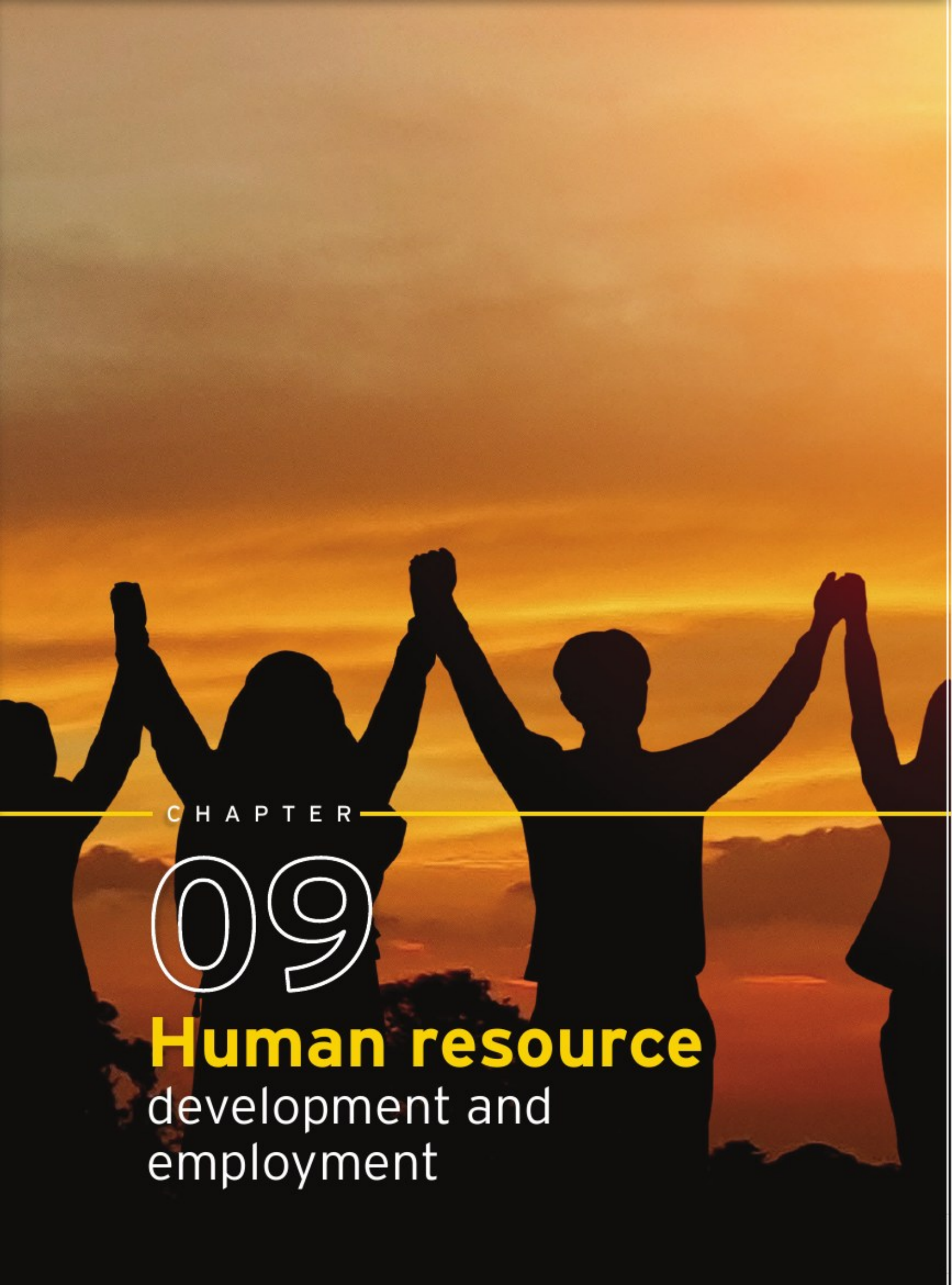
Knowledge infrastructure and cross-learning

Systematic knowledge sharing across the Northeast reduces duplication and accelerates innovation diffusion. A Northeast Innovation Network connecting researchers, entrepreneurs, and industry associations would facilitate cross-state learning and collaborative problem-solving. A digital platform documenting innovations, successful commercialization pathways, and lessons from both successes and failures would serve as a reference for entrepreneurs and researchers. Open-access policy briefs and technical notes would share evidence on effective practices across sectors and states.

The Northeast's geographic position creates opportunities for cross-border collaboration with research institutions and enterprises in South Asia and South East Asia. Bilateral arrangements for research collaboration, technology transfer, and supply chain integration would expand knowledge access and commercialization opportunities for NER innovators.





The background of the entire page is a photograph of a sunset or sunrise. The sky is a gradient of warm colors, from deep orange at the bottom to a lighter, hazy yellow at the top. In the foreground, the silhouettes of several people are visible, their arms raised and hands clasped together in a gesture of unity or celebration. The silhouettes are dark against the bright sky.

CHAPTER

09

Human resource

development and
employment



Human resource development and employment form the cornerstone of the NER's long-term development trajectory and its contribution to India's Vision 2047. The past decade has witnessed sustained public investment that has expanded physical connectivity, strengthened access to basic services, and improved integration with national markets. As the region enters its next phase of development, the strategic focus must evolve – shifting from the expansion of inputs toward enhancing the quality, effectiveness, and economic translation of human capital.

NER's development path is shaped by three distinctive structural characteristics that, while presenting specific constraints, also create a coherent strategic opportunity space. First, a relatively modest population base necessitates efficient rather than scale-intensive growth models. Second, spatial dispersion encourages innovation in service delivery mechanisms. Third, challenging topography creates natural incentives for high-value economic specialization. Together, these conditions generate predictable yet manageable economic dynamics.

These structural realities produce specific implications for human capital strategy. Thin labour markets demand strategic skill development and targeted occupational pathways rather than broad-based credentialism. Lower enterprise density directs attention toward high-productivity ventures and quality employment over volume-based metrics. While geographic fragmentation raises coordination costs, it simultaneously reduces the transmission lag between education reforms and employment outcomes – particularly when appropriate bridging mechanisms in tradable services and digital connectivity are systematically deployed. Under these conditions, the region possesses a distinctive comparative advantage

in human-capital-intensive sectors that reward specialization over scale, provided education systems respond to market signals and labour mobility frictions are strategically addressed.

This analysis reveals a critical strategic insight: in the NER, Human Resource Development and Employment function most effectively not as sequential interventions but as mutually reinforcing elements of an integrated economic system. Skills formation aligned with employment pathways generates productive job matches; employment strategies anchored in human capital development sustain wage premiums and productivity growth. The region's structural characteristics thus create both the necessity and the opportunity for a unified policy architecture – one where education quality, skill relevance, enterprise development incentives and labor mobility frameworks are designed as interdependent components of a cohesive strategy capable of converting demographic efficiency into competitive advantage.

NER Vision 2047 therefore adopts an outcome-oriented perspective on human capital. The strategic objective extends beyond expanding participation in education or employment – it aims to support investments in learning, skills, and workforce development translate into higher productivity, improved job quality, and sustained income growth. This approach recognizes that returns to human capital are mediated by local economic structures, institutional capacity and the alignment between education systems and labour market demand. Accordingly, differentiated pathways across states and districts are integral to achieving region-wide progress.



9.1 Demographic Profile and Human Capital Potential

The eight NER states collectively house over 45 million people, accounting for ~3.8% of India's population while occupying around 8% of the national land area¹²⁰. This demographic-spatial configuration exerts a fundamental influence on labor market depth, service delivery costs, and enterprise formation, structurally differentiating the region from more densely populated growth corridors elsewhere in the country.

Population dispersion and terrain characteristics directly shape the depth and composition of labor markets. Lower population density and dispersed settlements – particularly in hill and border districts – result in smaller local markets, higher per capita service delivery costs, and limited scope for large employment clusters. These structural conditions affect both labor supply and the types of economic activities that can be sustained locally. Consequently, the region's employment landscape is characterized by a combination of agriculture, small-scale enterprises, public services, and a growing set of service-sector activities concentrated in urban centers and along connectivity corridors.

Over the past decade, the NER has witnessed economic growth driven largely by public capital expenditure and connectivity-led investments. Regional GSDP reached ~INR 5.7 lakh crore in FY2021, growing at a CAGR of 8.2% between FY2015 and FY2022¹²¹. This growth trajectory reflects sustained public investment in roads, railways, air connectivity, power transmission, and digital infrastructure. However, employment outcomes have not expanded proportionately, indicating a capital-led growth path with limited employment elasticity.

From a human capital perspective, this growth trajectory carries two significant implications. First, improved connectivity expands the range of employment opportunities accessible to the working population, both within the region and beyond. Second, infrastructure investment creates a complementary demand for skills in construction, logistics, services, administration, and maintenance, influencing the composition of labour demand over time. The translation of output growth in employment outcomes, however, depends fundamentally on the availability, quality, and adaptability of the workforce.

The region is now entering a demographically advantageous phase. Assam, Meghalaya, Manipur, and Tripura are positioned to experience a sustained

expansion in working-age populations through the medium to long term. Favourable dependency ratios over this period translate directly into increased fiscal space – as the share of the economically active population rises relative to dependents, per capita costs decline while the tax base broadens, creating a structural window for productivity-enhancing public investments.

This demographic dividend, however, is neither automatic nor indefinite. Its realization depends critically on the synchronization of three reinforcing conditions: accelerated human capital formation that raises the earnings potential of each labor market entrant; education and skill systems recalibrated to align with the region's evolving comparative advantages in tradable services and specialized manufacturing; and enterprise development frameworks capable of absorbing skilled labor into productive employment at wage premiums that justify educational investments.

The strategic implication is time sensitive. States that frontload investments in learning outcomes, vocational relevance, and labour market information systems during the early phase of working-age population expansion will capture compounding returns as successive cohorts enter employment with progressively higher productivity endowments. Conversely, delayed action compresses the policy response window and risks converting demographic opportunity into a coordination failure – where expanding labour supply meets inadequate demand for skilled workers.

The current demographic trajectory thus establishes both a clear opportunity structure and an explicit implementation timeline. The next decade represents a high-return period for integrated investments in education quality, skill ecosystem development, and employment pathway design – investments that will determine whether the region's favourable population dynamics translate into sustained per-capita income growth or dissipate through underemployment and out-migration.

Agriculture and allied activities remain central to the region's employment structure, engaging the majority of the workforce across districts. This reflects genuine agro-climatic potential that operates within a complex set of constraints shaping both current productivity and future transformation pathways. Agriculture continues to absorb most of the region's workforce not

¹²⁰ Census of India, *Census of India 2011: Primary Census Abstract*, Ministry of Development of North Eastern Region (MDoNER), Annual Report 2022-23

¹²¹ Ministry of Development of North Eastern Region (MDoNER), Annual Report 2022-23

primarily due to comparative advantages but also due to limited alternatives and structural barriers to mobility. While customary land tenure and agro-ecological diversity provide certain risk-mitigation benefits, they also constrain productivity: fragmented holdings prevent mechanization, unclear titles limit credit access, and poor connectivity to markets results in post-harvest losses for perishable crops.

Market access constraints exacerbate production-side challenges. Inadequate storage, weak transport connectivity and thin market linkages drive significant farm-level losses. Climate vulnerability further compounds these pressures – recurrent flooding in exposed areas disrupts production cycles, heightens income volatility, and reinforces subsistence-oriented behaviour. These constraints shape household labour allocation strategies in which on-farm activity is combined with seasonal services, informal trade, and other non-farm work. While this diversification plays an important risk-mitigation role, it increasingly reflects a misalignment between available livelihood options and evolving aspirations rather than an economically optimal allocation of labour.

The strategic challenge is threefold: raising agricultural productivity through technology adoption, improved market access and targeted infrastructure; generating non-farm employment at scale to absorb surplus agricultural labor and meet rising aspirations; and managing this transition in a manner that safeguards social cohesion and food security. The opportunity lies in actively orchestrating employment transitions through coordinated investments in irrigation expansion, market infrastructure to reduce post-harvest losses, climate-resilient agriculture to mitigate flood risks, structured livelihood diversification – particularly for jhum-dependent communities – and sustained non-farm job creation to support the shift toward formal and higher-productivity employment.

Non-farm employment expansion reflects structural transformation in progress, though its pace and distributional impact remain constrained by spatial and institutional heterogeneity. Growth in construction, trade, transport, tourism-related services, public administration, education, and healthcare has absorbed labor transitioning out of agriculture and provided entry points for educated youth – critical given rising educational attainment and demographic pressures. This diversification has been enabled by improvements in connectivity and urbanization, which have reduced transaction costs and expanded market access.

