BioDiverse

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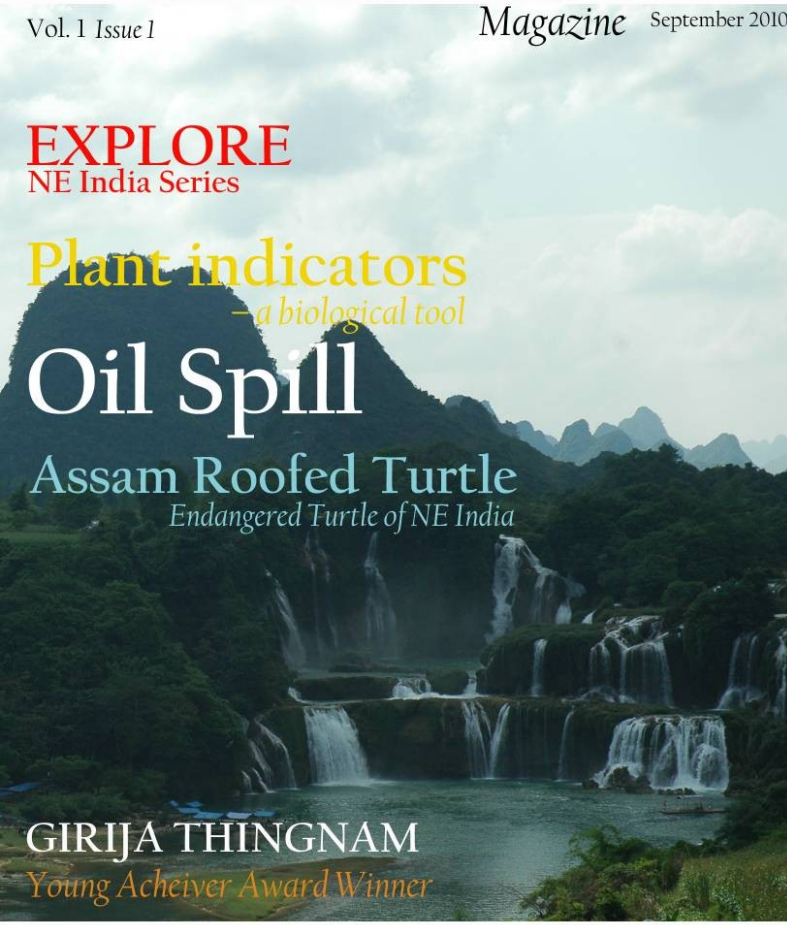


EXPLORE
NE India Series

Plant indicators
–a biological tool

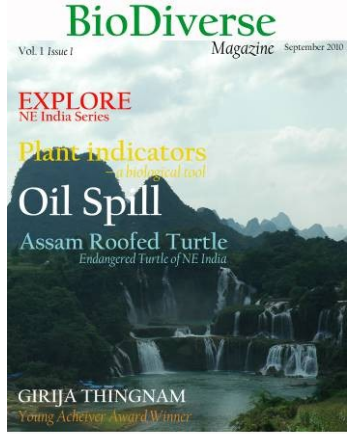
Oil Spill

Assam Roofed Turtle
Endangered Turtle of NE India

GIRIJA THINGNAM
Young Acheiver Award Winner

North East Centre for Environmental Education Research, Imphal

BioDiverse is an international quarterly magazine published by North East Centre for Environmental Education and Research (NECEER), Imphal. BioDiverse Magazine publishes news, articles, events and cartoons on biodiversity and environment of South and South East Asia.



North East Centre for Environmental Education Research, Imphal

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China-Vietnam Border
Photo: Rita Singh, GGSIPU

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EDITOR'S NOTE

The rate of natural calamities and disasters like floods, earth quakes, cyclones etc. have risen if we compare with the past, and these perhaps are the signs of human ever increasing atrocities on nature. The phenomenon like global warming and climate change have become the hot topics today and also the most retained words in the mind of mob prompting them to think about nature or their surrounding environment. The South Asian and South-East Asian Nations, which are home to most of the bioresources and intact ecosystems have become the indicators for climate change and have noticed huge losses due to various environmental disasters. For example- Bangladesh is simply drowning day by day, regardless various global negotiations going over to mitigate climate change. The signs are evident- the rising sea levels, melting glaciers, disappearing north and south poles, drowning nations, raging forest fires, ozone hole. The earth is going through the worst ever ecological crisis with upheavals having gripped the biosphere. Nature is warning that we must change.

In response to these global problems, efforts for protection of environment and biodiversity conservation have been accelerated by various govt. and non-govt. organizations all around the world. But at large various programmes, future threats and probable outcomes of these programmes are limited to scientific communities and bureaucrats. So there is urgent need to develop and adopt innovative and creative strategies to better communicate biodiversity with people from all spheres of life particularly involving the young generation. Various biodiversity conservation initiatives would not be successful until and unless their need, value, significance are understood by every single man sharing the earth space. In this regard, North East Centre for Environmental Education and Research (NECEER), Imphal, Manipur has taken initiative to start magazine "BioDiverse" which will provide a strong platform to (students particularly) undergraduate, postgraduate as well as research scholars to communicate by sharing their thoughts in the form of articles, news, poems, cartoons, and other graphic illustrations. The objective of the magazine is to disseminate information on the various biodiversity and environmental issues of South and Southeast Asia.

- Mohd. Sajid Idrisi
Editor-in-Chief


Equisetum sp.
Photo: Khuraijam Jibankumar Singh

Plant Indicators – a biological tool

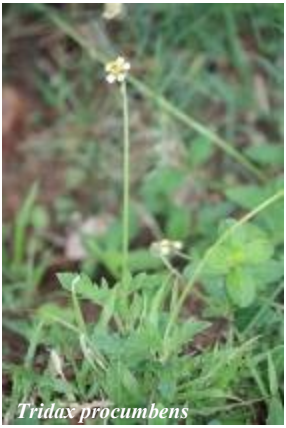
Even before man came to know agriculture, man was well aware of certain plants that served as indicators for the persisting environment. Explorer and dwellers of the dry lands of the world learned quickly to locate water by looking for indicator plants. For instance, in Central Asia, a plant called Syrian rue has been used for thousands of years to find water sometimes as deep as hundred feet below surface.

