Glimpses of Biodiversity in Assam





The Universe along with its creatures belongs to the Lord.
No creature is superior to any other.
Human beings should not be above nature.
Let no one species encroach over the rights and privileges of other species.



Iso- Upanishads (1500-60 B.C.)

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Assam State Biodiversity Board



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Published by:
Assam State Biodiversity Board,
Guwahati -781037
With financial assistance from
National Biodiversity Authority,
Chennai

Year of publication: 2013 Reprint: 2014 & 2017

> Design & Layout: Fine Edge, Guwahati -781005

Printed at: Anubhab Enterprise & Co. Guwahati -781006

Acknowledgement:

The Assam State Biodiversity Board sincerely acknowledges the contributions made by various Forest Officials, Researchers, Students and other friends for providing us the information and the photographs personally and through public domain.

This publication is solely for the purpose of public awareness.



Foreword

Assam is an exhilarating place beset with unmatched diversity, both cultural and biological. Nature has obviously been generous to this place. The traditional knowledge of local people epitomizes how they make the most of natural diversity besides maintaining it. Unfortunately, this aspect of sustainability is wearing away due to rapid urbanization and associated life-style changes.

While Nations have been spending fortunes in trying to bring back the glory of nature lost in the process of 'development', we in Assam seem to be oblivious of, or nonchalant about the rapid loss of biological diversity and associated traditional knowledge.

The Biological Diversity Act-2002 and Assam Biodiversity Rules-2010, aim to arrest this trend and safeguard biodiversity against unauthorized access or unwise use. It empowers people to own, conserve and sustainable utilize locally available biological resources. The Assam State Biodiversity Board is committed to facilitate this process.

In this publication we present glimpses of Assam's biodiversity.

(A. K. Johari)

Member Secretary, Assam State Biodiversity Board





Introduction

Assam is one of the richest biodiversity zones in the world. This is because Assam falls in the transitional zone of Indian, Indo-Malayan and Indo-Chinese bio-geographical regions and possesses a special geomorphic environment with large plains and dissected hills. Broadly, the climate is sub-tropical with heavy rainfall and humidity which supports various habitats such as rainforests, riverine grasslands, bamboo thickets and wetland ecosystems.

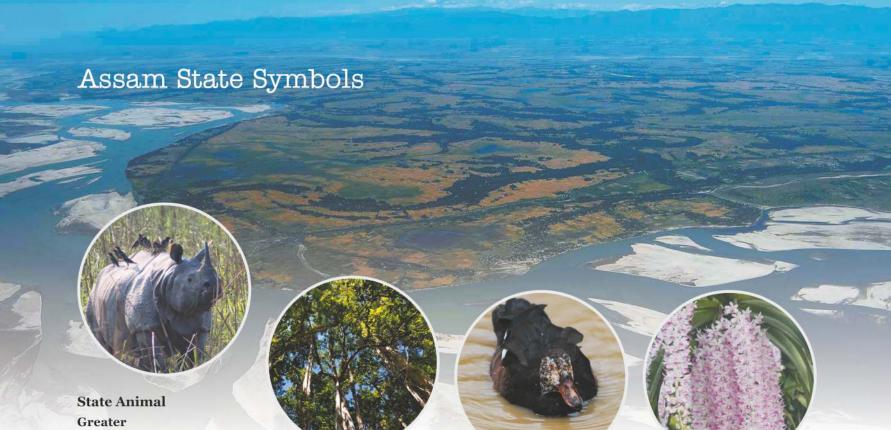
North-eastern India in general and Assam in particular is recognized as nature's laboratory from where many varieties of important commercial crops including rice, banana, citrus, ginger and tea are believed to have originated. Wild ancestors of these crops still thrive in Assam. Assam has 3010 species of flowering plants of which 347 have medicinal properties. The State has 102 endemic and restricted range plants, 182 species of orchids, 42 species of bamboos and 14 species of cane. In faunal diversity, Assam has 193 species of mammals including 10 species of primates, more than 820 species and subspecies of birds, 185

species of fish, 405 species of butterflies, 115 species of reptiles, 46 species of amphibians and 39 species of snails.