However, the capacity of districts to generate and sustain non-farm employment varies significantly with

local economic structure, proximity to urban centres, and human capital endowments. High-performing districts benefit from agglomeration economies, established infrastructure, and skill availability; lagging districts face thin labour markets, weak linkages, and limited fiscal capacity. The strategic implication is clear: non-farm employment growth, while positive, is neither automatic nor self-sustaining. It requires targeted interventions to address binding spatial and capability constraints, particularly in districts where connectivity gains have yet to translate into productive employment opportunities. Without such differentiation, aggregate expansion may mask widening intra-regional disparities in labour market outcomes.

Manufacturing in the region remains a selective contributor to employment and output, constrained by scale limitations and market fragmentation despite the presence of resource-based and niche product capabilities. Agro-processing, bamboo- and forest-based industries, handlooms and handicrafts, and pharmaceuticals constitute established segments of the regional production base, leveraging natural resource endowments and traditional skill clusters. However, the predominance of small-scale establishments – shaped by limited access to finance, technology, and markets – restricts direct employment absorption, particularly relative to capital deployed. This scale constraint is compounded by infrastructure deficits that raise logistics costs and weaken competitiveness in inter-regional and export markets.

Manufacturing's employment footprint is therefore amplified primarily through backward and forward linkages: service activities in value chain coordination, logistics, quality assurance, branding, marketing, and distribution generate derived demand for labour, often exceeding direct factory-floor employment. Manufacturing-led growth in the region depends less on replicating high-volume, capital-intensive models than on deepening value addition within existing sectors, strengthening ancillary service ecosystems, and addressing the binding constraints – access to finance, technology adoption, and market connectivity – that prevent micro and small enterprises from achieving viable scale.

Human capital indicators suggest that the region possesses a strong foundation. Literacy levels are relatively high, and access to schooling has expanded across states. Outcomes, however, vary across districts, reflecting differences in education quality, retention, and progression. These variations influence employability, productivity, and the capacity of local economies to absorb skilled labour. Where education outcomes are stronger, districts are better positioned to support higher-value services, enterprise



development, and innovation. Targeted interventions – linking curriculum to market demand, strengthening vocational pathways, and investing in districts with the weakest education-to-employment transitions – are essential to convert access into capability and capability into economic outcomes.

Demographic structure, economic growth, and human capital outcomes interact closely with patterns of mobility. Migration within and outside the region reflects household strategies to access education, employment, and income opportunities. Mobility contributes to income diversification and skill acquisition, while highlighting the importance of strengthening local employment ecosystems to retain

and attract talent. From a long-term perspective, informed mobility forms part of an integrated labour market system rather than an isolated phenomenon.

Looking toward 2047, the demographic profile of NER provides both scale and flexibility for human capital development. The combination of a growing working-age population, improving connectivity, and expanding service sectors creates conditions for sustained improvements in employment quality and productivity. Realizing this potential depends on continued progress in education outcomes, skill relevance, and the alignment between workforce capabilities and regional economic opportunities.



9.2 Education Landscape: Current Status and Challenge

Education outcomes constitute a central determinant of NER's long-term human capital formation and employment capacity. Over the past two decades, sustained public investment has expanded access to schooling and higher education across all States. Institutional coverage is now extensive, and basic

participation indicators indicate that access constraints at the primary level have been substantially addressed¹²². As the Region moves toward the Vision 2047 horizon, the analytical focus increasingly shifts from access to learning outcomes, retention, progression, and labour-market relevance.

Table 46: SDG-4 district index categories by state

State	Total Districts	Aspirant (0-49)	Performer (50-64)	Front Runner (65-99)	Achiever (100)
Arunachal Pradesh	17	7	6	4	0
Assam	33	7	20	6	0
Manipur	16	1	4	11	0
Meghalaya	11	1	7	3	0
Mizoram	11	0	1	9	1
Nagaland	16	1	7	8	0
Sikkim	6	0	0	6	0
Tripura	8	0	7	1	0
		~14%	~44%	~41%	<1%
Cross-NER Observations	118	AR (7), AS (7), MG (1), MN (1), NG (1)	AS(20), MG(7), NG(7), TR(7), AR(6), MN(4), MZ (1)	MN (11), MZ (9), NG (8), SK (6), AS (6), AR (4), MG (3), TR (1)	MZ (1)

NITI Aayog, SDG India Index 2023-24

The SDG-4 District Index, as presented in the table above, provides a consolidated and outcome-oriented assessment of education performance across districts in NER. The framework captures learning outcomes, teacher availability, and system performance at the district level; it serves as a useful diagnostic lens for understanding spatial variation in education outcomes and their implications for employability and productivity.

The distribution of districts across SDG-4 categories highlights two important structural features of NER's education landscape. First, a substantial share of districts are positioned in the Front Runner category, reflecting sustained progress in literacy, basic learning outcomes, and schooling infrastructure. These districts provide a strong base for further strengthening secondary education, higher education relevance, and skill formation. Second, a non-trivial number of districts remain classified as Performer or Aspirant, particularly in geographically remote or border areas. This pattern underscores the persistence

of spatial heterogeneity in education outcomes, even within States.

From a system perspective, these variations are closely linked to differences in institutional capacity, teacher deployment, and service delivery conditions. Districts with more favorable accessibility, higher urbanization, and stronger administrative capacity tend to demonstrate more consistent education outcomes. In contrast, districts characterized by dispersed settlements, difficult terrain, and linguistic diversity face higher service delivery costs and greater challenges in teacher availability and retention.

These structural factors shape education outcomes independent of overall policy intent and must be accounted for in long-term planning. Teacher availability and subject competence remain important mediating factors in education quality. Variations in pupil-teacher ratios, particularly at the secondary level, influence learning outcomes and student progression. In districts where subject-trained teachers are more readily available, education systems

¹²² Ministry of Development of North Eastern Region, Education and Skill Development Sector Profile: North Eastern Region, 2023



are better able to support science, mathematics, language, and vocational pathways that are relevant to emerging labour-market demands. Conversely, where

teacher deployment is constrained by remoteness or limited local incentives, learning outcomes tend to be more uneven.

Table 47: India/State/UT school distribution by primary/secondary level

India/State/UT	Total	Primary	Upper Primary	Secondary	Higher Secondary
All India	1217638	387097	137876	123151	873291
Arunachal Pradesh	360	318	47	127	33
Assam	6085	940	482	1067	2729
Manipur	4617	2422	966	582	71
Meghalaya	14600	922	335	291	462
Mizoram	3911	148	115	197	62
Nagaland	2718	115	778	757	6198
Sikkim	1259	685	307	150	117
Tripura	4929	2522	1226	702	479

Unified District Information System for Education Plus (UDISE+), UDISE+ 2021-22

States such as Mizoram, Sikkim, and Manipur feature districts with high literacy, low PTRs, and strong secondary completion, positioning them to effectively contribute to economic growth. In contrast, districts in Assam, Arunachal Pradesh, Meghalaya, and Tripura struggle with poor infrastructure, teacher shortages, low retention, and limited higher education access.

Equity remains central to the policy discourse. Gender gaps widen in secondary and higher education, despite near-parity at primary levels. Tribal communities, representing a significant percentage of the population (~28% of total NER population)¹²³, face systemic barriers including language and cultural mismatches, distance to schools, and limited social support mechanisms. Economically disadvantaged households continue to be overrepresented among dropouts, emphasizing the need for scholarship programs, mentoring, and community-based interventions.

Alignment of education with labour market needs is another challenge. Key regional sectors such as tourism, agro-processing, bamboo-based industries, handlooms, light manufacturing, and digital services require specialized skills that are often unavailable locally. These key regional sectors now require specialized technical, managerial, and digital skills that education systems and vocational training institutions are beginning to supply, though not yet at the scale or

specificity required. This gap reflects an evolving challenge of institutional coordination between education providers, industry associations, and sectoral employers, as well as curricula that are transitioning from generalist academic pathways toward more market-relevant competencies.

The current skills mismatch – where employers report difficulty sourcing qualified local talent for mid-skilled technical and supervisory roles, while educated youth seek opportunities aligned with their capabilities – signals both underutilized potential and clear reform priorities. Addressing this misalignment would unlock significant gains: enabling enterprises to scale by accessing local talent pools, improving returns to education for youth, and retaining skilled workers within the region. The strategic opportunity lies in demand-driven human capital development: strengthening vocational training systems through closer integration with regional economic priorities, embedding employer feedback and industry-recognized certification into curriculum reform, and directing public investment toward sectors with demonstrated growth potential and employment elasticity. With targeted coordination, NER can convert its educational access and rising aspirations into productive employment pathways – transforming a structural challenge into a foundation for inclusive, skill-led growth.

¹²³ Office of the Registrar General and Census Commissioner, India, *Census of India 2011*. Some reports indicate that the Scheduled Tribe population share in the NER currently exceeds 50%.

9.3 High Value Services and Knowledge Economy Transition

The expansion of high-value services represents a central pathway for employment growth and productivity enhancement in NER over the medium to long term. Structural conditions related to geography, market size, and settlement patterns limit the scope for large-scale, employment-intensive manufacturing. In this context, services particularly those that are knowledge-intensive, skill-driven, and connectivity-enabled play an increasingly important role in shaping labour-market outcomes and regional economic integration. Between 2013 and 2022, incremental human resource demand in NER across service sectors is estimated at approximately 17.1 million persons¹²⁴; tourism, healthcare, education, logistics, food processing, and digitally enabled services accounted for the bulk of this demand.

Tourism has leveraged NER's rich biodiversity, cultural heritage, and scenic landscapes, generating employment in accommodation, transport, food services, handicrafts, cultural enterprises, and ancillary activities. Income outcomes in tourism-related employment are influenced by workforce capabilities in customer service, language proficiency, and adherence to quality standards. These sectors benefit directly from improvements in physical and digital connectivity and exhibit relatively higher employment multipliers compared to capital-intensive industrial activities. Regional data indicate that employment intensity in tourism varies across states, with Assam, Meghalaya, and Arunachal Pradesh hosting the largest share of tourism-linked jobs, while Mizoram and Sikkim show higher per capita service employment in hospitality and cultural sectors.

Healthcare services represent a high-value, employment-intensive sector with significant expansion potential across the NER, driven by rising public and private investment in service delivery infrastructure. Growth in hospitals, medical colleges, clinics, diagnostic facilities, and wellness centres has generated sustained demand for doctors, nurses, allied health professionals, technicians, administrators, and support staff – creating employment opportunities characterized by relative stability, skill diversity, and above-average wages. This sector also contributes meaningfully to workforce participation among women, who constitute a significant share of nursing, paramedical, and administrative cadres. Urban centres such as Guwahati, Shillong, Imphal, Agartala, and Aizawl have emerged as regional healthcare hubs, attracting

patients from neighboring states and countries while anchoring specialized services and medical education.

Secondary centres are progressively strengthening their service capacity, supported by infrastructure investments and improved referral systems. However, the distribution of healthcare employment remains spatially concentrated, closely tied to the availability of trained personnel and institutional capacity. The strategic opportunity lies in scaling training infrastructure – particularly for nurses, paramedics, and technicians – expanding telemedicine and diagnostic networks to underserved districts and strengthening public-private coordination to accelerate service delivery expansion. With targeted investments in human resource development and institutional strengthening, healthcare can serve as both a driver of inclusive employment growth and a foundation for improved health outcomes, reinforcing NER's competitiveness as a service-oriented economy.

Education services constitute a significant and expanding source of formal employment across NER, generating demand for teaching professionals, support staff, administrators, and service personnel. This employment base is concentrated in established urban centres: Shillong, historically the region's premier education hub; Guwahati, emerging as a dynamic regional centre with expanding higher education and specialized training infrastructure; and Imphal, Agartala, and Dibrugarh as important state-level education centres. Employment in education offers relative stability and workforce participation opportunities, particularly for women in teaching and administrative roles. However, the sector's contribution to regional economic transformation depends critically on translating educational access into learning outcomes and employability. The sector functions within a constrained fiscal envelope: rising committed expenditure on salaries – often driven by employment generation imperatives – competes with resources needed for quality improvement and innovation. The strategic opportunity lies in strengthening education's dual role as both employer and enabler: improving teacher effectiveness and learning outcomes, aligning programmes with sectoral skill demands, and ensuring that institutional expansion is anchored in demonstrated quality and labour market relevance. The region faces a structural challenge: persistent out-migration of educated youth despite expanding local educational infrastructure. This reflects the concentration of productive employment in a narrow set of urban centres and

¹²⁴ Ministry of Development of North Eastern Region (MDoNER), Annual Report 2022-23



sectors, coupled with public sector dominance as the primary pathway for educated workers. In many districts, education employment itself functions as the principal absorber of graduates absent viable private sector alternatives.

