

F236  
739

# **Biodiversity**

## **NORTH EAST INDIA PERSPECTIVES**

Proceedings of the Workshop on Peoples' Participation in  
Biodiversity Conservation

4 – 6 March 1999

Organized by

North Eastern Biodiversity Research Cell,  
North Eastern Hill University, Shillong 793 003

&

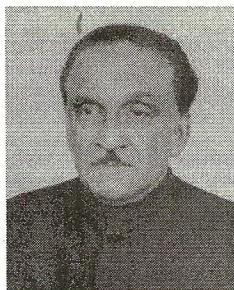
Synjuk Seng Samla Shnong, Shillong

Edited by

B. Kharbuli, D. Syiem and H. Kayang  
North Eastern Biodiversity Research Cell, North Eastern Hill  
University, Shillong 793 003, Meghalaya

Compilation, Design and Layout by

D. R. Michael Buam  
North Eastern Biodiversity Research Cell, North Eastern Hill  
University, Shillong 793 003, Meghalaya



Raj Bhavan  
SHILLONG  
793 001

March 07, 1999

## MESSAGE

It gives me great pleasure to learn that the North-Eastern Biodiversity Research Cell (NEHU) is publishing the proceedings of the recent workshop on "Peoples' Participation in Biodiversity Conservation" held in Shillong.

The north-eastern region is very rich in natural resources. It is globally recognized as a megabiodiversity area as it is one of the richest reservoirs of genetic diversity of plants, animals and microbes. The biodiversity of the region is under serious threat due to wanton felling of forest trees for shifting cultivation and to meet the demand for timber and fuel wood, urbanization, construction of roads, bridges and dams and other forms of exploitation of biological and mineral resources. This raises serious issues of sustainability of use, environmental degradation and stress on biological resources.

I think peoples' active participation can go a long way in conserving our rich biodiversity - for a better tomorrow. People must realise that life on earth will perish if they do not take pragmatic steps in order to save biodiversity.

I hope the efforts of the North-Eastern Biodiversity Research Cell (NEHU) and the Synjuk Seng Samla Shnong (SSSS) will be replicated by others to ensure peoples' involvement in the conservation movement.

A handwritten signature in dark ink, appearing to read "M.M. Jacob".

(M.M. Jacob)  
Governor of Meghalaya.



# ARUNACHAL UNIVERSITY

RONO HILLS, ITANAGAR-791 111

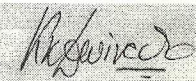
Arunachal Pradesh

Dr. K. K. DWIVEDI  
VICE-CHANCELLOR

## MESSAGE

I have noted with great satisfaction that the North-Eastern Biodiversity Research Cell at NEHU Shillong has very successfully organized a three day workshop on "Peoples participation in Biodiversity Conservation" in March this year. A large number of distinguished participants have gathered and exchanged their views on various aspects of biodiversity conservation and sustainable development in NE region. I have been informed that the deliberations in the workshop were extremely useful and the major contributions and findings are now being published in the form of a proceeding. I am very sure that such effort will bring out valuable reference material for scientists, environmentalists and planners.

I congratulate the scientists and organizers of NEBRC for bringing out the workshop's proceedings and hope that with their untiring efforts the objectives of the cell will be successfully achieved.

  
(K.K. DWIVEDI)

