

# A Comprehensive Checklist of Rare, Endangered and Threatened Taxa of Northeast India

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## ABSTRACT

The Northeast region of India is facing a significant threat to its biodiversity, with numerous plant and animal species threatened with the risk of extinction due to factors such as habitat loss, deforestation, jhum cultivation, invasive species, and economic activities like timber extraction. This study documented 45 plant species from 31 families and 21 animal species from 19 families identified as endangered or threatened drawing from an extensive review of peer-reviewed literature, policy documents and related sources on their conservation in Northeast India. The legislative and policy frameworks of the Biodiversity Act, 2002 is to provide conservation and regulated use of threatened plant and animal species while protected areas (*in situ*) and botanical gardens (*ex situ*) are crucial for safeguarding these species. Biotechnological strategies like tissue culture and cryopreservation are also crucial for the recovery of endangered plants and animals. This study also draws attention to the cultural relevance of species such as *Aquilaria malaccensis*, *Coptis teeta*, *Nepenthes khasiana*, *Taxus wallichiana*, *Amentotaxus assamica*, *Elephas maximus* and *Rucervus eldii eldii* nothing their important cultural and economics roles within local communities.

**Keywords:** Biodiversity, Cryopreservation, Government Policy, Rare Taxa, RET Species.

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**Received:** 13-07-2026;

**Revised:** 06-08-2026;

**Accepted:** 25-09-2026.

## INTRODUCTION

North East India, a global biodiversity hotspot, spans 2,74,680 square kilometres (21° 58' and 29° 27' N and 88° 00' and 97° 24' E) includes eight states and is divided into six major parts. It features diverse habitats like snow-capped highlands, tropical wet rain forests, and subtropical and temperate forests. Grasslands and wetlands are prominent habitat types in the valleys.

Biodiversity is an essential component of the world's ecosystems, maintaining ecological balance and giving the ecosystem stability (Brugière and Scholte, 2013). North East India boasts a diverse plant animal life, it case of plants, it including 700 orchids, 58 bamboos, 64 citrus, 28 conifers, 500 mosses, 700 ferns, 728 lichen species, and 7,500 flowering plants, essential for tropical and sub-tropical fruits, grains, and crops, particularly in the Eastern Himalaya (Arora and Singh, 1978). Other side animals, it includes 300 species of mammals, 977 birds, 176 reptiles, 110 amphibians, and 422 freshwater fishes (Saikia, 1997; Saikia and

Saikia, 2000; ZSI, 2019; BirdLife International, 2023). The Eastern Himalaya also constitutes an important centre of endemism and conservation priority, harbouring numerous globally threatened vertebrates (Norman *et al.*, 2000; Saikia and Saikia, 2000; IUCN, 2024). There are about 700 species of orchid are known to exist in the North East of the country. About 545 of these species, belonging to 122 taxa, are found alone in Arunachal Pradesh (Chowdhery, 1998). The genus *Rhododendron* of the Ericaceae is another remarkable group of showy plants which act as a keystone species in the ecosystem of mountains, soil stabilizer, moisture regulator, and the supporter of diverse pollinators and also have an economical and medicinal value; for slow growth and narrow range of habitat as well as loss of habitat and change climatic condition which move them towards threatened; more than 98% of all *Rhododendrons* known from India are restricted to the Himalayan region (Shekar and Srivastava, 2010; Singh *et al.*, 2003). Similarly, the Asian elephant is widely regarded as a keystone ecosystem engineer in the forests of Northeast India due to its major role in habitat modification, seed dispersal and maintenance of landscape heterogeneity (Sukumar, 2003; MoEFCC, 2021). Arunachal Pradesh has the highest number of plant species that are endemic to the state, in North Eastern India. Mizoram has two endemic species, whereas Sikkim and Manipur have three endemic species and one subspecies (Mao *et al.*, 2001); whereas, in faunal richness, with Assam consistently supporting the highest overall diversity, followed by Arunachal Pradesh,



DOI: 10.5530/ajbls.20260202

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while states such as Manipur, Nagaland and Meghalaya show moderate species richness (ZSI, 2019; BirdLife International, 2023). Northeast Indian plant species are crucial for indigenous populations' traditions, ecological heritage, and daily life, with residents preserving endangered and critically endangered species to preserve their cultural and medicinal value.

The article highlights the critical importance of rare and endangered plant and animal species in north-eastern India's diverse ecosystems, emphasizing the need for collective action to restore these ecosystems and cultures.

## METHODOLOGY

The study focused on sampling method, documenting and photographing specimens in study areas. The article also prepared by using the peer-reviewed literature, reports, policies and relevant sources which focusing on conservation of endangered and threatened species in Northeast, India. Databases viz., Web of Sciences, Scopus, Google Scholar, ICUN, Zoological Survey of India, Birdlife International, Turtle Taxonomy Working Group and Ministry of Environment, Forest and Climate Change (MoEFCC), were searched by utilizing the keywords mainly "Endangered plant", "Endangered animal", "Biodiversity", "Cryopreservation", "Government policy", "Northeast" and "Threatened species". The articles published between 2000 and 2025 were studied to trap the current information on conservations.

## Study area

The many study locations chosen for this review include the north-eastern Indian states of Assam, Meghalaya, Mizoram, Manipur, Nagaland, Sikkim, Arunachal Pradesh, and Tripura (Figure 1: Study area).