About 37.2% of State's area is under green cover. Nearly 4% of the area is notified as Protected Area, comprising of 5 National Parks and 20 Wildlife Sanctuaries. Assam has the distinction of having 2 UNESCO World Heritage sites (Manas and Kaziranga) 2 Biosphere Reserves (Dibru- Saikhowa and Manas) 4 Tiger Reserves (Kaziranga, Manas, Nameri and Rajib Gandhi Orang National Parks) and 5 Elephant Reserves.

Majuli Island, the largest river island in the world is famous for its rich culture and traditions and has been proposed to be declared a World Heritage Site.

The Assam State Biodiversity Board setup by the Government of Assam is working with people of Assam for conservation of biodiversity, promoting its sustainable use and for ensuring that on any commercial use of biological resources the benefits flow to the local people equitably.



One-horned Rhino (Rhinoceros unicornis):

Rhino is a majestic, wallowing animal, a symbol of strength living in marshy grassland habitats. Assam harbour the largest surviving population of about 2500 individuals. A vulnerable species, threatened for its horn believed to be having carcinogenic and aphrodisiac properties.

State Tree Hollong (Dipterocarpus retusus):

A medium hardwood, tall and emergent semi-evergreen tree, is the state tree of Assam. Abundant in Eastern Assam. besides the tallest tree of Assam.

State Bird

White-winged Wood Duck (Asarcornis scutulata):

One of the largest species of duck inhabiting the water-holes of dense evergreen forests which is an Endangered species and state bird of Assam.

State Flower **Foxtail Orchid** (Rhynchostylis retusa):

An exotic blooming orchid found in semi-deciduous forests and woodlands, is the state flower of Assam. An integral part of Bihu Festival.

Some beautiful orchids in bloom:





Paphiopedilum villosum

Arundina graminifolia

Orchids: Kopou

In Assam as many as 182 species of orchids are reported which represent 44.39% of North-Eastern species and 24.42% of the species occurring in India.

Rhynchostylis retusa, Foxtail Orchid is an exotic blooming orchid, known locally as "Kopou phul".

The pendant raceme (inflorescence) consisting of more than 100 pink spotted white flowers is used by the girls to adorn their hair during the spring festival- *Rongali Bihu*.

The orchid is an integral part of *Bihu* festival and a *Bihu* dancer's attire is incomplete without this orchid.

It is also used in the marriage ceremony of the Assamese people.

Besides its exotic looks, medicinally it is used to treat wounds, cuts and bruises.

Some other prominent orchid species of Assam include Arundina graminifolia, Aerides odorata, Dendrobium moschatum, Pholidota imbricata and Dendrobium aphyllum etc.

Many of these orchids including *Rhynchostylis retusa*, *Dendrobium* spp. etc. are regularly marketed to different places in





Dendrobium spp.

Paphiopedilum bellatulum

India, Myanmar and China.

High value of these rare and exotic orchids in global market leads to its illegal trade in some parts of the State.

Thus, it is the time to check this illegal trade before it wipes out the rare and endemic species even before they are discovered.

Let us conserve these rare and exotic orchids which are deeply associated with our culture and tradition for our future generations.

Rhino Conservation in Assam

"A unique success story"

Rhinoceros unicornis is the State animal of Assam which is also known as *Gor* in Assamese language, is the second largest land mammal native to Asia next to Asian Elephant. In India, this large mammal was once widespread in Indo-Gangetic plains and Brahmaputra valley but now it is primarily found in few protected areas of Assam namely the Kaziranga NP, Manas NP, Orang NP and Pobitora WLS.

Today, around 3,000 rhinos live in the wild, of which more than 2,500 are found in Assam alone. Its population trend in Assam is increasing from a few individuals in 1905 (as per Assam Secretariat record) to 2505 in 2012 (as per Assam Forest Department record, 2012).

Owing to its increasing population trend, IUCN upgraded its status from Endangered to Vulnerable in 2008.