As human civilization proceed towards "industrialisation", the importance of plant indicators began to surface as the indicator plants have been extensively used as a tool for mineral exploration. In 1810, a geologist on the Mary-Pennsylvania border (United States) noticed areas where the holly leaves were yellow with green veins. He guessed that these holly plants were feeding on high concentration of one or more mineral underground. The geologist was right; the mineral was chromite - chromium containing ore that later was mined commercially later.

Scientists have learned to read the plants in order to discover ores of a number of minerals. For example, large amounts of nickel or cobalt will cause white patches on leaves. Manganese rich soil will produce plants that are larger than usual, and where uranium is present the plants may be either very small or very large.

In early days of exploration for the development of atomic energy, plants were used as primary indicators of uranium in the western United States. Likewise Spruce needles (*Picea abies*) have also been used as an indicator for sulphur and heavy metals. However, the most important episode in the exploration of minerals with the help of plant indicators came when some researchers reported the presence of gold in some species of *Equisetum* in the early 20th century.

Since the later half of the last century, scientists have been employing certain plant indicators that can detect different types of pollution. *Tridax procumbens* that grows in wastelands is a good example of pollution indicator. Plants like *Chara* and *Utricularia* are best indicators for polluted water. Pine needles (*Pinus sylvestris*) have been proved to be suitable air quality indicators for pollutants especially for sulphur and heavy metals



Tridax procumbens

Photo: Khuraijam Jibankumar Singh

Plant communities, characteristic of a particular region provide information on climate of the region. For instance, evergreen forests indicate high rainfall in winter as well as in summer; grasslands indicate heavy rains during summer and low during winter and xerophytic vegetation indicate a very low or no rainfall.

Multi-utilities of plant indicators have help mankind in shaping a safe and secure environment, however the future prospects of these indicators depend on how man take care of such rare and very useful creatures ■

NECEER

Endangered Turtle of Northeast India

The Assam Roofed Turtle

- Chittaranjan Baruah and D.K. Sharma

The Assam roofed turtle is the smallest of all 28 Indian turtle species. It is listed as one of the most endangered freshwater turtles of Asia. The species was first reported from the Khasi hills of Meghalaya, and regarded as an endemic species of Northeast India and Bangladesh**.** It is most effortlessly seen in the Nameri and Kaziranga National Parks of Assam.

An Assam Roofed turtle in natural habitat

Local name: Phulen Dura

Scientific Name: *Pangshura sylhetensis* (Jerdon, 1870)

Distribution: Assam, Meghalaya, Arunachal Pradesh, Manipur and Nagaland in northeast India, also reported from northern West Bengal, Bhutan and Bangladesh.

Conservation status: Endangered
Indian Wildlife (Protection) Act, 1972: Schedule I (Highest protection category).

Description

The Assam Roofed turtle is a small turtle differing from other turtle species by typically having 13 pairs of marginal scutes, attaining a carapace length of 20cm. Shell is olive brown with a pale brown third vertebra. Carapace is serrated posteriorly, highly elevated in males and juveniles and smoothly domed shaped in females. Neck is with large yellow stripes. Males possess relatively longer tails with thick bases, and smaller than females. Nests are usually observed during October to December with 6-8 numbers of eggs per nest.

Habit and Habitat

The Assam Roofed turtle prefers to inhibit in slow flowing rivers and oxbow lakes of floodplains near foothills. It is found in reed beds of grasses on mud; with aquatic macrophytic plants. Itis found to be omnivorous and mostly nocturnal by habit. It prefers phytoplankton, zooplankton, grasses and minnows. It occasionally takes earthworms, snails, aquatic insects, prawn, and a small fish in its diet. It has very shy behavior and jumps into water in any small noise.

Threats

Habitat destruction and over exploitation are the most important factors for the decline. The population suffered a 90% decrease in the last

decade and the International Union for Conservation of Nature (IUCN) justifiably declared this species as endangered (IUCN, 2007). The following are the major threats to the habitat and population of Assam Roofed turtle.

Habitat destruction: The forests and wetlands are shrinking with the decline of turtle density. Deforestation and the resultant loss of soil, leading to increased siltation of lakes and wetlands. The deep pools that favored habitats of the species are rapidly becoming shallow and choked with silt, leading to the decline in habitat.

Subsistence consumption: The killing of adult female turtles and incidental catch of breeding adults has created pressure on the Assam Roofed turtle populations. Illegal collection of huge number of eggs from the nesting sites in the riverine Chars of Brahmaputra and over exploitation are the most important factors for the decline.

Potential pet trade: The population is declining due to heavy pet trade. The species is vulnerable and needs urgent protection and conservation attention.

Use in ethno medicine: Both the flesh and eggs are traditionally believed to have remedy for gout and arthritis, while the carapace of the Assam Roofed turtle along with other turtle species is also used as medicine.

Superstitious beliefs: Hanging a carapace in the cattle-shed is believed to be a good luck and to keep snakes away from the premises; and its hanging is believed to keep away burglars.

CONSERVATION

Under the aegis Turtle Survival Alliance (TSA) Range Country Programme-India, the Assam Roofed Turtle conservation programme in northeast India has been initiated by the “Turtle Conservation and

Research Program"; a volunteer student network under BiOILLUMINA (a newly established registered Scientific Society), based in Guwahati.

The ongoing activities include Conservation education, Local awareness programmes and Community participation in the wetland and rivers including *in-sit*u egg protection. Efforts have been made to sensitize and educate people about the significance of species and its conservation and to start a participatory conservation programme. The conservation program will require volunteers to help turtles in the coming years.

Community participation program: Awareness raising and capacity building programs are initiated among the riparian community in and around the *in-situ* egg-protection sites. The acceptable suggestions of the local people are being taken into consideration for egg protection and conservation network development.