## RESULTS

Altogether 45 plant species belonging to 31 families and 21 animal species belonging 19 families were found. The table depicting the list of the rare, endangered and threatened plant and animal species is given below in Tables 1 and 2. An analysis of species distribution across the region revealed variation in species richness among different states (Figure 2). Furthermore, the conservation status at the state level shows notable differences in the number of endangered and critically endangered species. A comparative representation of these categories illustrates the number of endangered and critically endangered plant species based on the data summarized in (Table 1 and Figure 3). Similarly, comparative representation has also done to illustrates the number of endangered and critically endangered animal species based on the data summarized in (Table 2 and Figure 4).

## Threats to endangered species

Human activities like deforestation, urbanization, agricultural growth, and infrastructure development pose significant threats

to endangered species in Northeast India, leading to biodiversity loss and fragmentation. Settled agriculture is less prevalent in Brahmaputra and Barak valleys, and rapid deforestation has resulted in over 1,800 square km of forest loss between 1991 and 1999 (Handique, 2014).

The emergence of invasive species, such as *Mimosa invisa*, is causing disturbance in native vegetation at Kaziranga National Park in Assam. According to studies, traditional harvesting practices may lead to overexploitation, while pollution from industrial operations and agricultural runoff worsens biodiversity (Mir *et al.*, 2021).

## Legislative and policy framework for plant conservation

Preserving the remaining biodiversity of the globe remains a controversial topic with global ramifications. The post-colonial forest conservation initiatives of the Indian government in the 1970s were initiated with the Wildlife Protection Act of 1972 (Fanari, 2022). Governments thus show their dedication to conservation by passing legislation to protect threatened and endangered species for coming generations (Kumar, 2021) (Figure 5).

## National biodiversity conservation exercises

### National Biodiversity Action Plans (NBAPs)

To meet its responsibilities under the UN Convention on Biological Diversity, India created the National Biodiversity Strategy and Action Plan (NBSAP), which encourages conservation, sustainable usage, and fair benefit-sharing. The NBSAP engages tens of thousands of stakeholders and a large level of public input to create localized action plans that represent different ecological scenarios (Kohli and Kothari, 2003).

### Conservation (*In situ* and *ex situ*)

While *in situ* conservation protects species in their natural environments, usually through national parks and reserves, *ex situ* conservation involves keeping animals outside of their natural habitats, such as in zoos and seed banks. Both strategies are important for protecting biodiversity, especially in megadiverse countries that are home to a large number of species worldwide (Singh, 2024) shown in below Figure 6.

## Characterization of Biodiversity Using GIS Methods

The Department of Space, Government of India, and the Indian Institute of Remote Sensing (IIRS, 2002) conducted the only landscape-level biodiversity characterization of the Northeast region of India utilizing satellite remote sensing and geographic information systems (Figure 7). The NESAC created biological richness maps that considered factors including species richness, disturbance index, ecosystem uniqueness, and biodiversity values.

## Biodiversity Conservation Prioritization Project (BCPP)

WWF-India's Biodiversity Conservation Prioritization Project (BCPP) (1997-2000) was the first initiative of its kind to identify priority sites and species based on their biological and socioeconomic values and to create national conservation plans for them (Chatterjee *et al.*, 2006).

## National Biological Diversity Act (2002) and Rules (2004)

The National Biodiversity Authority (NBA), headquartered in Chennai, was established in 2003 to oversee and advise the Biodiversity Act's activities for central and state governments.

State governments established State Biodiversity Boards (SBBs) to support their recommendations on biodiversity conservation and sustainable use, subject to Central Government guidelines (Kumar, 2021).

## Protected Area Network

One of the most thorough processes for creating a network of protected areas in India that is both practical and scientifically accurate is the Wildlife Institute of India's Protected Area Network Planning. Through the identification of ten biogeographic zones, the exercise offered a justification for both the current and suggested collection of places that are highly significant for biodiversity.