Rhino population growth in PAs of Assam

Protected Areas	Young	Sub-adult/ Adult	Total
Kaziranga NP	519	1771	2290
Rajiv Gandhi Orang NP	16	84	100
Pobitora WLS	26	67	93
Manas NP		22	22
			Total: 2505

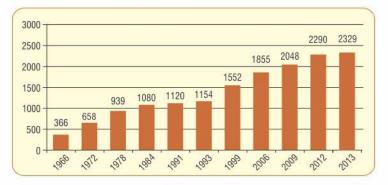
Rhino population growth in Kaziranga NP



1909 - Few Individual

2012 - 2290

2013 - 2329





Kaziranga Tiger Reserve received NTCA award for excellence in Anti-poaching category for the year 2010-11



Sri Sagar Mura, Forest Guard, KNP received the Airtel and NDTV gallantry award including ₹ 25000 for his field duties



Lesser known Globally Threatened Mammals of Assam

Hispid Hare Caprolagus hispidus



Also Known as Assam Rabbit, the species is confined to Manas National Park of Assam. Their Population is declining due to habitat degradation.

IUCN status: Endangered (EN)

Pygmy Hog Porcula salvania



An Endemic species of Assam nearly lost but reintroduced after successful captive breeding.

Pygmy Hog is the smallest and the rarest wild suid in the world.

IUCN Status: Critically Endangered (CR)

River Dolphin Platanista gangatica



National river animal of India, this species occurs in the Barak river, the Brahmaputra and few of its tributaries in Assam.

The species is facing serious threats from water pollution and hunting. The present population trend in Assam is declining.

IUCN Status: Endangered (EN)

Clouded Leopard Neofelis nebulosa



These elusive carnivores are the most talented climbers among the cat species.

Their population size is suspected to be lesser than 10,000 mature individuals in wild.

In Assam, it occurs at Jeypore Reserve Forest and is also reported from few other PAs of Assam.

IUCN Status: Vulnerable (VU)

Western Hoolock Gibbon Hoolock hoolock



The species has declining population trend primarily due to hunting and habitat loss.

In Assam, the species occurs at selected Protected Areas such as Gibbon Wildlife Sanctuary and Jeypore Reserve Forest.

IUCN Status: Endangered (EN)

Golden Langur Trachypithecus geei



This species is confined to a forest belt in western Assam between the Manas River in the east, Sankosh in the west and Brahmaputra in the south along the Indo-Bhutan border.

Habitat destruction is taking a toll on this species and now their population is restricted to few fragmented forest pockets.

IUCN Status: Endangered (EN)

Spectacled Langur *Trachypithecus phayrei*



This species is reported from the Cachar district in Assam.

A major threat to the species is habitat loss and degradation besides being hunted for food.

IUCN Status: Near Threatened (NT)

Slow Loris Nycticebus bengalensis



This is an arboreal, nocturnal mammal.

This species is found throughout the Protected Areas of Assam.

Their Population trend is decreasing rapidly due to habitat loss and hunting pressure.

IUCN Status: Vulnerable (VU)



Birds of Assam: A Bird's Eye view

Assam is famous for its extremely rich birdlife.

Two Endemic Bird Areas fall within Assam: The Eastern Himalayas (EBA 130) and The Assam Plains (EBA 131).

More than 820 species and sub-species of birds were recorded so far from Assam.

Altogether 46 Important Bird Areas (IBAs) are identified in Assam including the 5 National Parks and 20 Wildlife sanctuaries.

Its varied habitats are important for many rare and threatened avian species including 17 endemic and 77 globally threatened species.



Bengal Florican Houbaropsis bengalensis



Great Pied Hornbill Buceros bicornis



Greater Adjutant Stork Leptoptilos dubius



Alexandrine Parakeet Psittacula eupatria



Speckled Piculet
Picumnus innominatus



Ruddy Shellduck Tadorna ferruginea



Marsh Babbler Pellorneum palustre



Brown Hornbill Anorrhinus austeni

Endemic (En)	Critically Endangered (CREN)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)
17 species	8 species	9 species	29 species	31 species

The Endangered White-winged Wood Duck *Asarcornis scutulata* locally known as Deo-Hah is the state bird of Assam.

Some notable globally threatened and endemic birds of Assam include Bengal Florican *Houbaropsis bengalensis*, Greater Adjutant Stork *Leptoptilos dubious*, Rufous-necked Hornbill *Aceros nipalensis*, Black-breasted Parrotbill *Paradoxornis flavirostris*, Marsh Babbler *Pellorneus palustre* and White-naped Yuhina *Yuhina bakeri* etc.