Mixed turtle eggs including the eggs of Assam Roofed turtle, rescued from poachers by the help of local community

Photo: Chittaranjan Baruah

Long-term conservation action required

- Conduct population surveys and ecological research in potential rivers in Northeast India.
- Establish captive breeding centres and release the hatchlings in the wild.
- Habitat management and protection of nests, and prevention of trade
- Participatory conservation programs

Participatory egg protection program initiated in Assam

CONCLUSIONS

The most important component at this hour is to sensitize, educate the people about the significance of chelonian presence and their conservation.Immediate adoption of conservation measures is essential for the conservation of endangered turtle species. As a part of the conservation of turtle diversity, the authors emphasize on the participatory conservation initiatives with further research on alternative means of livelihoods of rural communities ■

The details of on-going Assam Roofed turtle conservation activities are available at:
www.ruffordsmallgrants.org/rsg/projects/chittaranjan_baruah
www.conservationleadershipprogramme.org/ViewProject.asp?ProjectID=0217910

Note: If you are interested to extend your help to save the Assam Roofed Turtle, contact : Coordinator, Turtle conservation & Research Program at conservationbiology@ymail.com

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Oil Spills: Threatening marine biodiversity

- Akanksha Gulia

From the oldest oil spill – asphalt volcanoes on a sea floor basin off Santa Barbara, California to the first major commercial oil spill on March 18, 1967, when the tanker Torrey Canyon ran aground on the Seven Stones Shoal off the coast of Cornwall, England spilling 830,000 barrels (119,000 tons) of Kuwaiti oil into the sea; from The Exxon Valdez oil spill in Prince William Sound, Alaska, on March 24, 1989, considered to be one of the most devastating human caused environ-mental disasters ever to occur in history to Galapagos Island Oil Spill in 2001, (the Galápagos contains plants and animals so unique they cannot be found anywhere else on Earth); and from the famous 2010 Deepwater Horizon oil spill (Gulf of Mexico) to the very recent Oil Spill in Dalian, China – oil spills leave us with contaminated water, destroyed shoreline habitat, perished sealife, oiled beaches and demolished fishing industry ...

An oil spill as defined by Encyclopedia of Earth "is the accidental petroleum release into the environment."

How Oil Spills Happen??

Oil remains the lifeline of country but over the years there is a growing gap between discoveries and production and soon there will be a gap between production and demand. Also the oil is always expensive and difficult to produce, refine and transport. And that's how oil spill happens. Oil spills happen when people make mistakes or are careless and cause an oil tanker to leak oil into the ocean. Equipment breaking is another reason causing an oil spill. If the equipment breaks down, the tanker may get stuck on shallow land. When they start to drive the tanker again, they can put a hole in the tanker causing it to leak oil.

When countries are at war, one country may decide to dump gallons of oil into the other country's oceans. Terrorists and illegal dumpers might be another forces behind an oil spill. Illegal dumpers are people that will

dump crude oil into the oceans because they do not want to spend money on decomposing their waste oil. Natural disasters (like hurricanes) may cause an oil spill, too. If a hurricane was a couple of miles away, the winds from the hurricane could cause the oil tanker to flip over, pouring oil out. Natural Seepages - Crude oil is made by the earth from decayed plants and animals which lived millions of years ago. Oil has been in the environment for a long time. Some oil lies below the ocean floor and can seep into the ocean through cracks. As much as 1.5 million barrels of oil may enter the ocean from natural seeps each year. When these leaks occur, as when spills occur, natural organisms and chemical processes act to break down the oil over time. This process is called natural bio remediation.

What Happens When Oil Spills takes place??

Effect on Biodiversity

Birds and specially sea birds die from oil spills if their feathers are covered in oil. The bird will then be poisoned because it will try to clean itself. Animals may die because they get hypothermia, causing their body temperature to be really low. They may die from really low body temperature. Oil may also cause the death of an animal by entering the animal's lungs or liver. The animal will then be poisoned by the oil. Oil also can kill an animal by blinding it. Oil spills sometimes are the reason for animals becoming endangered. This means that a certain type of animal is getting so small that it is in danger of becoming extinct. Sea Otters are among other marina fauna affected by oil in many ways. The otters' bodies may get covered in oil, which causes build up in the otters' air bubbles. These air bubbles are located in their fur and help them survive the cold oceans. They act like a covering for their body and help the otters to float. When oil builds up in the air bubbles, the otters may die of low body temperature. Many sea otters are being placed in captivity after an oil spill until the otters are cleaned and ready to live in the ocean again.

Oil spills are one of the many ways killer whales have become endangered. The oil may be eaten or enter the whale's blowhole. A blowhole is a hole to help them breath. Whales will rise up over the water to take a breath. If the blowhole is plugged with oil, the whale can not breathe. The main reason for whales dying because of a spill happens when they eat a fish that swam through the oil. If a fish swam through the oil, the whale will eat the oil along with the fish. Because the whale has eaten the oil, it will be poisoned, and it will die. Small Organisms are the neglected animals affected by oil spill. Plankton, larval fish, even seaweed, clams, oysters, mussels and and bottom dwelling organisms are strongly affected by oil spills.

Effect on Food Chain

Each tier of the marine food chain can be affected by an oil spill. Oil floating on the water may contaminate plankton (very small, swimming or floating plants and animals). When small fish eat these plankton, they also eat the oil. Bigger fish, bears and humans who eat these fish will ingest oil too. Marine animals and birds can eat oil or it can get on their fur and feathers. When oil gets on a bird's feathers, the feathers lose their insulation capability and the bird can't adjust its body temperature and dies. Oil may obstruct the germination and growth of marine plants.

Effect on people

Oil coats the ocean surface, seabirds, fish, and marine mammals. It washes onshore and destroys shoreline habitat. Vast numbers of plants and animals die, and entire fishing industries have been destroyed. Coastal communities suffer economic damage. Oil damage cleanup costs run into the millions of dollars. This is an irreversible loss to people.

BP Oil Spill 2010, endangering a toothy marine predator - A SPECIAL CASE

Gulf of Mexico Oil Spill 2010 threatens the cultural and historic icon, a largetooth sawfish, a popular curio item known for its sawlike snout, was proposed to **join as one of the only two marine fish in United States waters to receive such federal protection.**

"The oil spill will not only have very dire effects on such highly visible creatures as seabirds and dolphins, but also threatens a multitude of bottom-dwelling organisms including the smalltooth sawfish, which already is in considerable trouble as its range diminished and its numbers dwindled," said George Burgess, a UF ichthyologist and sawfish expert.

How to clear up the Oil Spills??

The methods used to clean the beaches or oceans depends on many aspects - the weather, the type and amount of oil spilled, if people live in that area, what types of animals live in that area, etc . In some situations, they may not react to a spill. It may not be helpful or it would just cause even more damage to that habitat. Boom can be placed around the tanker that is spilling oil. It collect the oil off the water. A boom may be placed somewhere before an oil spill. They can be placed around an entrance to the ocean, like a stream. They also can be placed around a habitat with many animals living there. These booms will absorb any oil that flows around it. Skimmers is another way of clearing spills. Skimmers are boats that can remove the oil off the water. Sorbents are sponges that can collect the oil. An airplane can fly over the water dropping chemicals into the ocean. The chemicals can break down the oil into the ocean.