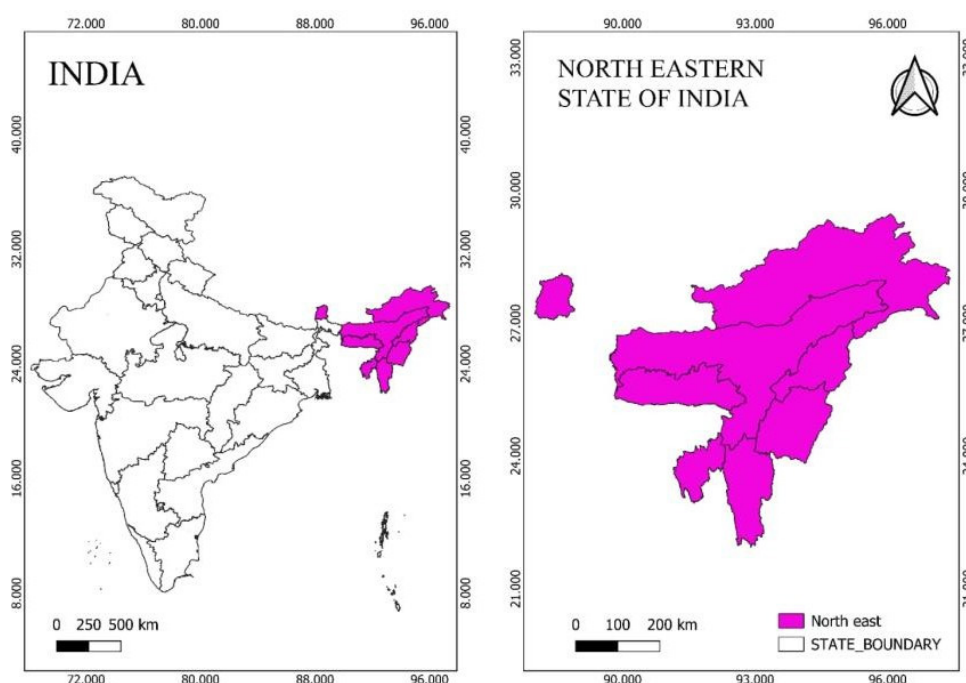


**Figure 1:** Map of Northeast, India showing the study area, prepared using QGIS software (version 3.34.9).

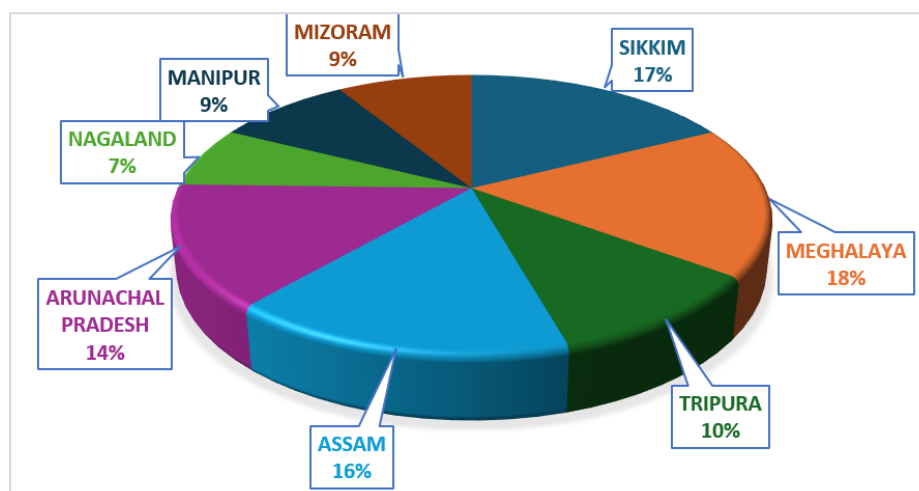


**Figure 2:** Pie diagram showing the species richness of the different states of northeast, India.

**Table 1: Table of RET plant species of Northeast, India.**

| Sl. No.                  | Botanical name                                                          | Family           | IUCN status | Reference                      |
|--------------------------|-------------------------------------------------------------------------|------------------|-------------|--------------------------------|
| <b>SIKKIM</b>            |                                                                         |                  |             |                                |
| 1.                       | <i>Taxus wallichiana</i> Zucc.                                          | Taxaceae         | EN          | (Tamang <i>et al.</i> , 2017)  |
| 2.                       | <i>Trillium govanianum</i>                                              | Melanthiaceae    | EN          | (Rashid <i>et al.</i> , 2023)  |
| 3.                       | <i>Piper pedicellatum</i> C.DC.                                         | Piperaceae       | EN          | (Mehta <i>et al.</i> , 2021)   |
| 4.                       | <i>Nardostachys jatamansi</i>                                           | Caprifoliaceae   | CR          | (Sherpa <i>et al.</i> , 2023)  |
| 5.                       | <i>Aconitum heterophyllum</i> (Wall)                                    | Ranunculaceae    | EN          | (Rai <i>et al.</i> , 2000)     |
| 6.                       | <i>Podophyllum hexandrum</i> (Royle)                                    | Berberidaceae    | EN          | (Rai <i>et al.</i> , 2000)     |
| 7.                       | <i>Swertia chirata</i> (Ham)                                            | Gentianaceae     | EN          | (Rai <i>et al.</i> , 2000)     |
| 8.                       | <i>Picrorhiza kurrooa</i> (Benth)                                       | Plantaginaceae   | EN          | (Rai <i>et al.</i> , 2000)     |
| 9.                       | <i>Illicium griffithii</i> Hook.f. and Thomson                          | Schisandraceae   | EN          | (Mehta <i>et al.</i> , 2020)   |
| 10.                      | <i>Coptis teeta</i> Wall.                                               | Ranunculaceae    | EN          | (Mehta <i>et al.</i> , 2020)   |
| <b>Meghalaya</b>         |                                                                         |                  |             |                                |
| 11.                      | <i>Sloanea tomentosa</i> (Benth.) Rehder and E.H.Wilson                 | Elaeocarpaceae   | EN          | (Lasushe <i>et al.</i> , 2022) |
| 12.                      | <i>Magnolia rabaniana</i> (Hook.f. and Thomson) D.C.S.Raju and M.P.Naya | Magnoliaceae     | CR          | (Lasushe <i>et al.</i> , 2022) |
| 13.                      | <i>Nepenthes khasiana</i> Hook.f.                                       | Nepenthaceae     | EN          | (Lasushe <i>et al.</i> , 2022) |
| 14.                      | <i>Pyrenaria cherrapunjeana</i> Mir                                     | Theaceae         | CR          | (Lasushe <i>et al.</i> , 2022) |
| 15.                      | <i>Paphiopedilum insigne</i> (Wall. ex Lindl.) Pfitzer                  | Orchidaceae      | EN          | (Lasushe <i>et al.</i> , 2022) |
| 16.                      | <i>Aquilaria malaccensis</i> Lam.                                       | Thymelaeaceae    | CR          | (Lasushe <i>et al.</i> , 2022) |