# CONTENTS

Acknowledgements	i
Preface	iii
Medicinal plants and herbal medicine: a case study in Meghalaya- D. Syiem, B. Kharbuli, B. Das, D. G. Nongkhlaw, I. Thamar, D. Marngar, G. Syngai, H.Kayang, B. Myrboh, Y. S. H. Yobin and D. R. M. Buam.	1
Indigenous knowledge of ethnobotanical importance in relation to biodiversity conservation in India with special reference to Mizoram- H.Lalramnghinglova.	9
A study on the migratory birds of Sibsagar district with special reference to habitat- H. K. Phukan and R. Stafford.	19
Present status of river dolphin ( <i>Platanista gangetica</i> ) - S.P.Biswas and Sanchita Boruah.	24
Biodiversity conservation vis-a-vis sustainability and development in Meghalaya - L. Cajee.	28
Apiculture - an activity which is nature dependent - S. Khongsit.	31
Prospects of development of ornamental fisheries in North Eastern India - S.P.Biswas, J. Phukon and Sanchita Boruah.	34
Conservation of threatened plants in North Eastern India - A. A. Mao and T.M.Hynniewta.	37
Comprehensive biodiversity profiles of North Eastern States: A WWF- India initiative - A. K. Goswami.	40
Indigenous conservation initiatives in Barak valley Assam - K. Guha, Abhik Gupta and B.K.Dutta.	42
Biodiversity Conservation perspectives, management and development plan for Meghalaya - R. R. B. R. Thabah.	47
Phytochemistry as a sustainable tool for conservation of biodiversity: A case study of Manipur - K.Brajeshwari Devi and L. Warjeet Singh.	59
Society, development and environment: A diagnosis and prognosis on North Eastern India - A. K. Nongkynrih.	62
Establishment of in-vitro raised seedlings of <i>Dendrobium aphyllum</i> in the community pots - Jauti Sharma.	68
✓ Sacred groves of Meghalaya- D. Syngai.	70
Biodiversity of insects with special reference to thrips (Thysanoptera) of Manipur - R. Varatharajan.	77
Biodiversity conservation in North East India - P.Gogoi and M. Ahmed.	81

Export of medicinal plants from India : Need for resource management - V.K.Dikshit.	85
Medicinal plants: Utilization and Conservation in Meghalaya - J. Kharduit.	89
Peoples' participation in Biodiversity conservation in the context of mediaeval Assam history - S. K. Phukan.	93
Peoples' participation in biodiversity conservation : Perspectives for NGOs in rural North East India - V. T. Darlong.	100
Importance of taxonomic and geographic data - base for conservation of biodiversity - P.J. Bora and J.Sarma.	108
Conservation of Biodiversity: Possible if the masses are made aware - Aparna Hariprasad.	111
Anti-tumor activity of crude extract of <i>Potentilla fulgens</i> – I. Thamar and Christine Syngai	114
Ethno-Biological studies of Arunachal Pradesh: The Yobins of Changlang District - Y.S.H Yobin.	116
Biodiversity conservation: What it means to the people, a case study of the Mawphlang dam - B.Das, D.Syiern, D.G. Nongkhlaw, B.Kharbuli, B.Myrboh, H.Kayang and D. R. M Buam.	121
Ethnobotanical studies among Naga tribes in Nagaland - N. S. Jamir.	128
Biodiversity: A preliminary study of West Khasi Hills, Meghalaya- D.Marngar	141
Peoples' participation perception in planned development programmes - P.R.Mawthoh and R. R. B. R. Thabah.	150
Prioritisation of Biodiversity-rich Sites in the state of Meghalaya – Debjani Roy and Sangeeta Choudhury.	159
Resolutions	164
List of local Participants to the Biodiversity Workshop	167
List of Outstation Participants	170
List of Participants through the Synjuk Seng Samla Shnong, Shillong	172
List of Contributing Authors	173
Authors' Index	176

# Acknowledgements

I consider it my privilege to thank all those who were instrumental in making this workshop a fruitful one and furthermore, on behalf of the NEBRC, I take this opportunity to briefly outline the genesis of this project and give due acknowledgement to those who were instrumental in the establishment of the Cell.

This project funded by the North East Council, Planning Commission, New Delhi was a direct outcome of the Govt. of India recognition of the much-needed thrust on Biodiversity, in line with the global environment conservation scenario. The establishment of the North Eastern Biodiversity Research Cell is a consequence of their intent to promote sustainable development by way of encouraging more Research and Development centres, keeping in view biodiversity conservation concerns. Given the constraints and lack of infrastructure in research and development, the North East needs to be viewed through perspective. Developmental priorities per se should be categorised/identified in consonance with the available resources. Needless to say that with its rich Biodiversity resources, serious attention must be given towards in-depth study of these resources so that they may be used in a sustainable manner to explore, expand, tap and regulate these bio-resources in a sustainable manner.