Beside these, more than 280 species of migratory birds visit Assam every year from the northern latitudes.

Black-headed Gulls *Chroicocephalus ridibundus*, Ruddy Shelduck *Tadorna ferruginea*, Northern Shovelor *Anas clypeata* and Greatcrested Grebe *Podiceps cristatus* etc are some well known migratory birds of Assam.



Black-headed Gull Chroicocephalus ridibundus



Black-breasted Parrotbill Paradoxornis flavirostris

Threats to IBAs:

- At present, habitat modification and destruction is the main threat affecting as many as 42 IBA sites of Assam.
- Besides, unsustainable exploitation of natural resources such as illegal felling, excessive firewood collection, drainage pollution and poaching etc. also affect the natural forests.
- In addition, conversion of large scale natural forest lands into agricultural fields and tea gardens are cause of concern.

Fish Diversity of Assam

The Brahmaputra and Barak river system along with their tributaries and flood plain wetlands locally known as beels provide very conducive habitant for an array of fish species.

Assam and other parts of North Eastern region is recognized as

Few Commercial Fishes found in Assam

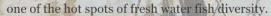


Indian butter Cat fish Ompok bimaculatus (Pabho)



Rohu Labeo rohita (Rou)

Mrigal Cirrhinus mrigala (Mirika)



So far 216 food, sports and ornamental fish species are reported from the region of which 185 are reported from Assam.

Some important ornamental fish species of Assam include Colisa, Nemacheilus, Danio, Botia and Chaca etc.

Few commercially important fish species of Assam include, Rou, Bhakua, Pabho, Chital, Magur, Singi, Sol, etc.



Clarias magur (Magur)

Few Ornamental Fishes found in Assam



Sunset Gourami Trichogaster Ialius (Ronga Kholihona)



Dangila danio

Danio dangila (Darikona)



Tiger Loach

Botia dario (Rani mach/Gethu)



Devil fish Chaca chaca (Kurkuri/Chakmakoa)







Moth yet to be identified



White Dragontail Lamproptera curius curius



Yellow Helen Butterfly Papilio nephelus



Khasi Hills Long-tailed Lizard Takydromus khasiensis



Giant Honey Bee Apis dorsata



Common Indian Toad Duttaphrynus melanostictus



Indian Garden Lizard Calotes versicolor



Assamese Tarantula Chilobrachys assamensis



Tokay Gecko Gekko gecko

Rice Diversity of Assam

Assam is traditionally a rice growing state

It plays a pivotal role in the socio-cultural life of the people of the region.

In other words, rice is life for the people of Assam.

Some of the special classes of rice in the state include *joha* or aromatic rice, *bora* or waxy rice and *chokuwa* or soft rice.

Agricultural classes of indigenous rice in Assam:

 Autumn Rice: Ahu, Dumai, Murali and Chengri.

> Duration: 80-130 days; Season: March/ April

 Winter Rice: Sali, Lahi, Joha, Boro, Chakuwa, Asra and Bao.

Duration: 150-180 days; Season: June/July & Nov./Dec. • Summer Rice: Boro

Duration: 180-200 days; Season: Nov. & May/June

• Jhum cultivation:

Duration: 210-250 days; Season: March/ April to Sept./ Oct. A number of preparations are made out of rice.

Three special classes of rice are grown to prepare special dishes. They are Bora, Chowkua and Joha rice.

Tilpitha, Ghilapitha, Sungapitha, Chira, Bhojabora and *Hurum* are some of the preparations made from the above mentioned rice varieties.

	Area (ha)	Production (tonne)	Productivity (kg/ha)
Autumn Rice	346369	334655	966.18
Winter Rice	1789161	3213979	1796.36
Summer Rice	394442	859790	2179.76
Total Rice	2529972	4408424	1742.48

Commonly cultivated rice varieties in Assam:



Ahum Hali Dhan



Kola Joha



Pakhi Loga Bora Dhan



Maniki Modhuri Dhan



Ronga Jengoni Dhan



Tora Boli Dhan



Some traditional rice delicacies (Pitha)

Few Local Fruits and Plants of Assam with medicinal properties

Paniol *Flacourtia jangomas*



It has rich pectin content and therefore quite suitable for processing as a jam or jelly. The fruits are used as medicine for jaundice and enlarged spleens. The leaves and roots are taken for schistosomiasis, malaria, and diarrhoea. The roots are also used for hoarseness, pneumonia, intestinal worms and as an astringent, diuretic, and pain reliever.