When oil reaches the shoreline, it can be cleaned in several ways:

- Manual pickup - hand tools are used to collect and bag oily materials. This method improves the appearance of the beaches.

Tarmat breakup / removal - tarmats, which are thick asphalt-like coverings of oil, are slow to degrade, can be broken with hand tools and then scattered or collected.

- Tilling/raking - Oil that is under the surface is exposed by using a rake to turn over the topsoil. Raking or tilling helps in natural degradation or bioremediation (discussed below).
- Spot washing - hand-held high pressure washing tools are used to remove small accumulations of oil. The runoff water is then collected.

Bioremediation is another technique that has worked to remove underlying oil. It involves covering the oiled area with "fertilizers" that contain microorganisms, like bacteria. These microorganisms speed the natural degradation processes already at work. It is thought that the more microorganisms at work, the faster the oil will be removed. Bioremediation is less disruptive to the environment than other techniques. It simply improves on nature's own way of destroying oil.

Saving oil spills and saving marine life

"Less oil requirement… less transportation… less oil spills…. Healthier and richer sealife"

Well this is what you can do to prevent oil spills and help in saving the marine biodiversity. The following three tier policy, called the 3A policy, looks to bring forward changes in the right direction. The policy is broadly categorized into three phases which need to run simultaneously.

ACT

1. All people must consciously try limiting their use of oil and gas. Better scientific and energy efficient practices can go a long way in curbing their misuse.

2. Alternatives like hydro, solar and wind power and bio-fuels must be used more frequently. They are both and renewable and non-exhaustive sources of energy. This would bring down the demand for the natural gas and oil.

ABIDE

1. The Government has set many standards in the consumption of oil and gas. Better vehicles with good engine condition are certified. A good citizen should abide by these policies to minimize the misuse of oil and gas.
2. All government policies and initiatives need to meet the complete support and encouragement of the people.
3. International bodies must monitor the consumption of oil and gas by various nations and must set international standards for all nations to practice.

ADVOCATE

1. It is of vital importance that the message of conservation of oil and gas must be spread to as many people as possible. It should be passed on as a social responsibility. Through various schemes and campaigns school children and the youth must be involved in the procedure. Awareness Campaigns should be conducted at regular intervals.
2. Research in new alternatives and better techniques to conserve oil and gas should be adequately funded and encouraged by the government as well as non government organizations.
3. Preaching without practice will never help and so we need to see that the policies have to be realized by the people and not remain as academic exercises only.

Bradley Millar has said,"*To tell a child not to stamp on the caterpillar is as important for the child, as it is for the caterpillar.*" This saying

summarizes the context of the discussion quite emphatically. In an ever dependent world on natural reserves to an extent that modern life would be alarmingly incomplete without them, it is saddening to observe the general callousness in their use and more precisely their '*misuse*'!

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A Thought

- Kalpana Das

Forests were worshipped in many ancient civilizations. They are considered as divine as God. Forests harbors delicate web of life with balance and hormony.Life in a forest embodies plentitude. None of its inhabitant takes more than it needs; there is plenty for all.

Despite being home to diverse species, forests are prestine.Seldom does one find a mess in a forest. God has provided natural clean up agents. What is waste for one creature is useful or essential to another creature. A forest contributes to the well being of entire planet, breathing out life-giving oxygen into the atmosphere while serving as habitat to a variety of life forms. It is a rich source of curative herbs and micro-organism and yet to know all there is to know about them.

Ancient texts extol forests as life enhancers; they were believed to be infused with divine spirit and hence considered sacred. Sacred groves

were respected as significant ecosystems that engendered rich biodiversity.Vedic wisdom expounded on the need for conservation of natural gifts. Perhaps rituals related to conservation were instituted to ensure that these treasures were not desecrated. We need to understand the significance of such conservation rituals and respect them in context. Green living was a way of acknowledging the divine nature of forests. Ancients considered it important to respect the interconnected nature of life. In tribal cultures, before axing a tree, people would ask permission of the tree, promising a plant five trees as compensation. Trees symbolize spirit of service, as they serve dead or alive. They sustain ecological balance when standing tall and protect and serve as wood after death.

We need to give something back in the same altruistic spirit. We must look at the lifestyle choices we make every day. These choices must be made on the basis of environmental conservation.
Let's green our minds and remember M K Gandhi's words: "Earth provides enough to satisfy every man's need, but not every man's greed."

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Explore North East India Series: Manipur

Protected Area

Keibul Lamjao National Park

Keibul Lamjao National Park, the world's only floating National Park is located at Bishnupur district of the state of Manipur in Northeast India. It is 40 km^2 (15.4 sq mi) in area and integral part of Loktak Lake (Ramsar site). The park which was initially declared as a Sanctuary in 1966 and then National Park in 1977 is characterized by 'Phumdis' (local name for the floating landmass consisting of a thick mat of soil, humus and dead vegetation in different stages of decay, upon which reeds and grasses grow up to a height of five meters). It is home to endemic and endangered Brow Antlered Deer (*Cervus eldi eldi*) or Sangai which is also known as 'Dancing deer of Manipur'.

Flora and fauna

The park, primarily composed of moist semi-evergreen forests, has a rich amalgam of aquatic, wetland and terrestrial ecosystem. The grass land structure of the park is divided into three zones.

Aquatic flora

Aquatic flora recorded in the park consisted of *Zizania latifolia* (Wild Rice) (*Ishing kambong*), *Saccharum munja (Khoimom), S. bengalensis, Eiranthus procerus (Singnang)*, *Discorea bulbifera (Phumha), Cynodon dactylon (Tinthou)*, *Alpinia galangal (pullei)* and *Eichhornia crossipes (Kabokang). Hedychium coronarium (Loklei)*, *Nelumbo nucifera (Thambal), Phragmites karka (Tou)* & 100 other species have also been reported.