Employment in education offers relative stability and workforce participation opportunities, particularly for women in teaching and administrative roles. However, the sector's contribution to regional economic transformation depends critically on translating educational access into learning outcomes and employability. The sector functions within a constrained fiscal envelope: rising committed expenditure on salaries – often driven by employment generation imperatives – competes with resources needed for quality. Reversing this trend requires:

- Fostering entrepreneurship ecosystems through incubators, seed funding and mentorship. Developing digital infrastructure to enable remote work connecting region-based professionals to national and global markets
- Strengthening industry-education linkages and vocational pathways aligned with regional economic priorities
- Engaging the diaspora as investors, mentors, and reverse migrants

Guwahati's emergence as a regional hub, supported by Shillong, Imphal, and Agartala, presents an opportunity to create demonstration effects in high-value sectors – healthcare, digital services, creative industries, and knowledge-intensive enterprises. Without such diversification and retention strategies, the region risks exporting its most capable human capital while importing skills for its own development – undermining both fiscal sustainability of education investments and long-term competitiveness.

Logistics and transport services are expanding across NER, driven by substantial infrastructure investments that are progressively reducing transaction costs and improving market access. However, the translation of connectivity into efficient, cost-competitive logistics operations and formal employment generation remains constrained by quality, utilization, and structural cost factors. The region's infrastructure base – more than 11,000 km of national highways, 19 operational airports¹²⁵, expanding rail connectivity, and National Waterway 2 on the Brahmaputra¹²⁶ – has enhanced the movement of goods and people, integrating previously isolated districts with regional

and national markets. Guwahati has emerged as the primary logistics hub, while states with strategic border locations – Meghalaya and Tripura (Bangladesh), Manipur's Moreh corridor (Myanmar), and Arunachal Pradesh (potential China and Myanmar gateways) – are positioned to develop as trade and transit nodes.

Organized logistics players offering integrated supply chain management, digital tracking, and multimodal coordination are establishing presence in Guwahati and select urban centers. The expansion of e-commerce and digital payment systems is catalyzing formalization, creating pathways for last-mile delivery networks, platform-based freight aggregation, and technology-enabled services that offer better employment quality than traditional informal arrangements. Modern warehousing, cold chain facilities, and freight consolidation infrastructure are expanding gradually, driven by growing demand from agro-processing, pharmaceuticals, and consumer goods distribution.

Several binding constraints prevent infrastructure availability from translating into sector maturity and productivity gains. Highway quality remains uneven, with many stretches vulnerable to monsoon disruptions and maintenance backlogs. Airport connectivity shows variable utilization, with several facilities operating below commercial viability. Rail density remains among India's lowest, while inland waterway potential is limited by seasonal navigability and minimal cargo handling infrastructure. These factors compound a significant cost disadvantage: transport costs exceed national levels due to distance from major consumption centers, difficult terrain, fuel price differentials, and the return freight problem – where trucks moving goods into the region often return empty, raising per-unit costs and undermining competitiveness for region-origin products. Addressing these constraints is essential to unlock the employment and productivity potential of the logistics sector and enable infrastructure investments to translate into sustainable economic gains.

Digitally enabled and knowledge-based services represent a strategically important employment opportunity for the region's educated workforce. Information technology-enabled services, professional services (accounting, legal, consulting), financial services, and corporate administrative functions are concentrated in Guwahati, with minimal presence in secondary urban centers. These services offer distinct advantages: higher productivity and remuneration

¹²⁵ Press Information Bureau, Government of India, "Infrastructure along Brahmaputra (NW-2) Includes Five Riverine Lighthouses at Key Locations," press release, 19 May 2025, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2129724&req=3&lang=2>

¹²⁶ Press Information Bureau, Government of India, "Modi Ji Is the Grand Architect of the New and Resurgent North East": Sarbananda Sonowal," press release, 4 December 2025, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2198667&req=3&lang=2>

than traditional sectors, skill development aligned with modern economic requirements, and career progression within nationally and globally connected value chains.

The sector's modest employment generation – despite India's substantial digital services growth – reflects a critical gap between educational outputs and employer requirements:

- While literacy rates are high and higher education access has expanded, translation into employable talent for IT and professional services remains incomplete
- Engineering and technical education institutions are limited in number and variable in quality
- Professional communication skills, particularly English proficiency in corporate contexts, require strengthening
- Exposure to corporate work culture, digital tools, and professional service standards is minimal outside urban centers
- Industry-academia collaboration for demand-driven curriculum is rare, resulting in graduates with credentials but lacking specific competencies employers require

These skills gaps directly shape employment outcomes: enterprises report difficulty sourcing qualified local talent, leading them to either import skilled workers at higher cost or avoid establishing operations in the region. Limited employment absorption is further constrained by infrastructure deficits and absent enterprise ecosystems. Internet connectivity faces bandwidth limitations and reliability concerns; power supply inconsistency disrupts continuous work; and Grade-A commercial office space remains scarce outside Guwahati. Limited startup infrastructure (incubators, accelerators, mentorship networks), restricted access to venture capital, and lack of anchor IT companies mean talented individuals face restricted career pathways – creating a trade-off between underemployment locally or outmigration to metropolitan hubs.

Looking ahead to 2047, services are expected to account for a growing share of employment and value creation in NER. The expansion of high-value services offers a pathway to improve employment quality, income stability, and workforce participation across genders and geographies. Realizing this potential depends on sustained investments in education outcomes, skill development, digital infrastructure, and institutional capacity, as well as strengthening linkages between service enterprises and local labor markets.



9.4 Manufacturing to Services: Sectoral Workforce Transition

Manufacturing in NER remains a modest contributor to formal employment despite national industrial growth, with workforce absorption occurring predominantly through service sector expansion rather than through a conventional agriculture-to-manufacturing-to-services transition pathway. This pattern reflects both the region's resource endowments and structural constraints that have limited manufacturing scale and diversification.

Formal factory employment across the region totalled ~270,000 workers in 2022-23, concentrated primarily in Assam (6,049 factories employing 242,000 persons), with significantly smaller bases in Tripura (702 factories, ~25,000 employees), Sikkim (87 factories, ~26,000 employees), and other states maintaining under 250 registered factories each. Average employment per factory remains small – ranging from 6-7 employees in Mizoram to 35-40 in Assam and Tripura – indicating predominance of micro and small enterprises rather than large-scale industrial establishments¹²⁷.

Manufacturing activity is strongly linked to local resource availability: agro-processing units depend on tea, food crops, and spices; bamboo and cane-based industries leverage forest resources; handlooms and handicrafts sustain household livelihoods while preserving cultural heritage; and pharmaceutical manufacturing, concentrated in Sikkim and Meghalaya, contributes significantly to output but remains capital-intensive with limited direct employment generation. This resource-based pattern, while aligning production with natural endowments, has constrained progression toward higher-value manufacturing that characterizes successful industrial economies.

Service sector employment now dominates regional growth, but the composition and quality of this employment requires careful assessment. While manufacturing-linked services – logistics coordination, quality assurance, supply chain management, packaging, and marketing – have expanded in urban centers, particularly Guwahati, the bulk of service sector employment comprises retail trade, transport services, construction, personal services, and public sector positions. These activities provide essential livelihoods and meet local needs, but many are characterized by informal arrangements, lower

productivity relative to organized manufacturing, and limited opportunities for skill development and wage progression.

Infrastructure investments and improved connectivity alone have not catalyzed large-scale manufacturing growth, suggesting that infrastructure, while necessary, is insufficient without parallel progress on market integration, skills development, power reliability, and enterprise capability building. Spatial variation in employment patterns remains pronounced: urban centers and industrial nodes exhibit stronger integration between manufacturing and services, supporting more diversified and higher-productivity employment opportunities, while rural and remote districts rely predominantly on small-scale resource-based production and locally oriented services with gradual workforce transition shaped by infrastructure availability, human capital endowments, and local economic structure.

The quality of workforce transition depends critically on three interdependent factors: first, enhancing the productivity and scale of existing manufacturing through targeted skill development, technology adoption support, and value chain strengthening that enables progression from basic resource processing to higher-value activities; second, ensuring that service sector expansion increasingly comprises organized, formal employment in higher-productivity segments rather than expansion of informal, low-wage activities; and third, creating enabling conditions – reliable infrastructure, access to finance, regulatory simplification, market linkages – that allow enterprises in both manufacturing and services to scale, formalize employment, and invest in workforce development.

Without deeper manufacturing capacity or progression toward higher-productivity services, the region risks perpetuating patterns of low-wage informal employment, limited fiscal capacity for public investments, and continued out-migration of skilled workers seeking opportunities in more diversified regional economies. Human resource development thus necessitates strengthening vocational and technical skills aligned with existing manufacturing clusters (agro-processing, bamboo industries, pharmaceuticals) to improve productivity and value addition within resource-based sectors.

¹²⁷ Ministry of Statistics and Programme Implementation, National Statistics Office, *Annual Survey of Industries 2023-24, Volume I*

9.5 Employment Generation and Entrepreneurship

Employment generation in NER is structurally anchored in micro-enterprise formation rather than large-scale wage employment. The region's employment structure differs materially from larger industrialized states: limited agglomeration economies, high incidence of self-employment, and the predominance of micro and small firms mean that labor absorption occurs primarily through new enterprise creation and enterprise survival rather than through the expansion of large employers. Vision 2047 therefore positions entrepreneurship as a core employment strategy, with emphasis on scale, inclusion, and durability of enterprise outcomes.

The earmarking of 10% of the Ministry of MSME's annual budget for the region provides a stable fiscal foundation for enterprise-led employment. Between 2020-21 and 2024-25, total expenditure increased from INR 482.1 crore to a peak of INR 2,341.0 crore¹²⁸, before moderating in the current year in line with expenditure phasing. This multi-year fiscal commitment is critical for sustaining enterprise formation and employment outcomes over time, lowering entry barriers for entrepreneurs, enhancing program predictability, and supporting the gradual strengthening of local enterprise ecosystems.

The Prime Minister's Employment Generation Programme (PMEGP), together with complementary MSME ecosystem interventions, operates as a decentralized employment mechanism, enabling first-generation entrepreneurs to generate own-account employment and limited wage employment at the local level. Between 2020-21 and December 2024, more than 26,000 PMEGP projects were assisted across the eight states¹²⁹. Assam accounts for the largest share of supported enterprises, reflecting its population size and economic scale, while Manipur, Tripura, Mizoram, and Nagaland also demonstrate sustained enterprise creation over successive years.

Enterprise-led employment exhibits systematic inclusion of women and special-category beneficiaries. Nationally, over 3.2 lakh women entrepreneurs have been assisted under PMEGP since inception, with stable annual flows in recent years. In 2024-25 alone (up to December), more than 11,000 women entrepreneurs have been supported¹³⁰. Similarly, 5,704 projects¹³¹ for differently abled persons have been assisted under PMEGP since inception. While absolute numbers are smaller, the continuity of support reflects deliberate policy prioritization of labour market inclusion for groups that typically face

higher entry barriers to wage employment. This inclusion expands workforce participation through enterprise ownership, which functions as a mechanism of labour market access, income generation, and social participation.

Public procurement data for SC/ST-owned MSEs illustrate the role of market access mechanisms in supporting employment sustainability. Between 2015-16 and 2023-24, the value of public procurement from SC/ST-owned MSEs increased from INR 99.37 crore (0.07%) to INR 1,757.26 crore (1.03%), further rising to 1.29% in 2024-25 (up to December)¹³². This increase indicates growing integration of small enterprises into assured demand channels – critical for enabling enterprises to transition from subsistence activity to more stable self-employment and limited job creation.

Employment generation and enterprise activity exhibit geographic variation driven by local economic structures, connectivity, and human capital endowments. Urban centers such as Guwahati (Assam), Agartala (Tripura), Imphal (Manipur), Shillong (Meghalaya), and Aizawl (Mizoram) serve as hubs of formal employment, higher-order services, and registered enterprise activity, hosting a concentration of educational institutions, healthcare facilities, logistics services, and medium enterprise linkages. Rural and remote districts, particularly in Arunachal Pradesh and Nagaland, exhibit higher reliance on household enterprises, informal work, and micro-scale production, with corresponding implications for job quality and income stability.