| 17.                      | <i>Aquilaria khasiana</i> Hallier f.                                    | Thymelaeaceae    | CR          | (Lasushe <i>et al.</i> , 2022) |
| 18.                      | <i>Nardostachys jatamansi</i> (D.Don) DC.                               | Caprifoliaceae   | CR          | (Mehta <i>et al.</i> , 2020)   |
| 19.                      | <i>Saussurea costus</i> (Falc.) Lipsch.                                 | Asteraceae       | CR          | (Mehta <i>et al.</i> , 2020)   |
| 20.                      | <i>Paris polyphylla</i> Sm.                                             | Melanthiaceae    | CR          | (Tariq <i>et al.</i> , 2023)   |
| <b>Tripura</b>           |                                                                         |                  |             |                                |
| 21.                      | <i>Vanda coerulea</i> Griff. ex Lindl                                   | Orchidaceae      | EN          | (Zhang <i>et al.</i> , 2020)   |
| 22.                      | <i>Renanthera imschootiana</i> Rolfe                                    | Orchidaceae      | EN          | (Seenii and Latha, 1992)       |
| 23.                      | <i>Nymphaea nouchali</i> Burm.f.                                        | Nymphaeaceae     | EN          | (Tynsong <i>et al.</i> , 2020) |
| 24.                      | <i>Renanthera imschootiana</i> Rolfe                                    | Orchidaceae      | EN          | (Kishor and Sharma, 2009)      |
| 25.                      | <i>Aquilaria malaccensis</i> Lam.                                       | Thymelaeaceae    | CR          | (Nath <i>et al.</i> , 2024)    |
| 26.                      | <i>Renanthera imschootiana</i> Rolfe                                    | Nymphaeaceae     | EN          | (Seenii and Latha, 1992)       |
| <b>Assam</b>             |                                                                         |                  |             |                                |
| 27.                      | <i>Prunus ceylanica</i> Miq.                                            | Rosaceae         | EN          | (Bhattacharyya, 2011)          |
| 28.                      | <i>Aquilaria malaccensis</i> Lam.                                       | Thymelaeaceae    | CR          | (Saikia and Khan, 2013)        |
| 29.                      | <i>Cycas pectinata</i> Buch.-Ham.                                       | Cycadaceae       | EN          | (SINGH and Singh, 2012)        |
| 30.                      | <i>Vanilla borneensis</i> Rolfe                                         | Orchidaceae      | CR          | (Hasnu and Tanti, 2022)        |
| 31.                      | <i>Paphiopedilum fairrieianum</i> (Lindl.) Stein                        | Orchidaceae      | EN          | (Rankou and Kumar, 2015)       |
| 32.                      | <i>Chlorophytum assamicum</i> D. Borah and A. P. Da                     | Asparagaceae     | CR          | (Borah <i>et al.</i> , 2021)   |
| 33.                      | <i>Aristolochia assamica</i> D.Borah and T.V.Do                         | Aristolochiaceae | EN          | (Borah <i>et al.</i> , 2021)   |
| 34.                      | <i>Kayea assamica</i> Prain                                             | Calophyllaceae   | EN          | (Baruah <i>et al.</i> , 2017)  |
| 35.                      | <i>Dipterocarpus retusus</i> Blume                                      | Dipterocarpaceae | EN          | (Tao <i>et al.</i> , 2024)     |
| <b>Arunachal Pradesh</b> |                                                                         |                  |             |                                |