Some of the above listed flora had been recorded in two types of phumdis namely, the *phumdi ataoba* (floating) and the *phumdi aruppa* (sinking); reeds, grasses, and other plants growing on a mat of dead and decaying vegetation floating on the lake surface form the ataoba, while Phumdi aruppa has mats of vegetation which have sunk to the bottom of

the lake and support a rich emergent growth of reeds and grasses. In a 1960 estimate, the phumdi vegetation had been structured into 45% *Phragmites karka*, 25% *Erianthus ravennae (elephant grass),* 15% *Saccharum munja*, 5% *S. latifolium*, 5% *Alpinia allughas* and 2% *Saccharum procerum* and 3% other species, including *Zizania latifolia*; *Zizania latifolia* is the plant much relished by the Sangai deer. *Eichhornia crassipes* was recent specie in the open water areas of the swamp in the midst of *Polygonum* (Buckwheat) and *Trapa* (Water caltrop or Boiled water chestnut). The three hills surrounding the Park are now denuded of most of the vegetation.

Fauna

Apart from the Brow-antlered deer – the *Cervus eldi eldi* (Sangai) other mammals reported from this park are the Hog deer (*C. porcinus*), Wild boar (*Sus scrota*)., Large Indian Civets (*Viverra civetta*, *Viverricula indica*), common otter (*Lutra lutra*), fox, jungle cat, golden cat, Bay bamboo rat, musk shrew, common shrew, flying fox and Sambar (*Cervus unicolor*). Amongst other vertebrates found in the National Park are fishes including *Channa striatus*, *Channa punctatus*, *Cyprinus carpio*, *Wallago attu* and *Puntius sophore* (Pool barb), amphibians and reptiles including Keel back Tortoise, Viper, Krait, Cobra, Water cobra, krait (banded) *Bungarus fasciatus*, Asian rat snake (Beauty rat snake), *python*, Russel's viper (*Daboia*), checkered garter snake and Common Lizard (*Viviparous Lizard*). *Python molurus*, an endangered species is found in the park.

Avifauna

The park being an integral part of Loktak Lake (A Ramsar Wetland) attracts a large no. of migratory as well resident bird species. Some of them are, Black kite, lesser sky-lark, Northern Hill Myna, Crimson-breasted pied wood pecker, Burmese Pied Myna, Indian white breasted water hen, East Himalayan pied Kingfisher, North Indian black Drongos, Lesser eastern jungle crow, Yellow headed wagtail, Spotbill

duck, Blue-winged teal, Ruddy Shell duck, Threatened Hooded crane, and Burmese Sarus Crane.

Threats

Some of the identified threats to the park are elaborated below:

1. The threats to the park are due to the permanent flooding of the park and its resultant effect on the thickness of phumdis. The reason attributed for this is due to construction of the Ithai Barrage under the Loktak Multi Purpose Project in 1983 where high level of water is maintained (between 768 m (2,519.7 ft) and 768.5 m (2,521.3 ft)) during October to March - the dry months of the year. This has disturbed the natural cycle of floating and sinking of phumdis which used to be maintained in the Park. Maintenance of high water level in the lake throughout the year for Loktak Multipurpose Project has broken this annual cycle and phumdis remain floating throughout the year during dry season and are no more available to phumdi vegetation. Therefore, the growth of vegetation on phumdis and their thickness are believed to be gradually decreasing.
2. Before the construction of the Loktak Hydro Electric Project, the phumdis floated during flooding by backflow from the Khordak River and discharge from other streams and nalas and settled down on lake bed during dry season when water was drawn out through the same river. This resulted in enhancing of nutrients and minerals of the phumdi vegetation from the bottom of the lake during the dry period. But this cycle has been disturbed by the Loktak Hydro Electric project. One apprehension is that at some stage the phumdis may not be able to support the weight of the Eld's Deer or Sangai deer.
3. The National Park and the Loktak Lake have provided sustenance (through fishing, growing and collection of vegetables of economic importance) to the people living in the peripheral villages and on the phumdis. The effect of maintaining permanently high water level is

stated to be a serious threat to the phumdis and consequently to the people living on the lake/park's natural resources.

4. Earlier, there was only marshy land in the park area but after commissioning of the hydroelectric project two ecosystems have emerged; one with water body covering one third area and the other the phumdis, which covers two thirds area.
5. Deteriorating water quality is indicated by the recorded pH values of 4 to 8.5. The reasons for poor quality are attributed to flow of a) pollutants from the towns draining into the lake, b) use of agrochemicals for farming in the surrounding farm land, c) accumulation of water on phumdi, d) deforestation and subsequent soil erosion in the catchment area and e) rotting vegetation.

Plant in focus

Siroy Lily

Lilium mackliniae
Conservation status: Endangered

Manipur is one of the states of North east India which is gifted with serene beauty together with magnificent diversity of flora and fauna and lofty mountains. One of such lofty mountains which surround the valley of the state is Shirui hill in Ukhrul district. The peak is part of Shirui – kashong range which is 2570 m in height and is blessed with a rare and endangered species of lily called "Siroy Lily" which is locally called Shirui kashung Timrawon or Shirui lily in Manipuri.

History

Siroy Lily (*Lilium mackliniae*) is known as Shirui Kashung Timrawon in Manipuri language. In 1946, Dr. Frank Ward, a botanist and his wife Jean Macklin came to the Manipur hills to collect botanical specimens on behalf of the New York Botanical Society and discovered the Siroy Lily. The lily gets its name from Macklin, the second wife of plant-hunter Frank Kingdon-Ward It bagged the prestigious merit prize in the 1948 Royal Horticultural Society Flower Show in London.

Description

Siroy Lily is Manipur's state flower which is native and endemic to Shirui hill in Ukhrul district. In wild, Siroy lily flowers in the months of June and July. These are seasonal flowering plants. The leaves are longish and narrow like most lilies. The flowers are pinkish white with bell shaped petals delicately flushed pink at the base and hang looking

down. The height of the plant is 1-3 ft. and has 1-7 flowers per plant. It grows best in partial shade with abundant humus.

Distribution

The lily grows and blooms in Ukhrul district at an elevation of 1730-2590m above the sea level. This Himalayan lily is found in Shriui-Kashong range in association with rhododendron species. The lily is native and endemic to Manipur.

Threats

The habitat of the lily is threatened with the intensive tourist activities which are especially organized during the blossoming period of the lily. The dumping of waste, plastic, plucking of flowers and uprooting has threatened the sustenance of the species. The species is also endangered by the invasion of *Machun* which is kind of miniature bamboo species growing profusely in Siroy's habitat.

