Introduction:

Assam, one of the sister states in northeast India possesses a rich reserve of natural resources and a cultural heritage. The state is characterized by distinct habitats, landscape, broad valleys and hills. Though largely plain, the Barail range is mountainous which separates the Brahmaputra and Barak valleys. The state has geographical area of 78,438 sq km and about 39% of the geographical area is covered by forest (Forest Survey of India). The forest types are mostly tropical and subtropical which harbours a rich pool of biodiversity. As per conventional estimates the state flora comprise of 3017 species (Baishya, 1999). However, the figures are provisional as still many areas are underexplored and constant changes are taking place in the flora due to human interference, biotic pressure and other ecological factors.

The rich flora has been the centre of attraction for various botanists since early 19th century which began with the famous Assam tea delegation comprising N. Wallich, W. Griffith and J.Mc Clelland (1823). Robinson provided the floristic account of the region (1841). Some of the earlier contributors to the flora of Assam are Carter (1921), Hooker et al (1872-1892), Kanjilal (1934-40), Bor (1940), Kingdon-Ward (1960).

Flora of Assam by Kanjilal *et al* was the beginning of botanical studies by Indian Botanists. This was further augmented by the re-organization of the Botanical Survey of India in 1956. A number of Botanists contributed to the understanding the flora of the state (Rao & Varma, 1969-1982, Kar & Panigrahi 1963, Kataki & Panigrahi, 1964, Jain & Hajra, 1975, Rao, 1974, Islam, 1990, Sarmah, 1989, Sas Biswas et al 1990, etc.). Many workers have attempted the floristic studies of different districts (Gogoi 1976, Barua 1978, Hajra 1978, Sarmah 1989, Barua 1992, Sarkar 1993, Singh 1993, etc.).

Although the state has been well explored but there are still some areas where the scope of floristic study is still prevalent Moreover, a detailed account of the flora of the present state of Assam is still to be brought out. Baishya, 1999 gave a detailed account of the florstics of Assam. However, considering the vastness and ecologically diverse area, there is ample scope to increase these numbers as many areas are still unexplored or underexplored. With this view, a study has been formulated to assess the flora of Umananda river Island, Guwahati.

Objectives:

The present study has been formulated to study the floristic diversity of Umananda river Island - a small island of 4.9 ha in the Brahmaputra river near Guwahati, Assam. Medhi (2004), while studying the behavioural aspect of the Golden langurs of the island tried to record some of the food and roosting trees of the Island. However, a great lacuna has been observed in studies particularly in the field of the floristics of the island. Therefore the study has been aimed at -

- assessing the floristic diversity of Umananda river island.
- finding out the rare and threatened plant taxa of the Island.
- recording the life form categories of the plant taxa and to classify the plants as per the Raunkiaer's life form classification and calculate the biological spectrum.
- identifying the threats and suggest the conservation measures.

Methods:

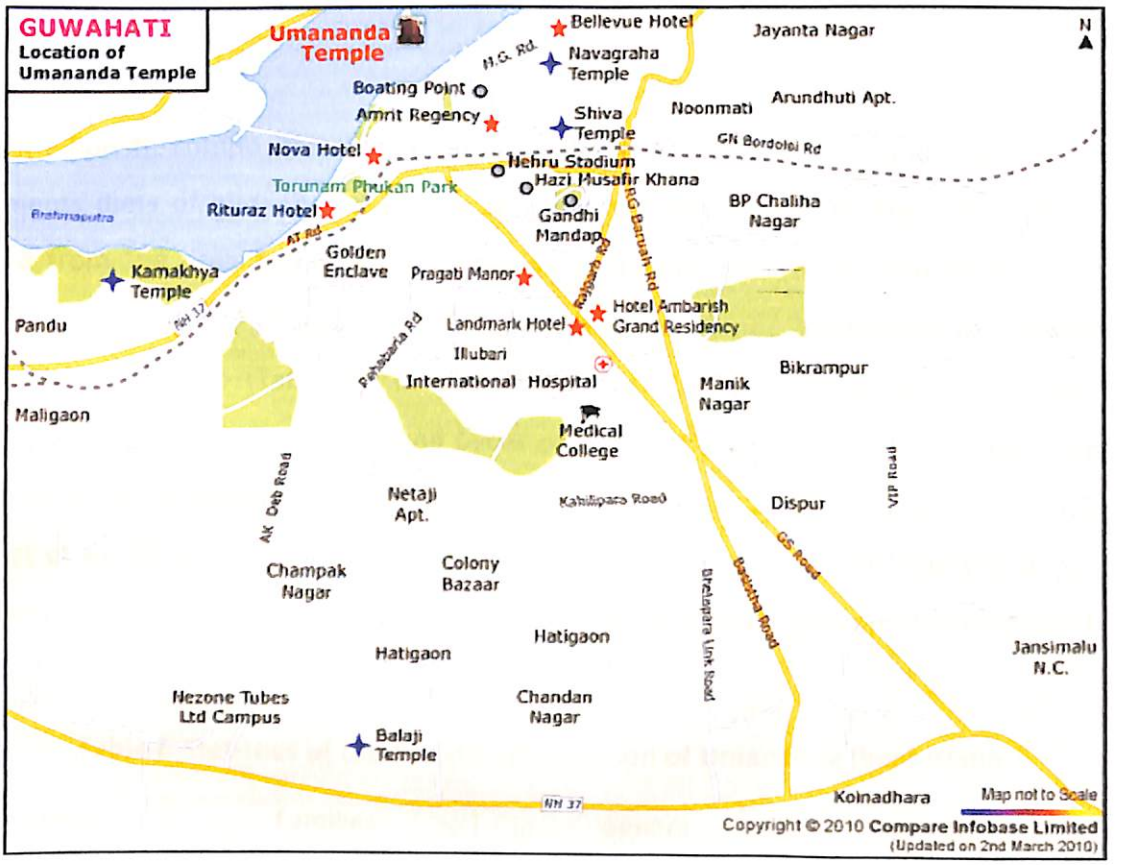
To study the floristic diversity of the island, several exploration tours to the island were undertaken. Accordingly specimens were collected and the field characters related to the habit, habitat, flower colour, fruiting, and life forms were recorded. Plant specimen thus collected would be dried and preserved as herbarium specimen. Records would also be made on the food habit of Golden langur. Plant specimens will be then studied for identification with the help of various available literatures and also by comparing the specimens with those preserved in the herbarium of Gauhati University. All the specimens thus collected are preserved in the herbarium of Department of Botany, Handique Girls' College, Guwahati for record.

Life form and the biological spectrum would be studied by Raunkiaer's (1934) method and subsequent modification by Braun and Blanquet (1951). For preparation of biological spectrum, the number of species in each life-form will be calculated and the percentage of species belonging to each life-form will be determined by following formula –

$$\% \text{ Life-form} = \frac{\text{Number of species in any life-form}}{\text{Total number of species in all life-forms}} \times 100$$

Study site:

The temple of Umananda is located on the Peacock Island in the middle of the river Brahmaputra at Guwahati. There are many permanent and temporary islands and beaches in the river. However, Umananda is a permanent island covering an area of 4.9 ha with a unique picturesque environment (Map 1).



Map 1: Map of Guwahati city showing Umananda Temple

This small Island of the river Brahmaputra has a Siva temple. The patch of land on which the temple has been built is known as Bhasmacala. The history of the temple dates back to TAI AHOM rules of Assam as the temple was constructed by them in 1694 A.D. by the Bar Phukan Garhganya Handique by the order of His Majesty Swargadeo Gadadhar Singh (1681- 1696), one of the ablest and strongest rulers of the Tai Ahom dynasty.

Situated in the river basin of Brahmaputra, the Island supports luxuriant vegetation. The golden langur population there is confined to the island and it is the only existing provisioned and semi-free-ranging population of the species. The major soil type of the study area is clayey soil. The physical and chemical properties of the soil samples of the island indicate that the soil is slightly basic in nature with pH 8.12.

Result:

The floristic composition of the Island is remarkable in its diversity and luxuriance. It also supplements diets of endangered golden langur population inhabiting the island. The plants collected from the area belong to 123 species of phanerogams. The dicotyledonous plants belong to 46 families, 99 genera and 105 species and the monocotyledonous to 9 families, 18 genera and 18 species (Table 1). In addition to this 2 (two) species of gymnosperm viz. *Cryptomeria japonica* (Taxodiaceae) and *Cycas pectinata* (Cycadaceae) and 3 (three) species of fern (*Adiatum* sp., *Dryopteris* sp. and *Drynaria quercifolia*) were also recorded from the island. A detail list of the flowering plants along with the gymnospermic and pteridophytic flora of the island (arranged alphabetically along with families and life forms is given in the Annexure I.