The evidence yields four structural implications for Vision 2047: enterprise-led employment constitutes the primary labor absorption mechanism and can be treated as such in long-term policy design; predictable fiscal earmarking is closely associated with sustained enterprise creation and employment outcomes; inclusion is integral to employment generation, expanding labor force participation beyond what conventional wage employment structures can accommodate; and market access determines employment durability, underscoring the importance of procurement and demand-side linkages alongside credit and subsidy support. Building on this foundation, the region's entrepreneurship pathway offers a scalable, inclusive, and geographically distributed model for employment generation that aligns with its structural characteristics and demographic profile.

¹²⁸ Ministry of Micro, Small and Medium Enterprises, *Annual Report 2024-25*

¹²⁹ Ministry of Micro, Small and Medium Enterprises, *Annual Report 2024-25*

¹³⁰ Ministry of Micro, Small and Medium Enterprises, *Annual Report 2024-25*

¹³¹ Ministry of Micro, Small and Medium Enterprises, *Annual Report 2024-25*

¹³² Ministry of Micro, Small and Medium Enterprises, *Annual Report 2024-25*



9.6 Migration Management and Talent Pool Retention

Migration in NER constitutes a structural mechanism of labor-market integration and human capital circulation, shaped by education capacity, sectoral employment structures, and spatial concentration of opportunities. Vision 2047 positions migration management as a human capital optimization function, aimed at strengthening local opportunity ecosystems, enabling skill portability, and supporting return and reintegration pathways as regional employment depth expands.

Population mobility has long been an intrinsic feature of NER's socio-economic landscape. Census data

indicate that majority of migration originates within the Region is intra-State, while inter-State migration remains limited in scale and concentrated among younger cohorts seeking education and employment opportunities¹³³. This pattern reflects the Region's demographic scale, settlement dispersion, and sectoral composition. Labour markets are characterized by limited depth and a concentration of employment in public services, small enterprises, and services. Migration therefore operates as a rational household strategy to access education, diversify income sources, and acquire skills that may not be locally available at scale.

Table 48: Key observations on migration pattern across NER states

- Intra-state mobility remains the dominant form of migration, highlighting local redistribution of labour.
- Skilled youth and students represent the majority of inter-state outflows, indicating both education and employment gaps.
- Negative net migration balance is concentrated in Assam, Manipur, and Arunachal Pradesh.
- Urban centers in rest of India remain the primary destinations due to employment opportunities, wages, and higher education availability.

From a long-term perspective, the policy relevance of migration lies in its composition, duration, and reversibility. Sustained outward mobility of educated and skilled cohorts, without commensurate return or reintegration, can reduce the region's effective human capital base over time. Conversely, well-managed mobility can support skill acquisition, income flows, and knowledge transfer to the regional economy. The two primary drivers that shape migration dynamics in NER are:

- Education-linked mobility arises from spatial variation in higher education capacity and program specialization. While access to basic and undergraduate education has expanded within the Region, advanced specializations and research-oriented programs remain concentrated in larger metropolitan centers. Administrative data confirm continued outward student movement for selected disciplines¹³⁴. Education-linked migration frequently transitions into employment-linked migration, particularly where graduates encounter stronger labour-market matching and wage prospects outside the Region. This linkage underscores the importance of aligning higher

education expansion with emerging regional employment opportunities.

- Employment-linked mobility reflects differences in sectoral scale, wage structures, and career progression across regions. National labour statistics indicate higher geographic mobility among younger workers, particularly in construction, organised services, healthcare, and education services¹³⁵. For NER, such mobility supports income generation and skill acquisition, while shaping long-term workforce location decisions.

International evidence suggests that regions experiencing growth in service-sector depth and enterprise absorption capacity are more likely to attract return migrants and benefit from skill reintegration over time. The distinction between permanent skill loss and temporary mobility depends primarily on local employment quality, enterprise productivity, and career pathways. As these conditions strengthen, migration increasingly assumes a circular or return-oriented character rather than permanent relocation.

¹³³ Census of India, Census of India 2011: Migration Tables

¹³⁴ Ministry of Education, All India Survey on Higher Education 2021-22

¹³⁵ Ministry of Statistics and Programme Implementation, Periodic Labour Force Survey 2023-24

Within the Vision 2047 framework, migration management is approached as an enabling and coordinating function, guided by three principles.

- Skill portability and recognition are essential for both outward mobility and reintegration. National frameworks such as the National Skills Qualification Framework and Recognition of Prior Learning provide a basis for standardized certification and cross-regional employability.
- Labor-market information systems improve migration efficiency. Platforms such as the National Career Service enhance visibility of opportunities within and outside the Region, supporting informed mobility decisions and better skill-job matching.
- Expansion of local opportunity structures remains the most durable mechanism for human capital retention. Growth in high-value services, enterprise productivity, and public service delivery capacity directly influences the Region's ability to absorb skilled labour over time, as discussed in preceding sections.

The strategic objective is to enable mobility contributes to productivity, income growth, and regional integration, while maintaining a stable and replenishing stock of skilled human capital. Effective migration management therefore supports Vision 2047 by aligning human capital formation with employment absorption over time. By enabling skill circulation, facilitating reintegration, and strengthening local opportunity ecosystems, NER can allow migration functions as a net developmental asset.



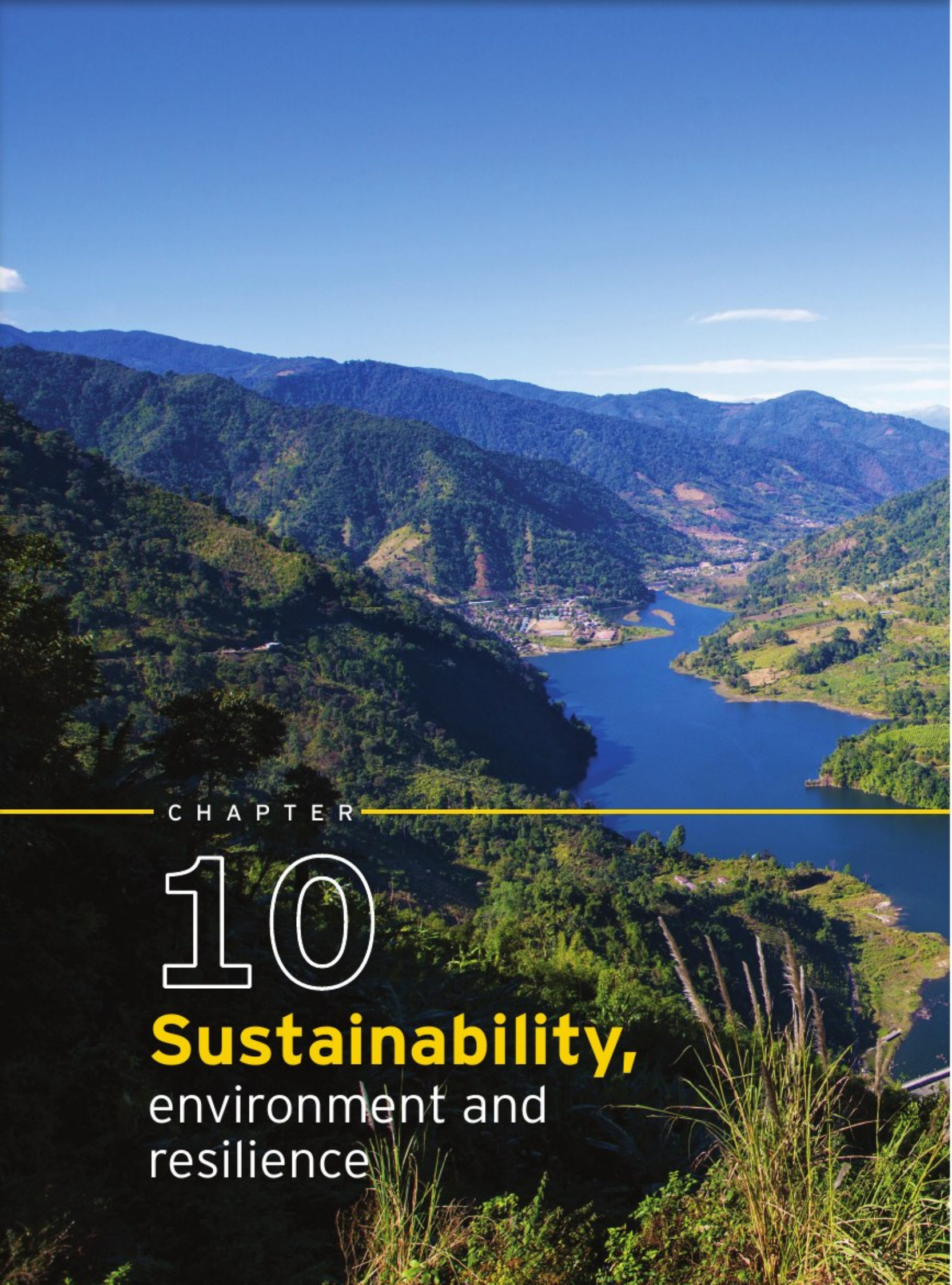
9.7 Strategic Considerations for Human Resource Development and Employment for Vision 2047

Human resource development and employment constitute the central economic pillar of the NER's long-term development strategy. Demographic momentum, spatial constraints, and a services-oriented growth trajectory require an approach in which education, skills, and employment are treated as an integrated economic system rather than as standalone sectoral interventions.

1. **Strengthening foundational learning quality as the base of workforce productivity:** While literacy levels in NER are relatively high, uneven learning outcomes at the primary and secondary levels continue to constrain long-term productivity. Vision 2047 therefore places foundational learning quality at the core of the employment strategy. Improvements in early-grade literacy, numeracy, and cognitive skills have direct economic implications by enhancing workforce readiness, reducing future skill remediation costs, and increasing the effectiveness of investments in higher education and skilling. Teacher capacity, learning assessment, and accountability mechanisms must be strengthened to support access translates into competence and employability.
2. **Reorienting secondary and higher education toward relevance and regional demand:** Education-led migration from the region reflects both aspiration and structural undersupply of relevant higher education capacity. Vision 2047 shifts emphasis from expanding enrolment and institutions to improving relevance, applied learning, and labour market alignment. Secondary and higher education systems could be explicitly aligned with priority growth sectors, including tourism, healthcare, logistics, agri-based value chains, and digitally enabled services. Educational institutions are expected to function increasingly as regional skill anchors that support local employment pathways, strengthen urban labour markets, and reduce avoidable out-migration.
3. **Integrating skill development with enterprise productivity:** Skill development initiatives in NER have expanded significantly in scale, yet employment outcomes remain uneven. Vision 2047 positions skilling as a productivity-enhancing economic instrument rather than a welfare intervention. Training systems must be organized around sectoral value chains, enterprise demand, and portable certification frameworks. Recognition of prior learning,

modular credentials, and inter-State portability are essential to supporting workforce mobility and hybrid livelihoods. Outcomes must be assessed in terms of employment quality, income stability, and productivity gains, rather than training volumes alone.

4. **Adopting a services-led employment strategy with quality benchmarks:** Structural constraints limit the scope for large-scale manufacturing-led employment in NER. Services therefore represent a strong pathway for employment expansion. Urban centers are strengthened as service hubs through coordinated investments in skills, digital infrastructure, and enterprise support, recognizing their role as labour market anchors for surrounding areas.
5. **Facilitating structured transitions from agriculture to non-farm livelihoods:** Agriculture will continue to engage a significant share of the workforce. Vision 2047 supports structured transitions through agro-processing, logistics, quality assurance, marketing, and allied services that extend agricultural value chains. These pathways enable gradual movement from subsistence and low-productivity activities into higher value employment while preserving rural livelihoods and social stability.
6. **Integrating migration into labour market planning:** Migration reflects rational responses to education and employment asymmetries. Vision 2047 treats migration as an element of labour market integration rather than displacement. Skill certification and portability are strengthened to support mobility across States and sectors. Reintegration pathways for return migrants are enabled by aligning local employment opportunities with acquired skills. Education migration is addressed through expansion of quality institutions within the region, while employment migration is leveraged through remittances, skill circulation, and entrepreneurship.
7. **Leveraging digital platforms to overcome geographic constraints:** Dispersed settlements and difficult terrain impose structural limits on traditional service delivery. Vision 2047 leverages digital platforms to expand access to education, skilling, healthcare, and employment services. Digital inclusion is treated as a means to acquire productive skills and enhance employability.

A scenic landscape photograph showing a wide river flowing through a valley. The river is a deep blue, contrasting with the vibrant green of the surrounding hills and mountains. The mountains are covered in dense forest, with some areas showing signs of deforestation or agriculture. A small village with several buildings is nestled on a bend in the river. The sky is a clear, bright blue with a few wispy clouds. In the foreground, some tall grasses are visible, slightly out of focus.