| Sl. No.         | Botanical name                                      | Family        | IUCN status | Reference                          |
|-----------------|-----------------------------------------------------|---------------|-------------|------------------------------------|
| 36.             | <i>Brucea mollis</i> Wall. ex-Kurz                  | Simaroubaceae | EN          | (Borthakur <i>et al.</i> , 2018)   |
| 37.             | <i>Coptis teeta</i> Wall.                           | Ranunculaceae | EN          | (Goswami <i>et al.</i> , 2019)     |
| 38.             | <i>Paris polyphylla</i> Sm.                         | Melanthiaceae | CR          | (Phurailatpam and Choudhury, 2022) |
| 39.             | <i>Albizia julibrissin</i> var. <i>julibrissin</i>  | Fabaceae      | EN          | (Kumari, 2023)                     |
| 40.             | <i>Garcinia lanciefolia</i> Roxb.                   | Clusiaceae    | EN          | (Hazarika and Lalnunsangi, 2019)   |
| 41.             | <i>Kaempferia galanga</i> L.                        | Zingiberaceae | EN          | (Gogoi <i>et al.</i> , 2023)       |
| 42.             | <i>Livistona jenkinsiana</i> Griff.                 | Arecaceae     | EN          | (Singh <i>et al.</i> , 2010)       |
| 43.             | <i>Rhyncostylis retusa</i> (L.)                     | Orchidaceae   | EN          | (Saxena, 2020)                     |
| <b>Nagaland</b> |                                                     |               |             |                                    |
| 44.             | <i>Aquilaria malaccensis</i> Lam.                   | Thymelaeaceae | EN          | (Giri, 2020)                       |
| 45.             | <i>Cycas pectinata</i> Buch.-Ham.                   | Cycadaceae    | EN          | (Devi and Das, 2016)               |
| 46.             | <i>Livistona jenkinsiana</i> Griff.                 | Arecaceae     | EN          | (Singh <i>et al.</i> , 2010)       |
| 47.             | <i>Renanthera imschootiana</i> Rolfe                | Orchidaceae   | EN          | (Seeni and Latha, 1992)            |
| <b>Manipur</b>  |                                                     |               |             |                                    |
| 48.             | <i>Lilium mackliniae</i> Sealy                      | Liliaceae     | EN          | (Premkumar <i>et al.</i> , 2023)   |
| 49.             | <i>Renanthera imschootiana</i> Rolfe                | Orchidaceae   | EN          | (Wu <i>et al.</i> , 2014)          |
| 50.             | <i>Saurauia punduana</i> Wall.                      | Actinidiaceae | EN          | (Deb and Gangmei, 2016)            |
| 51.             | <i>Cycas pectinata</i> Buch.-Ham.                   | Cycadaceae    | EN          | (Devi and Das, 2016)               |
| 52.             | <i>Magnolia griffithii</i> Hooke.f. and Thomson     | Magnoliaceae  | EN          | (Cicuzza <i>et al.</i> , 2007)     |
| <b>Mizoram</b>  |                                                     |               |             |                                    |
| 53.             | <i>Begonia wattii</i> C.B. Clarke                   | Begoniaceae   | EN          | (Barik <i>et al.</i> , 2018)       |
| 54.             | <i>Coelogyne nitida</i> (Wall. ex D. Don) Lindl.    | Orchidaceae   | EN          | (Natta <i>et al.</i> , 2022)       |
| 55.             | <i>Coelogyne ovalis</i> Lindl.                      | Orchidaceae   | EN          | (Singh and Kumaria, 2019).         |
| 56.             | <i>Cymbidium macrorhizon</i> Lindl.                 | Orchidaceae   | EN          | (Kim <i>et al.</i> , 2017)         |
| 57.             | <i>Globba wengeri</i> (C.E.C. Fisch.) K.J. Williams | Zingiberaceae | EN          | (Mawia <i>et al.</i> , 2020)       |