Leteku Baccaurea ramiflora



It is used medicinally to treat skin diseases. The bark, roots and wood are harvested for medicinal uses.

Rupahi thekera Garcinia lanceifolia



The fruits are used for preparation of soft drinks and have medicinal properties against diarrhoea.



The fruits have antioxidant, antiviral and antidiarrhoeal properties.



Bor thekera Garcinia pedunculata



The sun dried slices of this fruit are used to treat dysentery. The young leaves are cooked and eaten as a vegetable. The bark is used for dying clothes.

Karza tenga Carissa carandas



The fruit is a rich source of iron and contains a fair amount of vitamin C. It is an antiscorbutic and sometimes used for anaemia. Mature fruit contains pectin and so along being useful for making pickle; it is an ingredient in jelly, jam, syrup and chutney.

Nilakantha Ajuga integrifolia



The plant is aromatic, astringent and tonic. It is useful in the treatment of agues. The juice of the root is used in the treatment of diarrhoea and dysentery. The leaves are used in the treatment of fevers as a substitute for quinine.

Sirata/ Kalmegh Andrographis paniculata



The plant extract exhibits antityphoid and antifungal activities. Sirata is also reported to possess antihepatotoxic, antibiotic, antimalarial, antihepatitic, antithrombogenic, antiinflammatory, anti-snake venom, and antipyretic properties to mention a few, besides its general use as an immunostimulant agent.



Brahmi Bacopa monnieri



It is used in traditional Ayurvedic treatment for epilepsy and asthma. It is also used for ulcers, tumors, enlarged spleen, indigestion, inflammations, leprosy and anaemia.

Manimuni Centella asiatica



It is a mild adaptogen, and have antibacterial, antiviral, antiinflammatory, antiulcerogenic, anxiolytic, nervine and vulnerary properties, and can act as a cerebral tonic, a circulatory stimulant, and a diuretic.

Jilmil Sak/ Bathua Chenopodium album



The leaves and young shoots of this plant may be eaten as a leaf vegetable with moderation. Each plant produces tens of thousands of black seeds which are high in protein, vitamin A, calcium, phosphorus, and potassium.

Jomlakhuti Cheilocostus speciosus



The plant has many uses in Ayurveda, where the rhizome has been used to treat fever, rash, asthma, bronchitis, and intestinal worms.

Nayantara Catharanthus roseus

This species has long been cultivated for herbal medicine and as an ornamental plant.

In Ayurveda, the extracts of its roots and shoots, though poisonous, is used against several diseases including diabetes, malaria, and Hodgkin's lymphoma.

It can be dangerous if consumed orally.

Tulasi/Tulsi Ocimum tenuiflorum



Tulasi has been used for thousands of years in Ayurveda for its diverse healing properties.

It is considered to be an adaptogen, balancing different processes in the body, and helpful for adapting to stress. It is regarded in Ayurveda as a kind of "elixir of life" and believed to promote longevity.

Mahaneem Azadirachta indica



It is also known as "Sacred Tree" and "Panacea for all diseases". Products made from neem trees have anthelmintic, antifungal, antidiabetic, antibacterial, antiviral, contraceptive and sedative properties. It is also very effective against skin diseases.

Khutura xak Amaranthus spinosus



This plant is mainly eaten as a leaf vegetable for its varied medicinal properties. It helps to produces contraction in living tissue, reducing the flow of secretions and discharges of blood, mucus, diarrhoea etc. It also helps to reduce fevers and softens the skin, causing warmth and moisture. It is used internally in the treatment of internal bleeding, diarrhoea and excessive menstruation. It is also used in the treatment of snake bites. Externally, it is used to treat ulcerated mouths. nosebleeds and wounds.

Assam's Muga Silk and associated Livelihood

A silk from Assam that shines like Gold!

Muga silk is a wonderful gift of nature extracted from a species of insect not to be found anywhere else in the world except the North Eastern region of India.