CHAPTER

10

Sustainability,
environment and
resilience



Sustainability and resilience constitute binding conditions for development in the North Eastern Region (NER) and are central to the feasibility, efficiency, and durability of outcomes envisaged under Vision 2047. Given the region's ecological significance, climate sensitivity, and exposure to recurrent natural hazards, development strategies that do not systematically internalize environmental and disaster-related risks risk producing growth that is fiscally inefficient, environmentally fragile, and economically reversible. Vision 2047 therefore positions sustainability and resilience not as sectoral priorities, but as foundational principles guiding spatial planning, infrastructure investment, sectoral transformation, and institutional design.

This approach is anchored in India's national objective of achieving *Viksit Bharat* by the centenary of independence, as articulated through successive policy frameworks and reinforced in the Union Budget 2024-25. The national development strategy recognizes the need for regionally differentiated pathways that align local endowments and structural constraints with overarching national goals. Within this framework, Vision 2047 articulates a development pathway for NER that integrates ecological stewardship, economic transformation, and social resilience as mutually reinforcing objectives.

India's international commitments under the Paris Agreement establish binding parameters for climate action that directly shape the region's development trajectory. These include enhanced Nationally Determined Contributions under the United Nations Framework Convention on Climate Change, a progressive transition towards non-fossil fuel-based energy systems, and the long-term objective of achieving net-zero emissions. The National Action Plan on Climate Change, operationalized through eight National Missions, provides the national framework for mitigation and adaptation. NER's contribution to these objectives is structurally significant, given its role as a major repository of forest cover, biodiversity, and renewable energy resources.

The strategic importance of the region arises from its position in India's environmental and economic geography. The region contains the country's largest contiguous expanse of forest and tree cover and lies within globally recognized biodiversity zones encompassing the Eastern Himalayan and Indo-Myanmar regions. These ecological assets generate sustained national value through carbon sequestration, regulation of major river systems, moderation of climate and disaster risks, and the conservation of genetic resources with applications across agriculture, pharmaceuticals, and bio-based industries. The preservation and productive

deployment of this natural capital are therefore integral to national economic and environmental objectives.

At the same time, the region faces enduring structural constraints that have limited economic diversification and income convergence. Difficult terrain, relative geographic isolation, limited urban concentration, and historical deficits in transport, power, and digital infrastructure have shaped a development pattern characterized by continued dependence on climate-sensitive livelihoods and slower expansion of higher-productivity sectors. Recurrent hydrometeorological events further compound these constraints by imposing repeated losses on public and private assets, absorbing fiscal resources that would otherwise support net capital formation and long-term development.

The coexistence of high ecological value and persistent development constraints defines the central policy challenge for NER. Development strategies that treat environmental conservation as a residual consideration risk degrading the natural capital base upon which future growth depends. Conversely, conservation approaches that are disconnected from livelihood security, employment generation, and economic aspirations are unlikely to be durable. Vision 2047 therefore adopts an integrate development logic in which environmental stewardship and economic transformation are treated as complementary and mutually reinforcing.

This chapter addresses sustainability and resilience through seven interrelated dimensions that collectively shape the region's development trajectory to 2047. Section 1 sets out the environmental profile of NER, including ecosystems, biodiversity, forest resources, and institutional challenges related to fragmentation and capacity. Section 2 examines renewable energy potential and development, with particular emphasis on hydropower, grid integration, and investment constraints. Section 3 addresses climate change adaptation and mitigation, recognizing the region's dual role as both climate-vulnerable and nationally significant for mitigation outcomes. Section 4 focuses on disaster management and risk reduction, treating floods, landslides, erosion, and seismic exposure as structural conditions that must be embedded in statutory planning and investment appraisal. Section 5 examines sustainable development practices through the integration of connectivity, spatial planning, and climate resilience. Section 6 addresses the preservation of distinct ways of life and indigenous knowledge systems, recognizing customary institutions and practices as functional components of governance and economic organization. Section 7 articulates principles for



balancing development with conservation through spatial concentration of economic activity, productivity-led sectoral expansion, and resilience-informed public investment frameworks.

These dimensions are treated as interacting components of a unified development system rather than as discrete or parallel policy streams. The analysis draws exclusively on official Government of India data sources, policy frameworks, and institutional assessments, including forest and environmental assessments, State Action Plans on Climate Change, national disaster management guidelines, energy sector reports, Parliamentary responses, Press Information Bureau releases, and assessments by constitutional and statutory bodies. Strategic directions are designed to be implementable

within existing governance arrangements, while identifying areas that require institutional strengthening, improved policy coherence, and enhanced coordination across sectors and levels of government.

The purpose of this chapter is to establish a clear analytical and strategic basis for integrating sustainability and resilience into all development decisions affecting NER through 2047. By embedding environmental considerations, climate risk, disaster exposure, and indigenous knowledge systems into spatial planning, infrastructure design, and public investment appraisal, Vision 2047 seeks to enable development outcomes are not only accelerated, but also durable, efficient, and aligned with India's long-term national objectives.

10.1 Environmental profile of NER: Biodiversity and ecosystems

The North Eastern Region (NER) occupies a distinct ecological position within India's development landscape. Although the region accounts for less than 8% of India's geographical area, it contains a large share of the country's forest and tree cover, biodiversity, and ecosystem services. As per the India State of Forest Report 2023, forest and tree cover in the NER extends to approximately 174,394.7 square kilometers, representing about 67% of the region's geographical area, compared to 25.17% at the national level.¹³⁶ This makes NER the largest continuously forested region in the country.

The region lies at the intersection of two globally recognized biodiversity hotspots, namely the Eastern Himalayas and the Indo-Myanmar region, resulting in high species richness and endemism. Several industry reports highlight that NER hosts flowering plant species, medicinal plants, avifauna, and traditional crop genetic diversity, positioning it as a critical national repository of biological resources.¹³⁷

Beyond species counts, NER ecosystems perform system-level economic and environmental functions.

Forests in the region constitute a major component of India's forest carbon stock, contributing to national climate mitigation commitments (FSI, 2023). Wetlands and floodplains in Assam and adjoining states play a critical role in regulating peak flood flows in the Brahmaputra and Barak river systems, reducing downstream flood intensity and sedimentation impacts¹³⁸. Hill forests across Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, and Manipur stabilize slopes, moderate hydrological regimes, and reduce landslide risk.

Ecological endowments are spatially differentiated (as captured in table 1). Arunachal Pradesh and Sikkim anchor alpine and temperate ecosystems critical for headwater regulation. Assam's floodplains and wetlands form the ecological backbone of the Brahmaputra basin. Hill states support dense forest mosaics and bamboo-dominated systems, often managed through community and customary institutions. While protected areas exist across all states, several biodiversity-rich corridors and riverine systems remain outside formal protection, exposing them to fragmentation pressures.

¹³⁶ ISFR 2023 Volume I (PDF) https://fsi.nic.in/uploads/isfr2023/isfr_book_eng-vol-1_2023.pdf; ISFR 2023 Volume II (State & UT data) https://fsi.nic.in/uploads/isfr2023/isfr_book_eng-vol-2_2023.pdf; Government of India (2023). Press Release: India State of Forest Report 2023 - Key Findings. Press Information Bureau, Government of India <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1979816>

¹³⁷ India's Sixth National Report to the Convention on Biological Diversity. Ministry of Environment, Forest and Climate Change, Government of India. <https://moef.gov.in>

¹³⁸ Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program <https://www.adb.org/documents/india-assam-integrated-flood-and-riverbank-erosion-risk-management-investment-program>; Assam Integrated River Basin Management Program (World Bank) <https://documents1.worldbank.org/curated/en/099240011282216837/txt/P174593031a98a080ab5d08fa02e1fa2f3.txt>

Table 49: State-wise forest cover and quality, carbon stock and strategic significance in the NER

State	Forest and tree cover (% of GA)	Total forest cover (sq km)	Very dense forest (% of forest cover)	Forest carbon stock (million tons)	Strategic significance
Arunachal Pradesh	79.33	66,430	30.9	1,021.90	Core carbon sink and headwater forest system of the Eastern Himalaya; critical for long-term national climate mitigation and water security
Assam	35.83	28,327	14.6	256.4	Floodplain-linked forests underpin Brahmaputra basin resilience, disaster risk reduction, and inland fisheries
Meghalaya	76	17,119	8.5	331.3	Community-managed forest landscapes offering scalable models for participatory conservation and land governance
Mizoram	84.53	18,006	20	274.8	High-density, bamboo-rich forests supporting climate-resilient livelihoods and bio-based value chains
Nagaland	75.31	12,489	10.5	201.6	Customary forest governance with stable carbon stocks; institutional pathway for integrating indigenous systems
Manipur	74.34	16,847	7.3	184.8	Hill-wetland forest interface sustaining Loktak basin ecology and regional water regulation
Tripura	73.66	7,729	8.3	120.4	Compact forest-settlement interface with net forest gain, enabling integrated land-use and adaptation planning
Sikkim	47.08	3,341	43.8	148.2	High-altitude Himalayan forests with the highest dense-cover share; conservation-aligned development model

Source: India State of Forest Report 2023, Volume II, Forest Survey of India¹³⁹

Taken together, the table underscores the region's forests as a high-value but unevenly distributed natural capital base, combining nationally significant carbon stocks, dense-cover quality and hydrological services. The strategic task for Vision 2047 is to internalize these ecological assets into development planning and fiscal frameworks, before addressing the constraints and vulnerabilities that condition their long-term sustainability.

Challenges and vulnerabilities:

The principal environmental challenge facing NER is the acceleration of ecological risk driven by interacting climatic, anthropogenic, and institutional factors. Climate variability has intensified across the region,

with reports documenting rising temperature trends, declining long-term rainfall averages, and increasing intra-seasonal rainfall volatility. These shifts have translated into more frequent and severe floods in the Brahmaputra basin and a sharp rise in landslides across hill states, transforming environmental shocks into recurrent economic disruptions (FSI, 2023).

Anthropogenic pressures compound these risks. Expansion of transport infrastructure, urban growth around Guwahati and other secondary cities, and linear infrastructure development have increased forest fragmentation and disrupted ecological corridors. In fragile hill landscapes, even limited change in land-use generates disproportionate impacts through erosion, slope instability, and loss of

¹³⁹ India State of Forest Report 2023, Volume II, Forest Survey of India https://fsi.nic.in/uploads/isfr2023/isfr_book_eng-vol-2_2023.pdf



ecosystem functionality. Land degradation and soil acidification have further reduced ecosystem productivity, undermining both forest regeneration and agricultural resilience. This erosion of natural capital directly affects livelihoods, increasing dependence on forest extraction and intensifying pressure on already stressed ecosystems. Human-wildlife conflict, invasive species spread, and declining habitat connectivity are increasingly reported across NER states.¹⁴⁰

Institutional constraints further magnify these pressures. Environmental monitoring remains fragmented, enforcement capacity varies widely across states, and ecosystem services are largely excluded from economic and fiscal decision-making.

To address the challenges, the governments at the Union and state level have adopted policies and programs as captured in table 2.

Table 50: Key policy and institutional measures supporting biodiversity and climate action in NER

Policy / Program	Year	Implementing authority	Status
National Biodiversity Strategy and Action Plan (NBSAP) - Updated Version	2024	Ministry of Environment, Forest and Climate Change (MoEFCC); National Biodiversity Authority (NBA)	Launched and adopted (released at COP-16)
Biological Diversity (Amendment) Act, 2023	2023 (effective 2024)	Government of India; MoEFCC	Enacted and under implementation
India State of Forest Report (ISFR) 2023	2023	Forest Survey of India (FSI); MoEFCC	Published and operational
Compensatory Afforestation Fund Management and Planning Authority (CAMPA)	Ongoing (2020-2024 allocations)	MoEFCC; State Forest Departments	Ongoing statutory funding mechanism
Assam Integrated Flood and Riverbank Erosion Risk Management Programme (Phase I)	2023	Government of Assam (FREMAA)	Approved and under implementation
Assam State Action Plan on Climate Change (SAPCC) - Version 2.0	2021	Government of Assam	Under implementation
State Biodiversity Board Notifications and Biodiversity Heritage Site (BHS) Declarations (Assam, Meghalaya, Tripura, Nagaland)	2020-2024	Respective State Governments; State Biodiversity Boards	Ongoing statutory implementation
State Action Plans on Climate Change (SAPCCs) - Sikkim, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Tripura	2020-2024	Respective State Governments (endorsed by MoEFCC)	Approved and under implementation

¹⁴⁰Government of India (2023). Annual Report 2023-24. Ministry of Environment, Forest and Climate Change, <https://moef.gov.in/uploads/2023/05/Annual-Report-English-2023-24.pdf> (Ministry of Environment)

Between FY 2017-18 and FY 2021-22, the Government of India released INR139.91 crore to the NER states under North Eastern Council (NEC) schemes for anti-erosion, flood control, and landslide prevention works, as reported in official Parliamentary and PIB disclosures.¹⁴¹ In addition, under the Flood Management and Border Areas Program (FMBAP) of the Ministry of Jal Shakti, the Centre sanctioned INR 1,066 crore for flood management and related disaster mitigation projects in NER, as per official releases up to FY 2024-25.¹⁴² These allocations represent actual budgetary commitments directed toward addressing recurrent hydrometeorological risks in the region and reflect the continuing fiscal burden associated with floods, erosion, and climate-induced disasters. The scale and recurrence of these expenditures underscore the necessity of integrating resilience and risk reduction into upfront planning and capital investment appraisal, rather than relying on repeated post-event spending.