## Biotechnological approaches

The increasing number of endangered species and biodiversity loss necessitate innovative conservation measures. Biotechnology, including tissue culture techniques, assisted reproductive technologies, conservation genomics and cryopreservation, is crucial for preserving genetic resources and supporting future restoration efforts, thereby enhancing the preservation of plant and animal species (Nagel *et al.*, 2024; Baisetti *et al.*, 2024).

Biotechnological methods improve *ex situ* conservation by improving genetic management, breeding techniques, and germplasm preservation. They create disease-resistant cultivars and determine genetic compatibility for reintroduction, preserving genetic diversity. Combining biotechnology with traditional conservation techniques strengthens species protection, increasing sustainability and resilience for future generations (Coelho *et al.*, 2020).

## Cultural significance of ret species

Northeast India's Agarwood tree (*Aquilaria malaccensis*), a vital species for religious rituals and traditional medicine, is critically endangered due to overexploitation, threatening the region's biodiversity and cultural practices. Similarly, *Coptis teeta* Wall. (Mishmi teeta) and *Taxus wallichiana* (Zucc.) which are medicinal plants i.e., native in the state of Arunachal Pradesh and Himalayan region respectively are listed as endangered due to habitat degradation and unsustainable harvesting trends (Bajpay *et al.*, 2019; Bhuju and Gauchan, 2018). Indigenous communities like Mishmi tribe were using *Coptis teeta* for its medicinal properties while *Taxus wallichiana* is the important natural source of anticancer compound Taxol available worldwide (Bajpay *et al.*, 2019; Juyal *et al.*, 2014). Furthermore, *Nepenthes khasiana* Hook. f., the only pitcher plant from India endemic to the states of Meghalaya and parts of Assam is considered as endangered due to disturbance in their habitats and pressure on collection

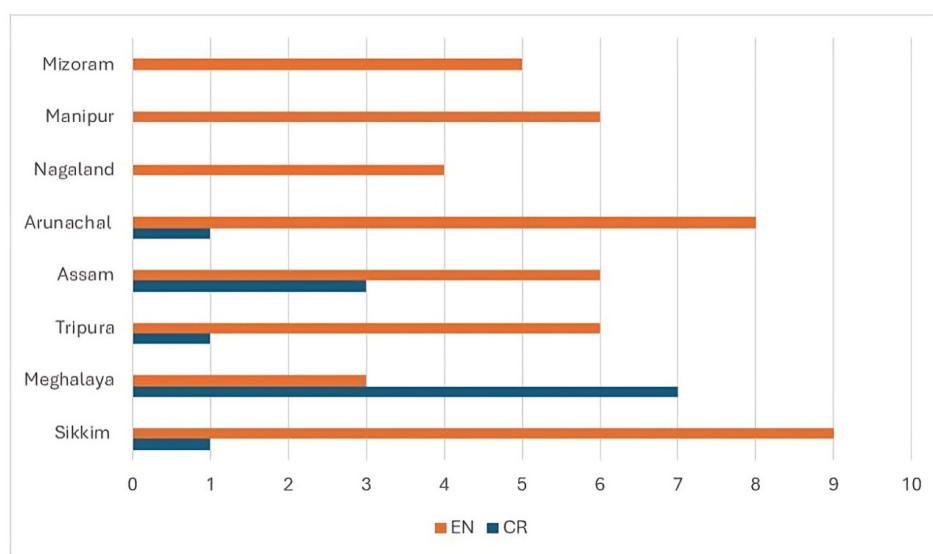


**Figure 3:** Bar diagram representing numbers of endangered and critically endangered species in the states of northeast India (from Table ).



**Figure 4:** Bar diagram representing numbers of endangered and critically endangered species in the states of the Northeast, India (from Table ).

(Konwar *et al.*, 2023; Devi *et al.*, 2019). Another threatened species, *Amentotaxus assamica* belonging to Arunachal Pradesh is a widely used element in traditional herbal remedies for respiratory ailments, fever and earache thus underlining its ethnobotanical importance (Sarma *et al.*, 2024; Tag *et al.*, 2012).