Conservation

The Forest dept. as well as Non-Govt. Organisations are working hard to save and conserve the habitat of this treasure of the state. At the most, with some financial assistance from the Central Government the department has been taking up some local support measures through providing awareness programmes and employing five local volunteers to look after and protect Siroy Lily. The Mungleng Vathei Hill Development Society (MVHDS) has volunteers checking people's belongings all throughout the trekking route. Nobody is allowed to even carry a blade of grass or leaf out of area. Within the flower's habitat itself, there were volunteers imposing a straight fine on anyone who plucked a lily. One ignorant student, to his disbelief, had to cough up Rs.500. The only unfortunate part here is that those lilies already pulled out from the earth cannot be returned to their original places. So, while

the fine is harsh, it is mostly a deterrent to the next misdemeanour. It might have been helpful, also, for the volunteers to caution all visitors about the fines at the beginning of the trek, where the entry fee is collected.

Throughout the trek to Siroy landscape, pits dug alongside the path can be observed, with signs indicating that the garbage can be dumped into them. Typically, these contained empty plastic bottles, wrappers from packets of chips, etc. This is an interesting change from the usual bright jarring dustbins that would just not blend in with the place. All the rubbish is later collected by MVHDS volunteers and disposed off elsewhere. The society has also launched *Project Farm*, with some important objectives to conserve the Siroy habitat. One of them is an attempt to plant the Siroy Lily on the first hill along the trek route, to reduce pressure on the flower's main habitat. This would also enable many tourists to experience it much earlier in the trek, potentially turning back those who had come only to see it briefly. While appreciating the efforts of the MVHDS, one could not help comparing it to an earlier system. A decade ago, these volunteer activities were handled by Shirui Youth Club, rather than the Mungleng Vathei clan which now manages the effort. The youth club had representatives of different clans of the Shirui village and acted as a community initiative. It had laid down a code of conduct for the visitors, including the fines for uprooting of plants, grazing, and so on. And the environment here was recognized as a community conserved area as well.

Conclusion

The need is to promote eco-excursions/eco-tourism which should aim at sensitizing people towards environment and biodiversity. The habitat of the lily that is Shirui hills should be declared as world heritage site and the visitors must be given some pamphlets about the hill to reconcile humans with nature. The present status of the Shirui hill i.e. proposed

National park should be implemented as soon as possible in order to safeguard the natural habitat and to promote in situ conservation of this endemic species. The above goal should be achieved through the local people involvement by linking the needs of people with biodiversity imperatives. The NGOs and government should support such activities to promote the community reserves.

Endangered Species

MANIPUR

Sangai – The Dancing Deer of Manipur

Brow antlered deer
Cervus eldi eldi (Percy Eld, 1844)

Conservation status: Critically endangered

Description

The deer is locally called sangai which means "one who looks at you" in Manipuri. Brow antlered deer has the peculiar shape of the antlers which are bend forward and down before continuing outward to the side.

The hooves of deer are specially adapted to walk on *Phumdis* which is characteristic feature of their habitat because of which they are also referred as "Dancing deer". The deer has special significance in Manipuri culture as its thought to be representation of cordial relationship between humans and nature, therefore is considered to be sacred.

Distribution

The Eld's deers were historically distributed across South East Asia and Indo china but today they are found in disjoint populations in India, Myanmar and Thailand. The Sangai deer is one of the three sub-species of Edl's deer which is found in Manipur, North east India with other forms distributed in Myanmar and Thailand. In India a remnant and the only population of the deer survives in Keibul Lamjao national park, southern part of Loktak Lake which is the sole habitat of the deer.

Habit and Habitat

Deer prefers open woodland/grasslands in close proximity of water courses especially the marshy areas. In India the *Phumdis* in Loktak

Lake is the potential habitat of the deer. The Keibul Lamjao national park conserves the small population of the deer in Manipur, North east India.

They are herbivorous and the diet mainly comprises of aquatic vegetation (usually plants that constitute *Phumdis*), herbs, shoots and grasses. The deer is believed to live in different sex herds which merge during the mating period.

Threats

The deer is the most endangered cervids of the world and Sangai was considered to have gone extinct in 1951 when a small population of deer was re-discovered by the auspices of IUCN in 1953. Sangai is threatened by poaching (as it is hunted for its hides and antlers), floods, epidemics, habitat infringement and habitat loss (due to the thinning of *Phumdis* due to Loktak Hydel project, transformation of grasslands to agricultural lands), environmental perturbation, due to small size of the population the animal is mired with threats like inbreeding depression and loss of genetic diversity. Due to the intensive poaching the specie is threatened with risk of extinction and hence was enlisted as vulnerable in IUCN red data list 2007.

Conservation

The Keibul Lamjao national park is the exclusive habitat of Sangai deer so it was declared as Wildlife Sanctuary by the Government of India in the year 1954 with purpose to promote in-situ conservation of the specie. The park presently accommodates only 100 individuals of the Sangai deer. A Sangai protection forum was developed by youths of adjoining villages of Loktak Lake for the effective management of habitats of Sangai and to halt the abject illegal poaching. The ex-situ conservation of Sangai was promoted by development of Sangai Breeding centre at Iroishemba Zoological Garden, Imphal where the specie is bred in captivity to increase their population.

Awareness programmes

The recent "Worldwide Save Loktak Campaign" organized by NECEER, Imphal raised the issues like intrinsic value of the lake, its ecological services, Sangai deer, potential threats to sustenance of the lake for sensitizing people around the world. The monumental work of the organization in spreading awareness among people is worth appreciation and more such actions must be taken which should encourage community participation.

Conclusion

Hence NGOs must collaborate with the government to promote community participation which will boost the community conserved areas (CCA's). The main challenges in wildlife conservation since ages had been poverty, commercial forces from outside, development processes, people are devoid of rights over the natural resources and lack of awareness. Hence the foremost need is to promote a cordial relationship between people and biodiversity through meeting needs of people and linking it with biodiversity.