In this context, the then Secretary of the North Eastern Council, Mr. H. A. D. Sawian, IAS, the present Secretary, Mr. T. Ringu, IAS, Mr. J. M. Syiem, IAS, Planning Adviser, Mr. G. Sen, Financial Adviser and their executives, deserve special mention for facilitating and making this project functional. The NEBRC would also like to particularly acknowledge Mr. Promode Kant, IFS, Chief Conservator of Forests, MoEF and Adviser (E & F) to the NEC, Mr. W. Suting, IFS, Conservator of Forests, MoEF and Dr. V. T. Darlong, Joint Director, MoEF who continually enrich us with their vast experience which will go a long way towards achieving our goals.

We extend our appreciation and gratefulness to the North Eastern Hill University, in particular, the Vice-chancellor, Prof. B. Pakem, for providing us the much-needed support, advice and the various facilities. The Head, Department of Chemistry, Prof. M. K. Mohanty and his colleagues, deserve special thanks for all the support and encouragement. It would be incomplete not to mention Prof. M. S. Swaminathan, Chairman, MSS Research Foundation, Chennai and Prof. T. N. Ananthkrishnan, Director, ERI, Chennai for their support and valuable suggestions in the formative stage of this Project.

To be able to achieve sustainable growth, it is imperative that people at the grassroots level be involved. It is with this view that the NEBRC in its maiden venture organized this workshop jointly with a premiere youth organization of the State. This joint undertaking was done with the view that an approach of this kind will provide a better interface between public and the intellectuals. In this context, I am indeed very grateful to the executive members of the Synjuk Seng Samla Shnong (SSSS), Shillong for their willingness to participate not only in this workshop but also in all our public activities related to Biodiversity awareness. In retrospect, it is due to their involvement that we have been able to reach out, and accepted by a larger grassroots audience within such a short time-span.

I take this opportunity to thank and express my gratitude to all our resource persons from the entire North Eastern States including the different Non-Government Organizations (NGOs), who, through their participation has provided us with a much more broader perspective as well as a more meaningful outlook towards biodiversity. Their contribution to this workshop by way of paper presentations, interactions and discussions will go a long way to provide a Regional focus on Biodiversity concerns.

I am indeed grateful to all the members of various committees, in particular Dr B. S. Khongwir, D.G. Nongkhlaw, C. Syngai, Gordon Tham, Linus Marwein, Larry Warjri, Khraw Kharlukhi, Paul Shanpru, Bull. N, Dr. M. B. syiem, Adamson Khonglam and Jemino Mawthoh, Chairman SSSS for their untiring support and effort throughout the entire workshop proceedings.

I thank the press and the media, in particular, Mr. Sanat Chakraborty and Ms. Linda Chhakchhuak for their enthusiastic participation besides the wide coverage throughout the duration of the Workshop. My appreciation for our own JRFs, Y. S. H. Yobin, I. Thamar, D. Marngar, B. Das, R. Lalfakzuala, Lalmangaihzuala, G. Syngai, R. Nongrum and R. Nongkhlaw and for our own personnel, Mr. Edwin Nongrum, M. Warr and M. Lyngdoh for their cooperation and especially to Ms. M. Kharmudai, Ms. D. Suiam and Mr. D. R. M Buam for all the tedious typing and compilation of the manuscripts.

I take this opportunity on behalf of the Cell, to duly acknowledge and express our special appreciation to Mr. P.R. Mawthoh retired Director, Soil, and ex-Advisor NEC, Chairman, Synjuk Rambah Shnong and ex-Coordinator Total Literacy Campaign for his ever willing service, effort, advice, support and enthusiasm right from the very initial stages of writing of this project. His advice will go a long way beyond this project to continually inspire us.

I am grateful to all the agencies/departments who have willingly supported this workshop by way of advertisements. I also would like to acknowledge M/S WATERS INDIA LTD. and M/S MILLIPORE INDIA LTD. for their sponsorships of dinners during the workshop.