In addition to floristic diversity the faunal component in Northeast India also provides the evidence of heavy cultural linkage with the people of the local. Rare, Endangered and Threatened (RET) animal species possess a significant cultural, spiritual and socio-economic significance in this biodiversity rich region in which wildlife is intrinsically linked with indigenous traditions and belief systems. Many species are sacred and have mythological significance or form the identities of clans and as such become informal mechanisms of conservation protection in traditional societies. For instance, the cultural association of the

Asian elephant (*Elephas maximus*) with religious symbolism and wisdom, the brow-antlered deer (*Rucervus eldii eldii*, Sangai) as the cultural heritage of Manipur and hornbills as having spread cultural associations in tribal art and ceremonial works across Northeast India are very wide autonomous cultural associations. Such species often are cultural keystone species that provide the attitude to wildlife protection and landscape stewardship in communities. However, the speed with which land use has been transformed and anthropogenic pressures felt have shattered some of the traditional protections and herald the importance of focus on the integration of biocultural knowledge into contemporary conservation management. Harnessing cultural values with scientific management is hence thought to be a productive way of solving the long-term conservation of threatened fauna of the biodiversity hotspot of Indo-Burma (Gadgil *et al.*, 1993; Sodhi *et al.*, 2010; IUCN, 2024; BirdLife International, 2023).

**Table 2: RET animal species of Northeast, India.**

| Sl. No.  | Scientific Names                                              | Common Name                       | IUCN Status | N.E. India                                                                  | References                                   |
|----------|---------------------------------------------------------------|-----------------------------------|-------------|-----------------------------------------------------------------------------|----------------------------------------------|
| REPTILIA |                                                               |                                   |             |                                                                             |                                              |
| 1.       | <i>Pangshura sylhetensis</i> Jerdon, 1870                     | Assam roofed turtle               | EN          | Sikkim, Meghalaya                                                           | IUCN (2024); TTWG (2021)                     |
| 2.       | <i>Nilssonia nigricans</i> Anderson, 1875                     | Black soft-shell / Bostami turtle | CR          | Tripura and Arunachal Pradesh                                               | IUCN (2024); ZSI (2019)                      |
| AVES     |                                                               |                                   |             |                                                                             |                                              |
| 3.       | <i>Gyps bengalensis</i> (Gmelin, JF, 1788)                    | White-rumped vulture              | CR          | Sikkim, Meghalaya, Tripura, Arunachal Pradesh, Assam, Manipur and Mizoram   | Birdlife International (2023); IUCN (2024)   |
| 4.       | <i>Houbaropsis bengalensis</i> (Muller, PLS, 1776)            | Bengal florican                   | CR          | Assam                                                                       | Birdlife International (2023); IUCN (2024)   |
| 5.       | <i>Asarcornis scutulata</i> (Muller, 1842)                    | White-winged wood-duck            | EN          | Arunachal Pradesh, Nagaland and Manipur                                     | Birdlife International (2023)                |
| 6.       | <i>Ardea insignis</i> Hume, 1878                              | White-bellied heron               | CR          | Nagaland                                                                    |                                              |
| 7.       | <i>Ciconia boyciana</i> R. Swinhoe, 1873                      | Oriental stork                    | EN          | Manipur                                                                     |                                              |
| 8.       | <i>Leptoptilos dubius</i> (Gmelin, JF, 1789)                  | Greater adjutant                  | EN          | Manipur                                                                     |                                              |
| MAMMALS  |                                                               |                                   |             |                                                                             |                                              |
| 9.       | <i>Ailurus fulgens</i> F. Cuvier, 1825                        | Red panda                         | EN          | Sikkim and Arunachal Pradesh                                                | IUCN (2024); ZSI (2019)                      |
| 10.      | <i>Cuon alpinus</i> (Pallas, 1811)                            | Dhole                             | EN          | Sikkim and Nagaland                                                         | IUCN (2024)                                  |
| 11.      | <i>Moschus chrysogaster</i> Hodgson, 1839                     | Alpine musk deer                  | EN          | Sikkim                                                                      |                                              |
| 12.      | <i>Elephas maximus</i> Linnaeus, 1758                         | Asian elephant                    | EN          | Meghalaya, Tripura, Arunachal Pradesh, Nagaland, Assam, Manipur and Mizoram | IUCN (2024); MoEFCC (2021)                   |
| 13.      | <i>Manis crassicaudata</i> E. Geoffroy, 1803                  | Indian pangolin                   | EN          | Meghalaya, and Tripura                                                      | IUCN (2024); Challender <i>et al.</i> , 2014 |
| 14.      | <i>Manis pentadactyla</i> Linnaeus, 1758                      | Chinese pangolin                  | CR          | Meghalaya, Tripura, Arunachal Pradesh, Nagaland, Assam, Manipur and Mizoram |                                              |
| 15.      | <i>Hoolock hoolock</i> Harlan, 1834                           | Western hoolock gibbon            | EN          | Meghalaya, Tripura, Arunachal Pradesh, Nagaland, Assam, Manipur and Mizoram | IUCN (2024); Choudhury (2009)                |
| 16.      | <i>Trachypithecus phayrei</i> (Blyth, 1847)                   | Phayre’s langur                   | EN          | Tripura                                                                     | IUCN (2024)                                  |
| 17.      | <i>Caprolagus hispidus</i> (J. T. Pearson in Horsfield, 1840) | Hispid hare                       | EN          | Assam                                                                       | IUCN (2024); ZSI (2019)                      |

| Sl. No. | Scientific Names                               | Common Name        | IUCN Status | N.E. India                                    | References                        |
|---------|------------------------------------------------|--------------------|-------------|-----------------------------------------------|-----------------------------------|
| 18.     | <i>Bubalus arnee</i> (Kerr, 1792)              | Wild water buffalo | EN          | Assam                                         | IUCN (2024)                       |
| 19.     | <i>Panthera tigris</i> (Linnaeus, 1758)        | Bengal tiger       | EN          | Assam, Arunachal Pradesh, Manipur and Mizoram | IUCN (2024); Qureshi et al., 2023 |
| 20.     | <i>Rucervus eldii eldii</i> (McClelland, 1842) | Brow-antlered deer | EN/CR       | Manipur                                       | IUCN (2024); CZA (2018)           |
| 21.     | <i>Nycticebus</i> spp.                         | Slow loris         | EN          | Mizoram                                       | IUCN (2024)                       |