Young Achiever Award Winner

Girija Thingnam

Ms. Girija Thingnam is a flower enthusiast, and hails from the state of Manipur. She is a special educator by profession and has a Masters degree in psychology, and a Diploma in Special Education (Autism). Her association with Dr. Tabish, Associate Professor, Dept. Of Physics of Jamia Millia Islamia, Delhi led to the creation of *www.flowersofindia.net*, which has large collection of photos and details of Indian flowers. The beautiful flowers blooming in the university lawns during the spring season made them interested to get information about these flowers. The lack of available online information prompted them to develop a database on the flowers of the country. This is how a database on flowers of our country came into being. Hats off to their extraordinary work, the website (www.flowersofindia.net) is now providing information on 3000 flowers, with different user-friendly hyperlinks.

Even the users can search for flowers on the basis of colours. Dr. Tabish snd Girija have visited many biodiversity rich areas of the country in search of wild flowers, including Valley of Flowers in Uttarakhand, Tawang in Arunachal Pradesh, Siroy Hills in Manipur.

Dr. Tabish and Girija at Valley of Flowers

News Section

Great Environmental Disaster of 2010 – Mumbai Oil Spill

On August 2010, the collision between two Panamanian cargo ships - MSC *Chitra* and *MV Khalijia-III* created havoc off the coast of India near Mumbai. The one that tilted after collision was *MSC Chitra*, spilling an estimated 400 tonnes of oil, according to the official estimates. The ship was loaded with an estimated 2,600 tonnes of oil, 300 tonnes of diesel and 70 tonnes of lubricating oil at the time of the accident. This accident proved as worst environmental disaster threatening marine life. The ship was also carrying the containers of pesticides, which would further increase the risk to marine organisms as well as human beings. This has also deprived thousands of local fishermen of their daily wages, as the fishing activities were banned due to oil spills. As a whole subsequent ban on fish by the Maharashtra government and civic body have adversely impacted fish supply and trade in Mumbai resulting huge losses ■

Yamuna River taking its revenge in Delhi

This monsoon the Indian capital city Delhi has been receiving abnormally high rain posing flood threats and multiple troubles to citizens. On the verge of Common Wealth Games, Yamuna River has warned all the officials and bureaucrats of its entire course that was illegally encroached upon. The Yamuna flowing through Delhi crossed its danger mark of 204.83 metres this season. Following this the state govt. ordered and facilitated the evacuation of several hundred people who were residing at the low lying areas of the river. These people were shifted to nearby relief camps set up by Delhi Govt. To prevent any loss to life and property, medical professional teams, divers, boats and Disaster Management Force were deployed. Besides heavy rain the capital received during this monsoon, the thousands cusecs of water released by Haryana Govt. held responsible for creating the flood

situation in Delhi. The rain also worsened the last minute preparations that were going in the capital. This year rains perhaps have proved the future threats that were warned off by the Environmental activists when the site for Common Wealth Games 2010 was being negotiated at the Yamuna flood plain area. Lesson to be learned before it is too late. Nature always takes revenge when we overload it with our indiscriminate anthropogenic activities ■

Events and Announcements

Thailand

Global Conference on Entomology
Chiang Mai, Thailand
Website: http://entomology2011.com/

Singapore

8th Flora Malesiana Symposium
Singapore Botanic Gardens, 1 Cluny Road, Singapore
Website: www.sbg.org.sg/fm8

Worldwide Save Loktak Lake Campaign

On 7th March, 2010, the North East Center for Environmental Education & Research (NECEER), Imphal in partnership with more than 20 organisations across the globe, launched a worldwide campaign to Save Loktak in 25 Cities (23 Indian Cities; New York and Washington, U.S.A and London, U.K.) and 5 Towns across the globe. Save Loktak Lake: Lifeline of Manipur was the theme of the campaign.

First Phase

In the first phase of the campaign (7th March 2010), the campaign was organised in 5 cities of the country – Imphal, Delhi, Guwahati, Silchar and Shillong.

The campaign is a three long awareness programme initiated by NECEER, Imphal for the conservation of Loktak Lake. More than 600 volunteers, 32 city Coordinators, Publicity Coordinator and 1 Worldwide Co-ordinator are involved in organizing this campaign. The campaign is to create awareness about the conservation of Loktak Lake, the largest fresh water lake in Northeast India. The lake was recognised as Ramsar site in 1990. Keibul Lamjao, the only floating national park in the world is situated at the south west part of the lake. It is home to the endangered Manipur brow antlered deer 'Sangai' - *Cervus eldi eldi* and many endangered species.

Photo: Loktak Lake

The lake has been a main source of income and sustenance for inhabitants of the area. For the last few decades the lake has been facing all round destructions due to both natural and anthropogenic activities. Rapid expansion of '*Phumdis**', siltation, pollution, agriculture and adverse effect from Loktak Hydropower Project are some of the main problems which had led to an alarming destruction of the lake. Involvement of youth and mobilization of public for the conservation of Loktak Lake is the main objective of the campaign. The campaign is supported by more than 20 international and national organisations. The campaign will conclude next year with a grand campaign at the vicinity of the Lake by involving the local inhabitants, local NGOs and Government officials.

Imphal Campaign

Campaign at Imphal was organized by NECEER, Imphal in association with Legend Studio, Manipur at Central Hall

of D.M. College of Science from 10 am to 5 pm. The event was graced by Thounaojam Ibobi Singh, Project Director, Loktak Development Authority (LDA) as Chief Guest Dr. RK Ranjan Singh, Manipur State Coordinator, IBCN (Bombay Natural History Society); Dr. Naorem Iboton Singh, Dean, College of Agriculture, CAU, Imphal; Koijam Brojen Singh, Joint Secretary/Publicity & Library Secretary, All Manipur Bar Association and Dr. Kh. Shamungou Singh, Former Lecturer, DMC of Science, Imphal as Guest of Honours.

Environmentalist Dr. R.K. Ranjan expressed concern over the deteriorating condition of the lake and need for urgent action for the conservation of Loktak Lake. He also highlights the problems that the lake is now facing vix. rapid expansion of weeds (phumdis), siltation, pollution and effluents from Loktak Hydro electric power project. Renowned Wildlife biologist Dr. Kh. Shamungou spoke on the rich biodiversity of Loktak Lake and its importance in the ecological balance of the region. Highlighting the cultural and economic importance of the lake, Dr. Iboton call upon the people of Manipur to save Loktak - the ancient cultural centre of Manipur. Conservation Activist, Khuraijam Jibankumar Singh, Managing Trustee of NECEER, Imphal and Worldwide Co-ordinator of the campaign spoke on the role of youth and local people in the conservation of fragile ecosystems of Manipur. He emphasized his lecture on the motivation of youth and their involvement in the protection and conservation of rich biodiversity of the state.