National commitments and policy documents therefore converge on a long-term direction for biodiversity and ecosystem management relevant to NER. These include halting biodiversity loss, restoring degraded ecosystems, expanding effective conservation coverage, and strengthening ecosystem-based adaptation as a core climate strategy. For NER, these priorities translate into the following imperatives toward Vision 2047:

- Resilience investments deliver fiscal returns through lower lifecycle costs
- Climate-resilient assets reduce volatility in disaster-related expenditure
- Protection of productive land and infrastructure stabilizes long-term growth

Environmental degradation and climate risk translate directly into fiscal exposure. Official assessments consistently document **recurring annual losses from floods, landslides, and riverbank erosion** across NER states, with repeated damage to roads, bridges, embankments, power infrastructure, and public buildings.

Reconstruction cycles in high-risk districts have shortened, resulting in **recurrent expenditure on asset repair rather than net capital formation**. This pattern reduces public investment efficiency and constrains development spending.

Vision 2047 adopts the principle that **resilience investments deliver positive fiscal returns** by:

- Lowering lifecycle costs of public assets
- Reducing volatility in disaster-related expenditure
- Preserving productive land and infrastructure

Accordingly, public investment appraisal shall internalize climate and disaster risk as core economic parameters rather than ex-post contingencies.

Strategic recommendations

To enhance long-term ecological sustainability, climate resilience, and fiscal efficiency in the North Eastern Region, the following strategic inputs are proposed for NEC consideration:

- **Recognize ecosystems as economic infrastructure** by institutionalizing ecosystem service valuation within public investment appraisal systems and medium-term fiscal and development planning frameworks.
- **Adopt landscape-level planning instruments**, including Strategic Environmental Assessments (SEAs) for major river basins and ecologically interconnected landscapes, to improve coordination across sectors and states.
- **Scale community-led conservation models** through performance-linked, outcome-oriented financing mechanisms, drawing on regional experience and international best practices (World Bank 2023).
- **Integrate biodiversity objectives with climate adaptation and disaster risk reduction strategies** to reduce long-term fiscal exposure, enhance resilience, and improve the efficiency of public expenditure.
- **Strengthen ecological monitoring, data integration, and inter-state coordination** by leveraging existing national frameworks and datasets, including the India State of Forest Report (ISFR) and State Action Plans on Climate Change (SAPCCs).¹⁴³

The strategic inputs outlined draw on globally recognized approaches to biodiversity, ecosystem management, and climate-resilient development, demonstrating their potential relevance for the North Eastern Region. Treating ecosystems as economic

¹⁴¹ Damage due to floods in North East Region, PIB, 2022 <https://shorturl.at/6mttk>

¹⁴² Flood management and infrastructure development in NER, PIB 2025 <https://shorturl.at/Yovlv>

¹⁴³ Assam State Action Plan on Climate Change (2021-2030), https://accms.org.in/userfiles/ASAPCC_V2.pdf; Mizoram State Action Plan on Climate Change (Upto 2030) <https://forest.mizoram.gov.in/uploads/qms/45aab4c95e697bead079c53a3180b8cf/sapcc-upto-2030-mizoram.pdf>; Nagaland State Action Plan on Climate Change, <https://moef.gov.in/uploads/2017/09/Nagaland.pdf>; Tripura State Action Plan on Climate Change Tripura 2.0 https://dste.tripura.gov.in/sites/default/files/2024-07/SAPCC_2.0_2023_24.pdf



infrastructure and incorporating ecosystem service valuation into planning and fiscal frameworks has informed investment decisions in countries such as New Zealand and Costa Rica, improving the efficiency of public expenditure while sustaining ecological assets. Landscape-level planning instruments, including Strategic Environmental Assessments, have been successfully applied in the European Union and Southeast Asia to integrate ecological considerations into major river basin and regional development plans, enhancing cross-sectoral coordination. Community-led conservation models, when linked to performance-based financing, have delivered measurable environmental and socio-economic benefits in multiple

programs supported by Development Partners, showing the effectiveness of aligning local incentives with measurable outcomes. Finally, integrating biodiversity objectives with climate adaptation and disaster risk reduction strategies has proven to reduce long-term fiscal exposure and strengthen resilience in diverse international contexts.

Collectively, these examples provide a robust evidence base for the adoption of these strategic inputs under the NEC Vision 2047 framework, while allowing flexibility for context-specific adaptation in the North Eastern Region.



10.2 Renewable energy potential and development

India's energy transition increasingly depends on regional system preparedness, as planning frameworks now recognize that states differ materially in resource endowment, grid architecture, demand patterns, and investment readiness. Within this differentiated context, NER holds a strategically significant position due to its renewable energy resource base and system characteristics.

The North Eastern Region has substantial hydropower and pumped storage potential. According to official estimates by the Government of India, the region's exploitable large hydropower potential stands at 55,930 MW and identified pumped storage potential at 6,530 MW (as of June 2024).¹⁴⁴ Despite this, the existing energy system remains misaligned with this potential, with installed capacity largely concentrated in conventional sources and limited renewable deployment outside of large hydro.¹⁴⁵ As a result, NER functions operationally as an energy-constrained system rather than a surplus or balancing region.

On the demand side, official national statistics indicate that India's overall per-capita electricity consumption has risen, yet it remains relatively low compared to global averages, underscoring the need for continued expansion of power utilization and productive infrastructure in all regions, including NER.¹⁴⁶ While complete state-specific per-capita data for NER are not uniformly published, the pattern of lower industrial power intensity and dispersed settlements in the region reflects similar structural influences.

Grid and system conditions

The grid architecture in the North Eastern Region constrains the deployment and integration of renewable energy. Technical assessments and official planning documents consistently identify limited inter-state and inter-regional transfer capacity, radial feeders, and constrained transmission corridors as key barriers to absorbing additional generation capacity without further strengthening of transmission networks, automation, storage, and flexibility services.¹⁴⁷

Table 51: NER renewable energy summary indicators

State level differentiation¹⁴⁸

- Baseline year (2025): Current assessed renewable energy potential in NER ~119.6 GW.
- Dominant resource (2025): Large hydro (~57 GW, nearly 50% of total potential).

Key states: Arunachal Pradesh, Assam, Manipur.

- Small Hydro (2025): ~3 GW, suitable for rural and decentralized energy access.

Significant states: Arunachal Pradesh, Meghalaya, Mizoram, Nagaland.

- Wind (2025): ~760 MW, concentrated in Arunachal Pradesh and Assam.
- Bioenergy (2025): ~562 MW (biomass and bagasse), supporting local energy generation.
- Solar (2024): Officially 57,360 MW in TERI table¹⁴⁹; actual solar potential exists but not quantified in this assessment.

State highlights (2025 baseline):

- Arunachal Pradesh: Largest total potential (~61 GW, led by hydro).
- Assam: Significant hydro and bioenergy (~15.5 GW).
- Manipur, Mizoram, Meghalaya, Nagaland: Moderate hydro and small hydro (~7-11 GW each).
- Tripura: Smallest potential (~2.1 GW), mostly hydro and bioenergy.

¹⁴⁴ GOI, Ministry of Power https://powermin.gov.in/sites/default/files/uploads/RSO2122024_Eng.pdf

¹⁴⁵ Government of India (2024). *State/UT-wise Exploitable Potential of Hydro and Identified Pumped Storage (as on 30.06.2024)*. Reply to Rajya Sabha Unstarred Question No. 791. Ministry of Power, Government of India. https://powermin.gov.in/sites/default/files/uploads/RSO2122024_Eng.pdf

¹⁴⁶ Government of India (2024). *Year End Review - 2024*. Ministry of Power, Government of India.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2089243>. Press Information Bureau

¹⁴⁷ India Smart Grid Forum (2024). *Accelerated Development of Renewable Energy in North East Region (NER), India* (Study Report). India Smart Grid Forum (for policy insights on grid constraints).

¹⁴⁸ TERI, 4th East and North East Energy Conclave, 2025. <https://teriin.org/files/Knowledge-Paper-Energy-Transition.pdf>

¹⁴⁹ TERI, 4th East and North East Energy Conclave, 2025. <https://teriin.org/files/Knowledge-Paper-Energy-Transition.pdf>



Systemic constraints to renewable deployment

Despite clear renewable potential, several systemic constraints limit realized outcomes in NER:

- **Grid readiness** remains the primary binding constraint; without material reinforcement of transmission networks, automation, and storage integration, additional generation capacity will face curtailment and underutilization.
- **Hydropower development** has tended to advance on a project-by-project basis, with limited basin-level coordination and insufficient integration of pumped storage and ancillary services, reducing its system-level value.
- **Investment risk perception** remains elevated due to terrain challenges, long gestation periods, complex clearances, and socio-ecological sensitivities, which deter sustained private investment.
- **Institutional fragmentation** persists, as energy planning, grid development, environmental approvals, and state renewable policies often operate in parallel rather than in an integrated system.

Together, these factors create a **self-reinforcing equilibrium** in which system weaknesses discourage investment, delay infrastructure upgrades, and leave substantial renewable resource potential underutilized.

To address these challenges, the government intervention in the renewable energy sector in the NER has shifted from capacity announcements toward

system enablement and foundational infrastructure. Region-specific instruments, including PM-DevINE and NESIDS, have expanded fiscal support for enabling infrastructure such as transmission networks, last-mile connectivity, and power systems in difficult terrain. Multilateral engagement has further supported grid strengthening, distribution reform, and climate-resilient power infrastructure in select NER states. At the state level, renewable energy policies are in place across the region. However, official assessments reports note that implementation capacity, grid readiness, and financial viability remain uneven, constraining effective translation of policy intent into deployable capacity.

Therefore, **structured and phased approach** is required to unlock the NER's renewable energy potential towards the medium- and long-term targets. Key principles include:

- a) Prioritizing transmission strengthening, grid automation, and energy storage integration
- b) Coordinating hydropower with pumped storage and ancillary services to enable grid balancing
- c) Aligning generation additions with system preparedness rather than uniform targets
- d) Ensuring distributed renewable energy supports agriculture, MSMEs, logistics, and services

Distributed renewable energy shall be deployed to support agriculture, MSMEs, logistics, and services, improving economic productivity rather than merely adding capacity.

10.3 Climate change adaptation and mitigation

Climate change functions as a structural constraint on development in NER. Intensifying hydro-meteorological variability, fragile terrain, and high livelihood sensitivity have elevated climate risk into a systemic economic, fiscal, and governance challenge. Development outcomes to 2047 will depend on the extent to which climate adaptation is embedded within infrastructure systems, livelihood strategies, and public investment frameworks, while safeguarding the region's nationally significant mitigation assets.

Climatic conditions across the NER display rising variability and unpredictability, with increasing incidence of intense precipitation events. These shifts have altered the frequency, spatial spread, and intensity of climate-related hazards, producing cumulative impacts beyond immediate physical damage

Flooding in the Brahmaputra and Barak river systems has become a persistent structural feature. Recurrent inundation, riverbank erosion, and sediment deposition have resulted in land loss, repeated household displacement, and chronic damage to embankments, roads, bridges, and public utilities. Recovery cycles have progressively shortened, reducing the effectiveness of reconstruction and asset restoration.

Hill states face parallel stress. Intensifying rainfall, steep slopes, ecological disturbance, and expanding built activity have increased landslide incidence and slope instability. Transport corridors, power transmission infrastructure, and access routes to remote settlements face frequent disruption, undermining connectivity, service delivery, and economic continuity. These disruptions are recurring

conditions, introducing persistent uncertainty into mobility and logistics systems.