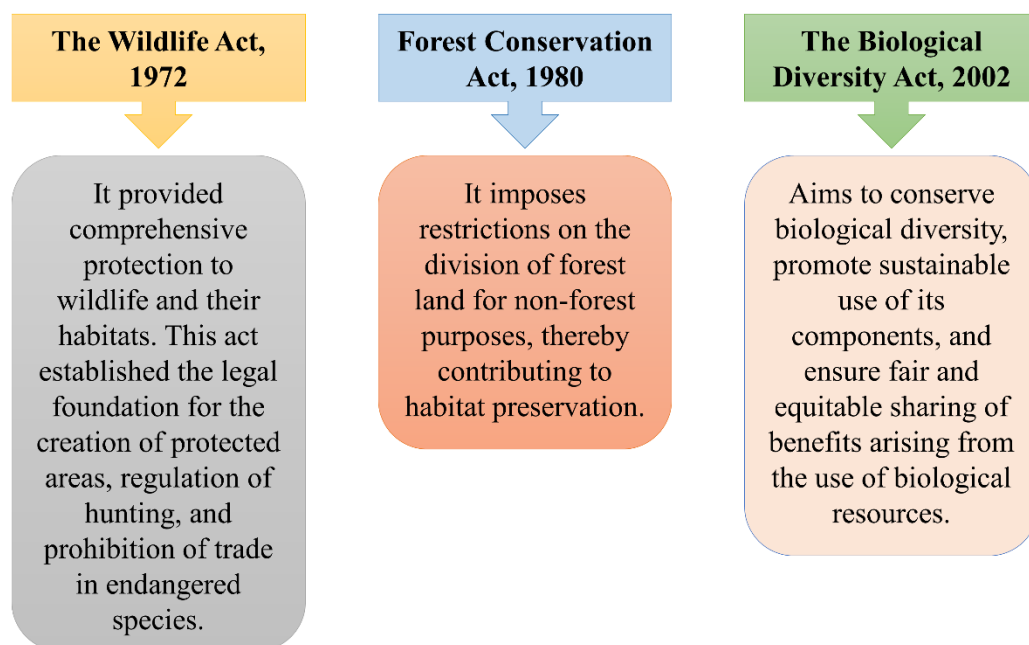


**Figure 5:** Key aspects of the legislative frameworks for plant conservation in the Northeast India.

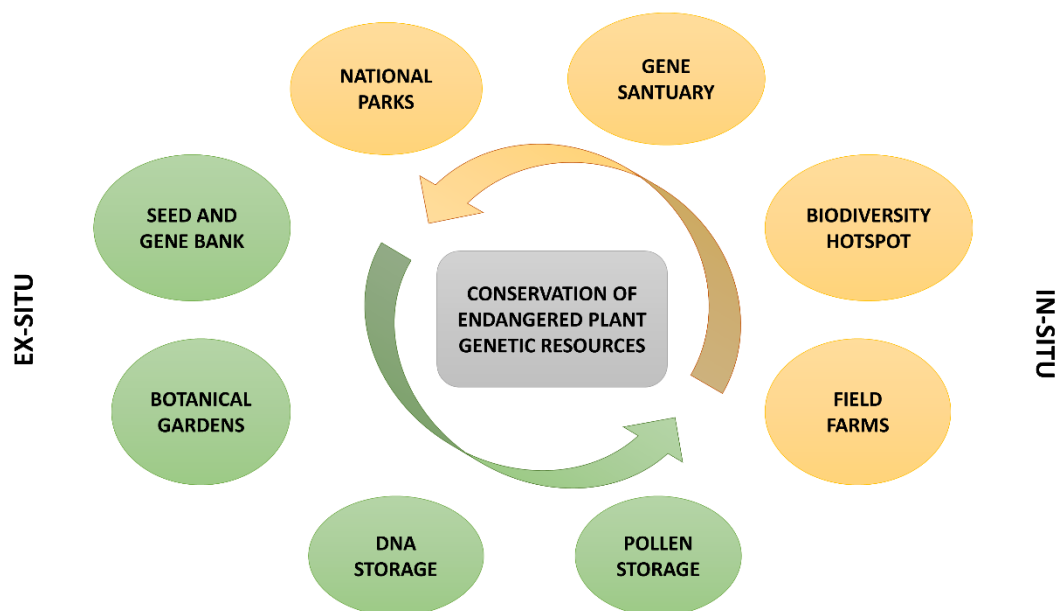


**Figure 6:** Various ways of conservation of the endangered species.

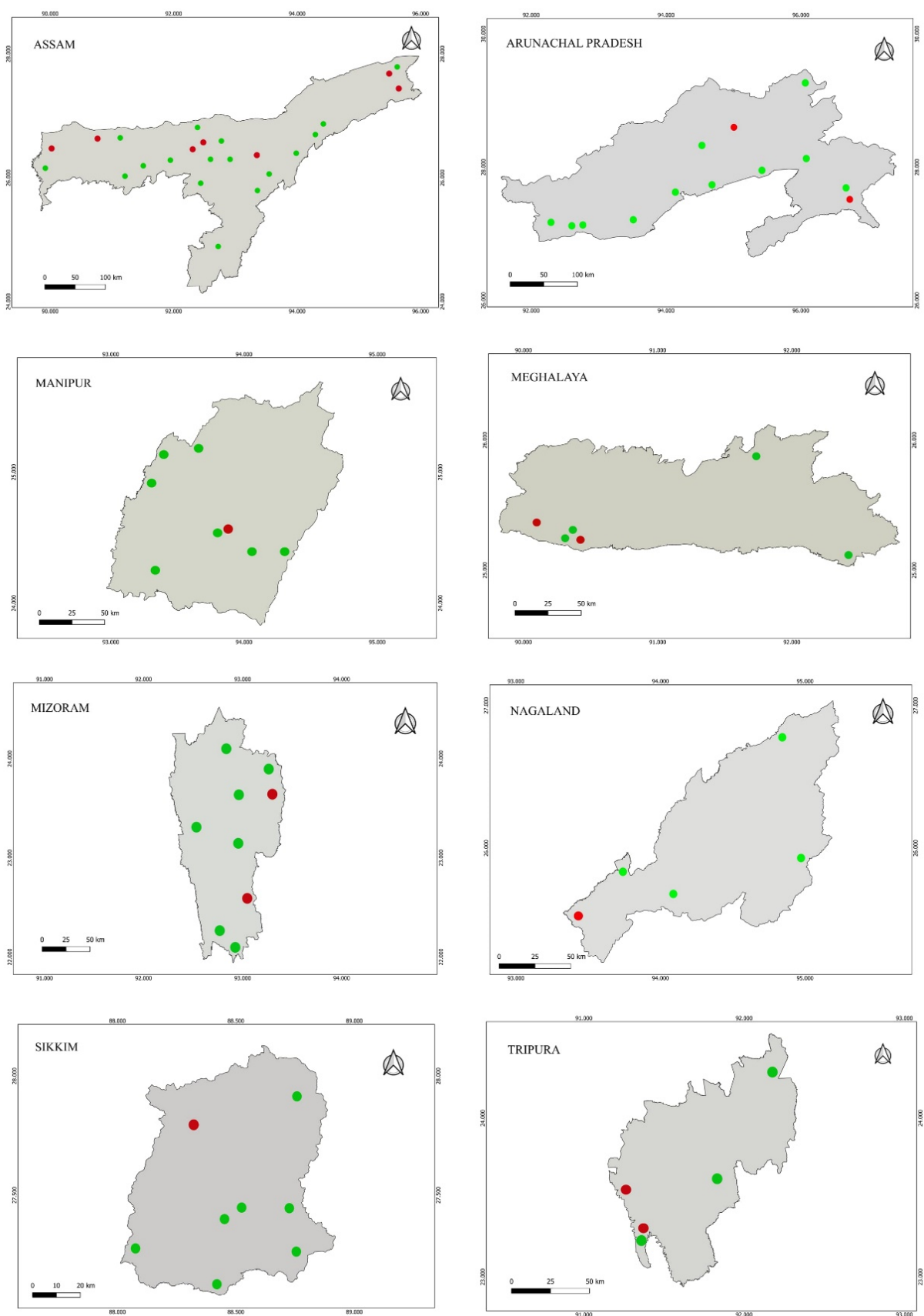


**Figure 7:** Map of different states of North East India showing the protective areas network prepared using QGIS software (version 3.34.9).

## CONCLUSION

The northeast region of India, home to the Himalayas and Indo Burma, is home to a diverse flora and fauna, but threats like habitat loss, invasive species, and climate change threaten these species. A multi-faceted approach, including biotechnological approaches, local community empowerment, and flagship programs involving natives, is needed to protect these species.

## ABBREVIATIONS

**RET:** Rare, Endangered and Threatened; **IUCN:** International Union for Conservation of Nature; **MoEFCC:** Ministry of Environment, Forest and Climate Change; **NBAP:** National Biodiversity Action Plan; **NBSAP:** National Biodiversity Strategy and Action Plan; **NBA:** National Biodiversity Authority; **SBB:** State Biodiversity Board; **BCPP:** Biodiversity Conservation Prioritization Project; **GIS:** Geographic Information Systems; **IIRS:** Indian Institute of Remote Sensing; **WWF:** World Wide Fund for Nature; **ZSI:** Zoological Survey of India; **TTWG:** Turtle Taxonomy Working Group; **NTCA:** National Tiger Conservation Authority; **CZA:** Central Zoo Authority; **EN:** Endangered; **CR:** Critically Endangered; **N:** North; **E:** East.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHORS CONTRIBUTIONS

**Liza Handique:** Conceptualization; methodology; visualization; writing original draft; writing review and editing. **Atlanta Kalita, Deepjyoti Medhi, Susanta Jyoti Saikia, and Soujit Kumar:** Conceptualization; methodology; visualization; writing original draft. **Soujit Kumar:** Manuscript preparation.

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**Cite this article:** Handique L, Kalita A, Medhi D, Saikia SJ, Kumar S. A Comprehensive Checklist of Rare, Endangered and Threatened Taxa of Northeast India. *Asian J Biol Life Sci.* 2026;15(3):603-13.