Photo: Chief Guest (Imphal Campaign), Thounaojam Ibobi Singh, Director, Loktak Development Authority (LDA) speaking at the event.

Photo: Khuraijam Jibankumar Singh, Managing Trustee, NECEER, Imphal distributing prizes.

Prior to the seminar, a cycle rally was organised at 10 am from Kids Foundation, Ghari to DMC of Science followed by a painting competition for school students on topics- “Save Sangai”, “Save Loktak” and “Conserve nature for better future”. Imphal Campaign was coordinated by Mohen Naorem.

Photo: Manipuri Actress Bala taking part in the cycle rally at Imphal Campaign (UB Photos). Eastern Chronicle.

Delhi Campaign

Delhi Campaign was organized at Gandhi Smriti and Darshan Smiti, Delhi. The event was graced by Dr. Th. Meinya, Member of Parliament, Inner Manipur Parliamentary Constituency as Chief Guest and Dr. Irfan Qureshi, Jamia Milia Islamia, Delhi as Guest of Honour.

Photo: Dr. Thokchom Meinya, MP (Lok Sabha) speaking at the event.

Speakers delivered lectures on the need of conservation of this natural heritage.

Manipuri Cultural Dance, Street play and interaction programme were also organized at the venue. Co-ordinator of the Delhi Campaign was Ms. Mehnaz Nasreen.

Photo: Street play by Centre for Media Studies, GGS Indraprastha University, Delhi

Photo: Manipuri Cultural Dance at Delhi Campaign

During the interactive session, the youth had a series of questions and queries on the status of environment in Manipur, conservation strategies and government initiatives.

Guwahati & Silchar Campaign

Guwahati and Silchar Campaigns were organized in association with Environ, Assam at Guahati University, Guwahati and Women's College, Silchar respectively. Mr. Kripaljyoti Mazumdar

was Co-ordinator of Guwahati and Mr. Chinmoy Choudhury was that of Silchar. NECEER, Imphal and Environ, Assam in association with Abhiyatri and Panchatava also organised a campaign to save Deepor Beel, another Ramsar site of Northeast India. The event was chaired by former PCCF of Assam, M. C. Malakar.

Photo: Vice Chancellor, Gauhati University inaugurating the 'Save Loktak and Deepor beel Campaign', Guwahati.

In order to mobilize the youth, a Quiz competition was organised during the pre-event programme of the campaign at P. Dutta Seminar Hall, Gauhati University and Art competition in Parijat Academy, Deepor Beel.

Photo: Students during the Quiz competition at Guwahati.

Shillong Campaign

Shillong Campaign was organized at Police Bazaar. 32 volunteers took part in the campaign and created awareness to the public by distributing pamphlets and interactions. Rajkumari Jashmi was the city Coordinator.

Photo: Volunteers at Shillong campaign

Prior to the launch of the campaign, several pre-event programme were organised. An awareness programme was also organised at India Gate on 29th November 2009 with the help of students of GGS Indraprastha University, Delhi. In the month of February 2010, lecture and interaction programme were organised at DMC of Science, Imphal College and Modern College to create awareness and to involve the youth in the campaign. Khuraijam Jibankumar Singh, World-wide Co-ordinator and Rajkumari Jashmi, Shillong Co-ordinator during their interaction with college students call for the active involvement of the youth and academicians in the conservation of this natural heritage.

Second Phase

Second phase of the campaign started at Kolhapur, Maharashtra on 11th April, 2010. The campaign was organised at four places in Kolhapur: 1. Bhavani

mandap, 2. Mahalaxmi temple, 3. Rankala lake and 4. Bindu Chowk. Mr. Lulel Sagolsem was Campaign Co-ordinator.

Photo: Volunteers at Kolhapur campaign

As part of the second phase, NECEER, Imphal in association with Bombay Natural History Society (BNHS) and E-Con, Mumbai organised the campaign at BNHS, HornBill House Kalaghoda, Mumbai, Maharashtra on 22nd May, 2010. Among the list of speakers were Sachin Singh, Area Manager - DD Greenpeace India, Ganesh Nochur, visiting faculty of TISS, former campaign director of Greenpeace India with 20 years of experience in Environment related fields, Anand Pendharkar (Founder SPROUTS Environment Trust) - Wildlife Biologist & Educator and James Mc Mayengbam founder E-con and coordinator of the Mumbai Campaign. The Seminar was attended by approximately forty individuals from different backgrounds. On the very day, a campaign in association with Indreni Pariwar was also organised at South Sikkim and Darjeeling. Mr. Puran Giri was the Campaign Co-ordinator.

Photo: Speakers at Mumbai Campaign

Third Phase

Third phase of the campaign will start at Bangalore. Speakers from different works of life will speak on the need of conserving Loktak Lake and rich biodiversity of the country. A film on Loktak Lake by renowned film maker Rajkumar Robindro will be screened during the campaign. Several programme will also be organised during the campaign. Mr. Harjeet and Ms. Leika Yumnam are the Bangalore campaign co-ordinators. As part of the third phase, the campaign will also be organised at Washington, USA and Chennai.

* *Phumdis* are floating islands of heterogeneous masses of vegetation, soil and organic matter in different stages of decay. They cover a substantial part of the lake area and are found in different shapes and sizes. Keibul Lamjao National Park, the largest single mass of phumdi is the world's only floating national park covers an area of 40 km^2; the park is the natural habitat of endangered Sangai, found only in this national park.

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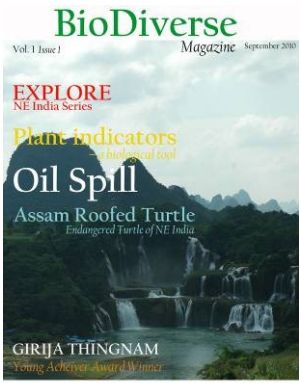
The NE India Biodiversity Network is dedicated to provide an impartial network for the exchange of knowledge, ideas, methodologies and information on Biodiversity and Environment of North East India among researchers, academicians, students, individuals, nongovernment and government organisations. In fact, it attempts to set a platform for debate and discussion among individuals and groups on Biodiversity of the region cutting across disciplinary and ideological predilections. Besides publication of the BioDiverse Magazine, the NE India Biodiversity Network will also organise bi-yearly lecture series.



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