The resolution adopted in conclusion stems directly from the interaction between all the participants in a special session meant primarily for the purpose. It expresses and reflects the views and concerns *vis-à-vis* Biodiversity Conservation issues in the North East. We sincerely hope that the resolution adopted will provide a better insight and serve as a reference document for other Agencies/Departments to act, and if necessary, legislate upon.

July 1999

**D. Syiem**  
Organizing Secretary

As an effort to contribute towards Biodiversity Study, Use and Conservation, the North Eastern Biodiversity Research Cell (NEBRC) in collaboration with the Synjuk Seng Samla Shnong, Shillong (SSSS), a federation of youth organizations, had organized a workshop on *Peoples' Participation in Biodiversity Conservation* from 4<sup>th</sup> to 6<sup>th</sup> March 1999. The workshop aimed to bring people to a single platform to discuss issues pertaining to utilization of natural resources/wealth of the North Eastern region. Participants from all walks of life, which included eminent Foresters, Scientists, Researchers, Herbal Medicine Practitioners, NGOs, Community Workers etc. had deliberated on various issues related to the theme. This compilation of the proceedings is an outcome of the selected papers contributed by these persons. Minor editorial alterations have been made where necessary to maintain conformity and style without changing the subject matter. The papers compiled here cover a variety of subjects, from Peoples' Experience, Indigenous Knowledge Systems, Species Diversity, Use of Medicinal Plants and Threats to Biodiversity. The resolutions emerging from the NGOs' discussion held before conclusion of the workshop have also been included in this compilation. The recommendations arising from the Workshop will be disseminated to policy makers and lawmakers of all the North Eastern States.

It is sincerely hoped that this compilation would provide a vast array of information and development alternatives to various communities and also enlighten them about the need to Conserve, Study and Use Biodiversity resources effectively.

July 1999

B. Kharbuli  
Convener

## PRIORITISATION OF BIODIVERSITY RICH SITES IN THE STATE OF MEGHALAYA

Debjani Roy <sup>1,2</sup> and Sangeeta Choudhury<sup>2</sup>

<sup>1</sup>Institute of Self Organising Systems and Biophysics, NEHU, Shillong-793 002

### Introduction

The Northeast region is one of the most important areas in the Indian subcontinent for developing comprehensive conservation network. This region acts as a bio-geographic gateway showing rich biological diversity at the community and species level. The varied climate and altitude have greatly influenced the rich diversity of flora and fauna and endemics of this region. Northeast is the BIOGEOGRAPHICAL GATEWAY for much of India's flora and fauna and as a consequence is one of the richest areas in biological values. Most of the species contributing to the biological diversity of northeast India are either restricted to the region as a whole or even to smaller localities as in Khasi and Jaintia Hills of Meghalaya which are perhaps the richest botanical habitats in entire Asia. The state of Meghalaya covering an area of 22,549 sq. km. comprising of the Khasi, Garo and Jaintia hill districts, lying between 25.47' - 20.10'N latitude and 89.45' - 92.47'E longitude in northeast India is one of the richest and interesting biodiversity region.

Flora of Khasi hills in Meghalaya is quite interesting. It has affinity with the flora of Nagaland as well as that of Manipur. Some of the Burmese elements like *Eulalia manipurensis*, *Germania khasiana*, *Spodiopogon lacei*, *Themeda caudata*, *T. subsericans* are found mainly in Khasi hills, India and China. Some Indo-Malayan, Burmese and Sikkim species were reported from Nongpoh area in the Ri Bhoi district of Meghalaya. Several Sikkim species are noted to be found in Khasi Hills at much lower altitude. Similarly a comparison of distribution of grasses common to Nagaland appear at greater heights like - *Contathoca lappacea*, *Calamagrostis seabrescens*, *Phyllostachys manii*, *Thamnocalamus prainii*, *Schizostachyum dullooa* etc. *Apocopes purpurea* of south India is also reported from the Khasi hills.