Mitigation conditions present a complementary but interlinked profile. Extensive forest cover and diverse ecosystems position the NER as a critical national carbon sink, contributing materially to India's climate mitigation objectives. Forests, wetlands, and riverine systems deliver essential ecosystem services, including carbon sequestration, flood moderation, soil stabilization, and biodiversity conservation. Climate stress, land-use change, and fragmentation are eroding ecosystem resilience in certain sub-regions, placing long-term mitigation capacity at risk unless restoration and protection are systematically strengthened.

Livelihood exposure remains pronounced. High dependence on climate-sensitive sectors, including rain-fed agriculture, riverine fisheries, and forest-based activities, means climatic shocks transmit rapidly into income volatility, food insecurity, and livelihood stress, increasing reliance on public support mechanisms.

Institutional preparedness exhibits uneven depth. **State Action Plans on Climate Change (SAPCCs)** and disaster management frameworks exist, but integration of climate risk into routine sectoral planning, infrastructure design, and public investment appraisal remains partial. Climate impacts therefore continue to manifest primarily as **ex-post fiscal and administrative burdens** rather than being systematically mitigated.

Vulnerabilities and systemic risks

Climate vulnerability in the NER arises from **interacting systemic factors**:¹⁵⁰

- **Hydrological volatility:** Intensified rainfall increases peak flood flows and erosion intensity, while altered seasonal patterns generate localized water stress. Agricultural productivity, transport reliability, energy infrastructure, and settlement stability are directly affected.
 - **Terrain and settlement patterns:** Populations, roads, and critical infrastructure concentrated along river valleys and unstable slopes amplify sensitivity to floods and landslides. Recurrent damage to highways, bridges, and power networks increases maintenance costs, disrupts service delivery, and constrains private investment.
 - **Livelihood sensitivity:** Dependence on climate-sensitive sectors means even moderate disturbances generate disproportionate social and economic effects, including income loss, distress migration, and erosion of human capital.
 - **Institutional and fiscal constraints:** State and local governments operate within constrained fiscal envelopes and face technical capacity gaps, while reactive disaster expenditure often crowds out development spending.
- Collectively, these dynamics produce a high-exposure, moderate-capacity equilibrium, under which climate shocks progressively erode development gains and elevate long-term fiscal risk.
- To address the challenges on climate action, NER adopts measures guided by national policy frameworks and state-level instruments.
- Nationally, missions addressing sustainable agriculture, water resources, Himalayan ecosystems, forestry, and strategic knowledge provide the overarching climate architecture. Several missions intersect directly with the region's climate risk profile.
 - SAPCCs articulate priority vulnerabilities and sectoral interventions across all NER states. Recent iterations emphasize disaster risk reduction, climate-resilient agriculture, water management, and ecosystem restoration, with implementation depth reflecting differences in institutional capacity and fiscal space.
 - Disaster risk management initiatives have strengthened flood forecasting, early warning systems, and structural measures in high-risk districts. Multilateral engagement supports river basin management, erosion control, and climate-resilient infrastructure, though coverage remains partial.
 - Mitigation efforts focus on forest conservation and ecosystem management programs, acknowledging NER's role as a national mitigation asset, while mechanisms to translate ecosystem services into sustained regional investment remain limited.

¹⁵⁰ Government of India (2025). *Parliamentary Question: Rising Threats of Climate Change*. Press Information Bureau, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2205313>; Government of India (2024-25). *Annual Report 2024-25*. Ministry of Environment, Forest & Climate Change, Government of India. https://moef.gov.in/uploads/pdf-uploads/English_Annual_Report_2024-25.pdf; India Meteorological Department (2025). *Press Release on Extreme Weather Events and Climate Variability*. India Meteorological Department, Government of India. https://internal.imd.gov.in/press_release/20250115_pr_3554.pdf; Government of India (2008). *National Action Plan on Climate Change (NAPCC)*. Ministry of Environment, Forest & Climate Change, Government of India. <https://southasia.iclei.org/news/delhi-state-action-plan-on-climate-change-how-it-all-began/>



Official planning frameworks signal a shift toward **mainstreaming climate resilience within development strategy**. Strategic direction emphasizes:

- Climate-resilient infrastructure across transport, energy, and urban systems
- Integrated river basin and watershed management
- Climate-resilient agriculture and livelihoods
- Protection and restoration of natural ecosystems

Strategic implications:

- a) Investments that reduce vulnerability deliver immediate economic and fiscal returns
- b) Integrating climate considerations into infrastructure planning and public investment appraisal prevents recurrent losses and escalating lifecycle costs
- c) Strengthen adaptive capacity while sustaining the region's nationally significant mitigation function.

These principles position the NER to pursue a resilient development trajectory, safeguarding lives, livelihoods, and public assets, while contributing meaningfully to national climate objectives through 2047.

10.4 Disaster management and risk reduction

Disaster risk in NER is structural, shaped by river systems, hill and mountain terrain, seismic exposure, and climatic variability. Government of India assessments consistently recognize the region as multi-hazard prone, with impacts recurring in the same geographies across years. Development outcomes to 2047 will depend on the extent to which disaster risk reduction is embedded within statutory planning systems, infrastructure standards, and institutional coordination, moving beyond response-dominant arrangements.

Disaster exposure in the NER is formally recognized across national disaster management instruments, including NDMA guidelines, national seismic zoning notifications, and official Government of India communications. Hazard occurrence is geographically concentrated and recurrent, resulting in cumulative impacts on infrastructure, livelihoods, and public expenditure.

Floods and riverbank erosion are officially acknowledged as dominant hazards in the Brahmaputra and Barak river basins. Parliamentary responses and PIB releases consistently identify these basins as experiencing recurring floods with extensive impacts on habitations, agriculture, roads, bridges, and embankments. Riverbank erosion is formally

recognized as a progressive process leading to permanent land loss in affected districts.

Hill and mountain states face a distinct disaster regime. NDMA and NIDM documentation for Himalayan and North-Eastern states identifies landslides, flash floods, and cloudburst-related events as recurrent hazards associated with steep slopes, rainfall intensity, geological conditions, and construction activity. Transport corridors and lifeline infrastructure experience repeated disruption, affecting access to markets and essential services.

Seismic exposure is formally recognized across the region, which lies largely within Seismic Zones IV and V under national zoning notifications. National disaster management guidelines classify earthquakes as low-frequency, high-impact hazards, while acknowledging uneven compliance with seismic safety provisions.

Institutional mechanisms for disaster management operate across all NER states under the Disaster Management Act. State and District Disaster Management Authorities, response forces, and emergency operations centers function in accordance with notified plans. Official assessments consistently indicate that risk reduction and mitigation functions remain less embedded than response and relief activities.

Table 52: Recognized disaster hazards and state-wise differentiation¹⁵¹

State / Region	Hazard / Condition	Description
Assam, Arunachal Pradesh, Sikkim, Meghalaya, Nagaland, Mizoram, Tripura	Extremely dry / severely dry conditions (2021)	Part of Northeast region with increasing flood frequency and precipitation variability
Manipur	Extremely dry / severely dry conditions (2021); floods / flash floods	Vulnerable to water-induced disasters due to valley geography and fragile environment; impacts include erosion and landslides
NER Region-wide	Floods; extreme precipitation variability	Trend analysis shows increased frequency of floods and heavy rainfall events in the Northeast

Disaster management in the NER operates within a defined statutory framework supported by NDMA guidelines and State and District Disaster Management Plans. Early warning systems are coordinated nationally through designated technical agencies and disseminated via notified alert protocols, with reviews noting variation in last-mile reach in terrain-constrained districts. Operational emphasis remains concentrated on relief, response, and post-event asset repair. Functions related to risk mapping, mitigation planning, land-use regulation, and resilient infrastructure standards are formally recognized within policy frameworks but show uneven integration into routine development planning and capital expenditure processes.

Institutional and financial arrangements underpinning these functions are formalized through the State Disaster Response Funds (SDRF) and the National Disaster Response Fund (NDRF), ensuring recurring budgetary provisions and clearly defined expenditure protocols. Risk mapping and hazard assessment are carried out under national guidelines and technical programs, providing the evidence base for planning and preparedness, though integration into routine development planning and capital budgeting varies

across states. Mitigation planning is recognized as a core function within national policy frameworks, primarily implemented through sectoral schemes and program-based interventions. Collectively, these arrangements establish a structured framework for disaster preparedness, response, and resilience in the NER, while highlighting areas for strengthened integration and systematic planning.

NER lies predominantly in **Seismic Zones IV and V** and is exposed to floods, landslides, and erosion on a recurring basis. Disaster risk reduction is therefore integrated into statutory planning rather than treated as a response function. Key **policy directions include:**

- Risk mapping and hazard assessments shall inform land-use planning and infrastructure siting
- Public infrastructure in high-risk zones shall comply with resilient design standards
- Investment decisions shall account for recurrence probability and lifecycle costs

Response and relief mechanisms remain essential but shall not substitute for risk reduction and mitigation.

¹⁵¹ Environmental Hazards in NER States, PIB 2024

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2040030&utm_source=chatgpt.com®=3&lang=2



10.5 Sustainable development practices

Development conditions in the NER are shaped by location, terrain, climate variability, and historically constrained connectivity. Strategic proximity to South-East Asia offers long-term potential for trade and regional integration, yet limitations in transport infrastructure, logistics systems, and border connectivity have restricted translation of geographic advantage into sustained economic activity.

Climate exposure interacts directly with these constraints. Flooding, landslides, and rainfall variability affect agricultural productivity, infrastructure reliability, and settlement stability, raising lifecycle costs of public assets and private investment. Development practices that exclude climate resilience at the design stage can therefore generate recurrent losses and sustained fiscal pressure.

Spatial structure further conditions outcomes. Dispersed settlements, limited urban agglomeration beyond select centers, and terrain-driven infrastructure challenges increase per-unit service delivery costs and constrain scale efficiencies. Sustainable development in the NER is thus inseparable from coordinated treatment of connectivity, climate risk, and spatial form.

Connectivity climate and spatial structure as interlinked drivers:

Connectivity, climate exposure, and spatial structure function as mutually reinforcing drivers of development outcomes in the NER. Connectivity deficits constrain market access, limit industrial clustering, and raise logistics costs, particularly in hill and border areas. Climate exposure amplifies these constraints by disrupting transport corridors, supply chains, and service delivery. Spatial dispersion magnifies both effects by increasing infrastructure intensity per capita and reducing resilience to shocks.

Independent treatment of these drivers has proven ineffective. Connectivity investments that ignore climate risk experience repeated asset damage. Climate-resilient infrastructure that lacks spatial integration fails to unlock economic activity. Spatial planning divorced from connectivity and climate considerations results in inefficient settlement expansion and rising service delivery costs. Sustainable development outcomes therefore depend on coordinated progress across all three dimensions.

Institutional frameworks supporting sustainable development:

Institutional arrangements supporting sustainable development in the NER combine national development initiatives with bilateral and regional cooperation frameworks that integrate economic objectives and environmental considerations.

One of the key instruments is the India-Japan Sustainable Development Initiative for the North Eastern Region of India, launched under the Act East Forum. Structured coordination across agriculture and irrigation, agro-industry (including bamboo-based value chains), tourism, education and skills, and urban services distinguishes this initiative from project-specific interventions. Strategic value lies in its integrated approach to connectivity, livelihoods, and sustainability rather than in individual investments.

National connectivity and development programs further frame investment priorities across transport, logistics, and regional integration. Together, these frameworks signal a shift toward embedding sustainability within development cooperation and infrastructure planning rather than pursuing parallel sustainability programs. Effective utilization of these instruments depends on cross-sectoral alignment, inter-state coordination, and execution capacity.

Spatial differentiation and state-level considerations:

Border and transit corridors present opportunities for trade and regional integration alongside heightened requirements for environmental safeguards and resilient infrastructure. Hill and mountain areas face pronounced terrain and climate constraints, necessitating climate-resilient, low-impact infrastructure and settlement planning. Urban and peri-urban areas encounter challenges related to land-use efficiency, service provision, and environmental management as growth concentrates. Rural and agrarian regions require sustainable livelihood strategies linked to value-chain integration and market access.

Development challenges and opportunities vary across NER due to differences in geography, connectivity, and economic structure. The SDG Index Report 2023-24 highlights uneven performance across districts and sectors, underscoring the need for place-specific strategies. Mountainous areas face distinct infrastructure and climate-related constraints, while states with higher urban concentration confront challenges related to land use, service provision, and

environmental management. Border and transit corridors introduce additional considerations related to trade facilitation and environmental safeguards, as reflected in official trade and connectivity policy assessments.