Unique characteristics of Muga Silk:

• Muga silk is the product of the silkworm Antheraea assamensis

- endemic to Assam.
- The larvae of these moths feed on som (Machilus gamblei) and sualu (Litsea monopetala) leaves.
- The silk produced is known for its glossy fine texture and durability.
- Low porosity of Muga yarn allows natural golden color to be retained.
- This silk can be hand-washed with its lustre increasing after every wash.
- Muga silk production/handloom industry provides livelihood to a considerable section of Assamese population.



Machilus gamblei (Som)



Litsea monopetala (Sualu)



The Silk Moth (Male)



The Silk Moth (Female)



Larva



Eggs



Cocoon



Muga Yarn









Reeling of the Silk

Weaving

End Product

End Product in Shop

Assam Muga-silk & Livelihood		
Number of Villages engaged	10,532	
Number of Families engaged	2,54,134	
Number of Weavers engaged	1,10,00,000	
Host plant plantations (hectares)	21,300	
Number of Muga cocoons/year	63,60,00,000	
Annual silk production (MT)	113	
Annual average sale (₹)	6,95,00,000	

Associated Livelihood:

Sericulture is unique to the socio-economic life of the people of Assam.

Assam is famous for various types of silks that are produced here - Muga, Pat and Eri. $\,$

The entire village of Sualkuchi in the Kamrup district thrives on commercial production of these indigenously woven fabrics especially the Muga and Pat silk.

The artisan of Sualkuchi, with their skills, create an impressive array of exotic silk products such as *Saris, Mekhela Chadar*, *Kurtas* and shirts etc.

The costs of these Assamese Saris or Mekhela Chadar range between at Rs. 2000- 20,000 (approx.) depending upon time and occasion.

Traditional Use:

The tradition of rearing silkworms and weaving silk is still maintained and silk has remained as the preferred dress material and a regular costume for the Assamese women.

Ladies of all ages wear these Assamese Saris (*Mekhela Chadar*) on festive and auspicious occasions.

Bihu denotes a set of three major cultural festivals of Assam greatly associated with Muga Silk.

During *Bihu* festival, young unmarried men and women attired in traditional golden *Muga* silk dance and sing *Bihu* songs in the open fields.



Few edible local vegetables and fruits of Assam

To peep into Assamese way of life visit their weekly *bazaars* (markets). These markets are vibrant places rich in variety and traditions. Most sellers are tribal women selling their home grown products and fruits collected from forests.

Majority of the fruits and vegetable are local varieties grown organically. They are in high demand and fetch good prices compared to hybrid varieties. A practice which is encouraging conservation and propagation of locally evolved varieties.

Assam lemons are unique products with a high percentage of vitamin C (10 mg.) besides vitamin B (0.02 mg.), niacin (0.1) per 100 gm. Extractable oil content of the peel is around 0.8% and can be used in the cosmetic industry.

Citric concentrate locally known as *Tenga* and food additives known as *Khar* are essential in most of the Assamese traditional recipes.

Assam has about 13 varieties of bananas, each unique in taste and high in nutrient content. It is recommended as first-food for new born. *Bhim Kol*, a large sized banana with thick seeds is known for improving platelet count of blood and its peel is used for making *Khar*.



Allium sativum (Noharu)



Elaeocarpus floribundus (Jolphai)



Diplazium esculentam (Dhekia xak)



Averrhoa carambola (Kordoi)



Phyllanthus emblica (Amlakhi)



Dillenia indica (Outenga)



Dioscorea alata (Kath aalu)



Piper nigrum (Jaluk)



Citrus aurantiifolia (Kaji nimbu)



Aegle marmelos (Bel)



Capsicum annuum (Bhutjolokia)



Areca catechu (Tamul)



Musa paradisiaca (Koldil)



Bamboo shoot (Baah Gaaj)



Musa champa (Cheni Kol)



Musa paradisiaca (Kas Kol)



Musa balbisiana (Bhim Kol), Endemic to Assam



Musa assamica (Malbhog Kol)





OUR VISION

Bountiful, secured and economically rewarding biological diversity.

OUR MISSION

Ownership rights to people for conservation and wise-use of local biological resources and equitable sharing of benefits on commercial utilisation.



Our ancestors had learnt to live with wildlife in mutual respect. We hold this great heritage is trust for future generations.



- Indira Gandhi







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