Despite its initial botanical fame as early as 1854, Meghalaya is also rich in faunal values not found anywhere else in the world. Meghalaya has one of the largest and densest elephant populations of India- a population that is poorly protected. Other large mammals of significance include wild buffalo, gaur, serow, bear, tiger, lesser cat and gibbon. Avifauna including hornbills is exceptionally rich.

### Existing Conservation Inputs

While 40% of Meghalaya is classified as ecological forest, at present it has 2 parks and 3 sanctuaries conserving just 1.4% of the State's total geographical area.

- a) Balpakram National Park of 200sq. km. protects evergreen forest community on the southern border.

---

<sup>2</sup> Sri Aurobindo Institute of Indian Culture, P.O. Box 82, Shillong-793 001.

- b) Nokrek Ridge of some 50sq. Km. protects an area of exceptional genetic diversity in wild citrus varieties, as well as other flora and fauna.
- c) Nongkhylllem Wildlife Sanctuary of 29 sq.km offers protection to moist deciduous forest on the northern slopes.
- d) Siju Wildlife Sanctuary of 5 sq. km. and Baghmara Pitcher Plant Sanctuary of 1sq.km. protects plant area in the vicinity of Balpakram, Garo Hills district.

Some protection has been given to a few temperate forests as "Sacred Forest Groves" e.g. Mawsmai and Mawphlang, but in many cases deterioration has been observed in the past few years e.g. Shillong Peak and Jowai Town. Mention must be made of the District Council's initiative such as the Jarain Pitcher Plant sanctuary created by Jaintia hills District Council.

### Method for Prioritization

Prioritization of biodiversity conservation sites was done with reference to certain well-defined values that include biodiversity and socio-economic importance of the prioritized site.

1. Collection of secondary data from various libraries and Institutions.
2. Discussion with village elders and knowledgeable persons.
3. Maps and site locations were prepared with the help of Survey of India, Shillong.
4. Depending on the available secondary data the assessment for each site was divided in to 2 major groups:
  - A) Biodiversity values
  - B) Socio-economic values.
5. The biodiversity values were further sub- grouped as:
  - a) Richness- depending upon the number of species.
  - b) Uniqueness/Taxa based values - depending upon the rarity status of the species (threatened or endangered)
  - c) Naturalness- sites free from human intervention.
  - d) Endemism- depending upon the number of endemic species.
  - e) Representatives- community formations.
6. The socio-economic values were also sub-grouped depending upon the direct economic value and scientific value as:
  - (a) Ornamental value
  - (b) Research and Horticultural value
  - (c) Economic and Horticultural value
  - (d) Economic and Socio-cultural value
  - (e) Medicinal Plants.
7. Each site was assessed for each of the values of sub-groups and the scores obtained were ranked. Ranking scores of 0 to 5 were allotted to each of subgroups depending upon the characters, rarity status and other criteria as defined above. Based on the individual scores obtained, total scores for all the sub-values for a given site was calculated.

8. Each of the sites were allotted a place in the priority list and accordingly given a rank based on the total scores obtained. Along with the scores, the importance of each site was also calculated with regards to the number of prioritized species depending upon their rarity status. Sites with higher scores and consisting of highly prioritized species were given the top priority for conservation.