- Border and transit corridors: Trade facilitation aligned with environmental safeguards
- Hill and mountain areas: Climate-resilient infrastructure and settlement planning
- Urban and peri-urban areas: Resource efficient urban development
- Rural and agrarian regions: Sustainable livelihoods and value chain integration

Within this context, the strategic implications are as follows¹⁵²:

- ✓ Sustainable development in the NER depends on integrating connectivity-led growth with climate resilience and spatial planning as a single development logic.
- ✓ Institutional cooperation frameworks provide the means to embed sustainability within economic development, provided coordination and execution capacity are strengthened.
- ✓ Differentiated, place-based strategies remain essential to enable economic viability, environmental responsibility, and fiscal efficiency.

Alignment of planning and investment decisions with these principles could support development that is economically viable, environmentally responsible, and institutionally grounded through the Vision 2047 horizon.

10.6 Preservation of distinct way of life and indigenous knowledge

Economic development in the North Eastern Region must preserve and operationalize indigenous social systems and knowledge frameworks that continue to govern land use, resource management, livelihoods, and community organization. These systems constitute enforceable institutional capital and materially influence development outcomes. NER comprises more than ~200 tribes and sub-tribes, with customary institutions exercising authority over land, forests, water, and social regulation across parts of Nagaland, Mizoram, Meghalaya, Arunachal Pradesh, and hill districts of Assam. Key structural characteristics include:

- Predominance of community and clan-based land ownership
- Customary governance and dispute-resolution mechanisms
- Livelihood systems embedded in ecological cycles
- Strong coupling between culture, economy, and environment

Formal development interventions intersect directly with these systems and cannot bypass them without affecting implementation viability.

Indigenous knowledge systems in the region perform defined economic and governance functions:

- Regulation of forest access and regeneration through community rules
- Agricultural practices sustaining crop diversity, soil fertility, and climate adaptation
- Settlement and construction norms aligned with terrain, rainfall, and seismic risk
- Informal social insurance mechanisms reducing vulnerability and transaction costs

Evidence from forest and land governance assessments indicates higher ecological stability under community-managed regimes relative to open-access or externally administered systems. Replacement of

¹⁵² Government of India (2025). *North Eastern Region District SDG Index Report 2023-24*. NITI Aayog and Ministry of Development of North Eastern Region. <https://niti.gov.in/sites/default/files/2025-07/SDG-NER-Report.pdf> NITI Aayog; NITI Aayog & MDoNER (2025). *North Eastern Region District SDG Index 2023-24 (Official Report)*. Government of India. <https://niti.gov.in/sites/default/files/2025-07/SDG-NER-Report.pdf> NITI Aayog; Government of India and Embassy of Japan (2025). *Act East Forum - India-Japan Sustainable Development Initiative for the North Eastern Region of India*. Government of India and Government of Japan fact sheet. in.emb-japan.go.jp; Embassy of Japan in India (2017). *Act East Forum Inauguration and Cooperation Framework for NER*. Government of Japan and Government of India.



these arrangements through formal institutions entails higher fiscal cost and lower contextual effectiveness.

Development pressures:

Structural change is generating identifiable stress on indigenous systems through:

- Infrastructure and market integration altering land-use incentives
- Monetization of land weakening collective governance
- Out-migration of youth disrupting intergenerational knowledge transfer
- Education systems insufficiently aligned with local languages and practices
- Climate variability affecting traditional livelihood cycles

Development principle:

Development strategy for the North Eastern Region shall apply the principle of cultural continuity with economic integration. Operational implications include:

- Customary institutions to be treated as implementation counterparts
- Project design to align with local land and governance systems
- Standardized development templates to be avoided in tribal areas
- Indigenous knowledge to inform climate adaptation and resource planning

Policy integration priorities

- a) **Livelihood systems:** Support agroforestry, bamboo and cane value chains, handlooms, handicrafts, and traditional food systems. Focus

on value addition, market access, and income stability without altering social organization

- b) **Knowledge transmission:** Integrate local languages, ecological knowledge, and history into formal education. Document and digitize indigenous practices to prevent erosion and enable innovation
- c) **Natural resource governance:** Strengthen community forest management and customary land-use frameworks. Align state conservation and climate programs with indigenous practices
- d) **Cultural economy and tourism:** Promote community-owned tourism models. Prevent cultural dilution through safeguards on scale, ownership, and representation

Institutional alignment

Constitutional provisions, including the Sixth Schedule, establish the legal basis for preservation of indigenous systems. Effective outcomes require:

- Policy coherence between state governments, district administration, and customary bodies
- Mandatory early-stage community engagement in planning and appraisal
- Capacity building of local institutions to interface with markets and public programs

Governance frameworks must recognize indigenous institutions as **operational economic actors**. To summarize, development of the NER by 2047 shall reflect a model where economic progress proceeds without erosion of distinct ways of life and indigenous knowledge. Cultural systems and customary institutions shall function as sources of resilience and comparative advantage, aligned with the national objective of Viksit Bharat.

10.7 Balancing development with conservation

Long-term economic transformation in NER must proceed through a development pathway that internalizes ecological constraints, preserves natural capital, and strengthens resilience. Ecological stability functions as an economic input for the region, given its terrain, land-use patterns, and livelihood structure. Development outcomes and conservation outcomes are therefore structurally interlinked rather than sequential.

In NER, forest ecosystems and river systems underpin agricultural productivity, hydropower generation, drinking water supply, urban drainage, and transport infrastructure across the region. Employment structure reinforces this linkage. Between 55% and 60% of workers in the region are engaged in agriculture and allied activities, compared to a national average of about 42%.¹⁵³ Household incomes and employment stability remain closely tied to soil

¹⁵³ NABARD, 2018. <https://www.nabard.org/auth/writereaddata/tender/3001193230Meghalaya%20RO%20-%20FINAL%20SFP-2019-20%20PDF.pdf>

quality, water availability, forest cover, and climatic conditions. Environmental degradation therefore translates into direct economic costs through lower yields, infrastructure damage, and increased disaster-related expenditure.

Structural conditions shaping the development-conservation balance

Terrain conditions impose binding constraints. Over ~70% of the region's land area is hilly or mountainous, combined with high seismic exposure. These conditions amplify the economic costs of deforestation and unplanned construction, particularly through landslides, floods, and erosion. Settlement patterns remain predominantly rural. Urbanization in the region stands at about 21%, compared to a national level of 35%. Limited urban concentration constrains land-saving agglomeration effects and increases pressure on forests and agricultural land when economic activity is spatially dispersed.

Land governance arrangements further shape development outcomes. Customary and community land tenure systems cover large parts of the hill states, influencing land assembly, infrastructure siting, and urban expansion. Development approaches that are spatially inefficient or socially misaligned face higher implementation risks and cost escalation.

Principle of conservation-aligned growth

Development strategy in NER shall follow a conservation-aligned growth framework built on three operational principles.

- **Spatial concentration of economic activity:** Economic expansion can be anchored in select urban centers and economic nodes to reduce land conversion, preserve contiguous forest landscapes, and lower per capita infrastructure and environmental costs.
- **Productivity-led sectoral expansion:** Growth in agriculture, tourism, industry, and services must be driven by productivity improvements and value addition rather than horizontal expansion into ecologically sensitive areas.
- **Resilience as a core economic parameter:** Investment appraisal must account for climate exposure and disaster risk, recognizing that resilience-enhancing investments reduce long-term economic losses and fiscal stress.

Sectoral integration of conservation objectives

- Urban development outcomes depend on compact and planned growth, which reduces land consumption and exposure to floods and landslides while enabling agglomeration benefits.
- Agriculture and allied sectors depend directly on conservation of soil, water, and forest ecosystems, which support productivity in tea, horticulture, fisheries, and livestock.
- Industrial and infrastructure outcomes depend on environmentally aligned location and design choices, which lower long-term maintenance costs and reduce disruption from climate and disaster events.
- Tourism growth remains directly dependent on environmental quality, particularly in nature-based and cultural tourism segments prevalent in the region.

Governance and institutional alignment:

Balancing development with conservation requires early integration of environmental considerations into planning and appraisal processes rather than reliance on post-approval compliance. Institutional capacity at the state and urban local body level in land-use planning and risk-informed infrastructure design directly affects economic outcomes.

Coordination across sectors and states is necessary, as river systems, forest corridors, and ecological zones extend beyond administrative boundaries. Community and customary institutions play a material role in land and resource management, influencing implementation effectiveness and sustainability.

Long-term development outcomes:

Development aligned with conservation is expected to reduce disaster-related economic losses, stabilize agricultural and non-farm incomes, and protect public capital stock. Lower exposure to environmental shocks supports more stable growth trajectories and higher long-term productivity. Economic transformation in the North Eastern Region by 2047 must proceed through a model in which growth and environmental stewardship reinforce each other. Conservation-aligned development enables the region to leverage its natural capital, strengthen resilience, and achieve sustained improvements in living standards, consistent with the national objective of a Viksit Bharat.



10.8 Strategic implications

The analysis across this chapter establishes that sustainability and resilience are foundational conditions for development in the North Eastern Region and must be treated as integral components of economic planning rather than parallel considerations. The region's environmental characteristics such as forest cover, river systems, terrain, seismic exposure, and livelihood dependence on natural resources that directly influence development feasibility, infrastructure performance, fiscal exposure, and long-term growth outcomes.

Official assessments document the economic functions performed by the region's ecological assets. Forests regulate hydrological flows supporting agriculture across the Brahmaputra and Barak basins, moderate flood peaks affecting settlements and infrastructure, stabilize slopes critical for transport connectivity, and contribute to national climate commitments through carbon sequestration. These functions generate measurable economic value and reduce exposure to recurrent losses, underscoring the role of ecological stability as productive infrastructure.

Conversely, environmental degradation and climate variability impose recurring fiscal and economic costs. Central allocations released for flood control, erosion management, and landslide mitigation under North Eastern Council schemes and the Flood Management and Border Areas Programme reflect sustained public expenditure directed towards managing hydrometeorological risks.¹⁵⁴ In a region where a majority of the workforce remains engaged in agriculture and allied activities, climate variability documented by official meteorological assessments directly affects incomes, food security, and public finances. These patterns indicate that environmental risk, when not addressed ex ante, manifests as repeated fiscal pressure and erosion of development gains.

The strategic direction for Vision 2047 is therefore to internalize sustainability and resilience considerations within development planning, investment appraisal, and governance systems. This requires a shift from reactive management of environmental impacts to proactive integration of ecological, climate, and disaster risk parameters in all development decisions.

Six strategic imperatives guide implementation. These include:

- ✓ Recognition of ecosystems as economic infrastructure
- ✓ Integration of climate and disaster risk into land-use planning and infrastructure design
- ✓ Adoption of landscape-and basin-level planning instruments
- ✓ Institutionalization of community-led conservation and indigenous governance systems
- ✓ Alignment of renewable energy deployment with system readiness and grid capacity
- ✓ Pursuit of conservation-aligned growth through spatial concentration and productivity-led expansion

Operationalization requires coordinated action across governance levels. At the central level, the Ministry of Development of North Eastern Region and the North Eastern Council are responsible for strategic coordination, inter-ministerial alignment, and resource mobilization. At the state level, sustainability considerations must be embedded within State Action Plans on Climate Change, disaster management frameworks, renewable energy policies, and fiscal planning processes. At the district and local levels, land-use planning, infrastructure siting, enforcement of standards, and community engagement are critical for translating policy direction into outcomes. Community and customary institutions must function as implementation counterparts for conservation and livelihood initiatives, reflecting their role in land and resource governance.

Fiscal and investment frameworks must reinforce this approach. Public investment appraisal systems could incorporate ecosystem service values, climate risk exposure, and lifecycle cost considerations alongside conventional assessment criteria. Green budgeting practices and performance-linked financing mechanisms can improve allocation efficiency and accountability. Existing instruments, including CAMPA¹⁵⁵, flood management programmes, and disaster response funds, can be deployed strategically to prioritize upstream resilience and ecosystem-based interventions. External finance from multilateral and bilateral sources can be leveraged to support system-level investments aligned with regional priorities.

¹⁵⁴ PIB (2025), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2115291®=3&lang=2>

¹⁵⁵ Compensatory Afforestation Fund Management and Planning Authority (CAMPA) <https://environmentandforest.assam.gov.in/information-services/state-campa-0#:~:text=Compensatory%20Afforestation%20Fund%20Management%20and,lying%20with%20the%20Adhoc%20CAMPA.> To note, as illustration, link for Assam Government is mentioned here.