TABLE 1

NO	SITE	PLACE
1.	A	Nartiang, Jowai, Umtapoh, Shangpung, Raliang, Khliehriat, Sutnga, Thadlaskein, Laskein, Mynso.
2.	B	Jakrem, Mawphlang, Mawsyram, Sohrarim, Cherrapunjee, Shella, Pynursla
3.	C	Byrnihat, Umling, Lailad, Nongpoh, Umtasor, Umtyngar, Nongkhlaw, Mairang
4.	D	Umsning, Sumer, Umsaw, Umtham, Umwai, Umran, Barapani, Umshing, Shillong, Laitkor Peak, Mawphlang, Mawkdok, Nongkrem, Laitlyngkot
5.	E	Anogiri, Jengal, Rongram, Selbalgiri, Tura, Damalgiri, Adugiri, Kherapara, Barengapara, Dalu, Thebrangiri, Asimgiri
6.	F	Dawki, Muktapur
7.	G	Songsak, Rongrengiri, Williamnagar, Darugiri, Rongjeng, Damra, Dainadubi, Manikganj, Simseng, Manda, Tasek, Dambu
8.	H	Garampani, Kupli
9.	I	Siju, Baghmara
10.	J	Balpakram, Kanai, Mahadeo, Maheskholo
11.	K	Sonapahar, Nongstoin, Rambrai
12.	L	Sonapur, Umkiang
13.	M	Mawpat
14.	N	Balat, Ranikor, Nongkhyllam
15.	O	Phulbari, Digrangiri, Duragiri, Rongsanggiri
16.	P	Garobadha

### Criteria for Prioritization

The following categories of rare species have been recognized by the IUCN, mainly based on:

- (1) Present distribution.
- (2) Decline in number of population in course of time
- (3) Abundance and quality of natural habitat.
- (4) Biology and potential value of the species.

These are defined as Rare, Vulnerable and Endangered for conservation and protection. We further prioritized the broad categories into sub-categories for their socio-economic values based on their medicinal, economic, horticultural and botanical interest values. According to our prioritization, maximum weightage is given to endangered species since these species need immediate protection. Among endangered species, highest priority is given to the plants

having medicinal values. Similarly, among rare plants highest priority is given to the medicinal plants and least to the ornamental species. Weightage is given to the endemics with narrow distribution range, especially if their habitat is endangered by anthropological interference.

The final map for the sites prioritized for conservation for the state of Meghalaya was based on the prioritized sites for the individual group. This exercise led to the prioritization of 16 sites. Each site was scored for their individual values of their groups and sub-groups. After the individual site scoring was done, each site was ranked for their prioritization. Site having the maximum score received the highest ranking for their prioritization.

### **Prioritized Sites of Meghalaya**

Based on the prioritization of individual groups, 16 sites were prioritized. They are as depicted in Table: 1.

### **Discussion**

Forests in India have been over-exploited due to the various demand of the growing population. In this process, the distribution and population of several plant species have been reduced to such an extent that if their removal is not restricted, then, some species may face extinction. Recently, it has been noted that increasing biotic influences, including socio-economic development, unrestrained commercial exploitation of this region, amounting to a great loss of national heritage.

Looking at the status and the needs for conservation we have prepared a priority list on the basis of biodiversity, socio-economic values and anthropogenic stresses, sites were awarded special needs for conservation which are as follows:

1. Rare and endangered
2. Rare and endemic
3. Endemic and endangered
4. Rare and ornamental
5. Endemic and economic
6. Rare and horticultural/economic
7. Rare and medicinal
8. Endangered and medicinal

Maximum priority has been given to medicinal plants. These plants are used directly in the health care system of the society. The results gain importance at three levels:

- a) the welfare of the patients who use the medicines prepared from these plants
- b) the welfare of the Practicioners for the upkeep of their knowledge. These plants are the source of their livelihood.
- c) The recurring exploitation of medicinal plants from their natural populations is also alarming.

From the results obtained, Site A has been given the highest priority. This site has scored the maximum points in richness, endemism, representativeness and in medicinal values. However, almost all the sites contained one or more species either belonging to threatened or endangered or threatened and endangered.

## **Conclusion**

In order to protect the biodiversity, ecology and landscape the following constructive measures are being suggested:

- a) An intensive survey for both floral and faunal distribution
- b) Wild collection of Orchids to be banned and programmes for the propagation of the Orchids under natural conditions
- c) Awareness campaign about the harmful effects of jhum and shifting cultivation and deforestation by indiscriminate felling of trees
- d) Protection of Sacred Groves and as practised in the Garo Hills the bamboo species to be protected and propagated by the villagers themselves.
- e) Induction of longer fallow period to be brought about by reforms in agricultural practices.
- f) Protection of medicinal plants, based on statistical data on the user list from ethnomedical practitioners.