Table I: Statistics of the floristic composition of Umananda River Island

Group	Families		Genera		Species	
	No.	%	No.	%	No.	%
Dicotyledons	46	83.64	99	84.62	105	88.37
Monocotyledons	09	16.36	18	15.38	18	14.63

A special mention may also be made on the members of the family Poaceae in the study site where 6 species of grasses including a species of bamboo have been recorded. Several exotic species have become almost completely naturalized in the area. Important among these are *Mikania micrantha, Eupatorium odoratum,* etc. Based on representation of number of species found in the family, the largest 15 families of the island are shown in the table 2.

Table 2: Fifteen largest families of flowering plants of Umananda River Island

Sl. No.	Family	Genera	Species
1	Asteraceae	8	8
2	Caesalpiniaceae	7	8
3	Euphorbiaceae	7	8
4	Verbenaceae	7	7
5	Poaceae	6	6
6	Amaranthaceae	5	6
7	Moraceae	3	5
8	Apocynaceae	5	5
9	Papilionaceae	4	4
10	Acanthaceae	4	4
11	Malvaceae	3	3
12	Rutaceae	3	3
13	Mimosaceae	2	3
14	Meliaceae	3	3
15	Arecaceae	3	3
Total ==========		**70**	**76**

The trees one of the best examples of which is *Tamarindus indica* of about 30m height is one of the dominant trees of the island. Some of the other common tall trees of the island are *Bombax ceiba, Mangifera indica, Samanea saman, Sterculia vilosa, Tectona grandis, Terminalia sp.*, etc. Other trees that formed the second story are *Albizia procera, Artocarpus heterophyllus, Azadirachta indica, Casia fistula, Delonix regia, Dysoxylum binectariferum, Ficus benghalensis, F. religiosa, Litsea sp, Mallotus philipensis, Premna latifolia, Spondias axillaries, Syzygium cumini, Toona ciliata, Wrightia arborea*, etc.

Other tree species recorded in the island are *Aegle marmelos, Barringtonia acutangula, Bauhinia purpurea, Butea monosperma, Erythrina stricta, Plumeria rubra, Streblus asper, Zizyphys mauritiana* and *Dendrocalamus giganteas*.

Some of the common large shrubs or small trees recorded from the island are – *Adhatoda vasica, Abutilon indicum, Anona reticulata, Boehmaria nivea, , Camelia caudata, Capparis zeylanica, Carica papaya, Clerodendron viscosum, Eupatorium odoratum, Euphorbia nerifolia, Glycosmis arborea, Holmskioldia sanguinae, Jatropa curcas, Lantana camara, Murraya exotica, Nerium indicum, Phlogocanthus curviflorus, Ricinus communis,* etc. Apart from these *Acacia oxyphylla, Argyrea argentia, Cissampelos pareira, Dioscorea pentaphylla, Schefflera venulosa, Mikania micrantha* are some liana, wiry climber, stragglers that are entangling with some of the trees of the island.

The common herbs found in the island are *Acalypha indica, Achyranthes aspera, Alocasia sp, Aneilema conspicum, Apluda mutica, Cassia tora, Costus speciosus, Crotalaria pallida, Cythula prostrata, Euphorbia hirta, Heteropogon contortus, Hyptis suaveolens, Leucas aspera, Phaulopsis imbricata, Plumbago zeylanica, Scoparia dulcis, Sida acuta, Sonchus arvensis, Urena lobata,* etc.

***Life form and Biological Spectrum*:**

The flora of Umananda River Island was found to consist of 128 species of vascular plants belonging to 122 genera and 60 families. The flora can be classified into following life form classes according to Raunkiaer (1934).

A total number of 46 species were found to be Phanerophytes (Ph= 35.94%). This major class was further divided into 4 subclasses with species content viz. 4 species of Nanophanerophyte (Nanoph. = 3.13%), 12 Species of Microphanerophyte (Microph. = 9.38%), 26 species of Mesophanerophytes (Mesoph. = 20.31%), and 4 species of Megaphanerophytes (Megaph. = 3.13%). Besides, 15 species of Chamaephyte (Ch. = 11.72%), 9 species of Hemicryptophytes (H.Cr. = 7.03%), 41 species of Therophytes (Th. = 32.03%), 7 species of Geophyte (G = 5.47%), 7 species of Lianas/climbers (L = 5.47%), 3 species of Epiphytes (E = 2.34%) were recorded during the study period.

A comparision of the percentage of the life form classes of the flora of the Umananda river island with Raunkiaer's normal spectrum is shown in the table 3 (fig. 1). It revealed that the biological spectrum of the flora of Umananda River Island deviated from the normal spectrum of Raunkiaer and major deviation is observed in hemicryptophytes and in therophytes. The occurrence of lianas/climbers is also very high in the present study.

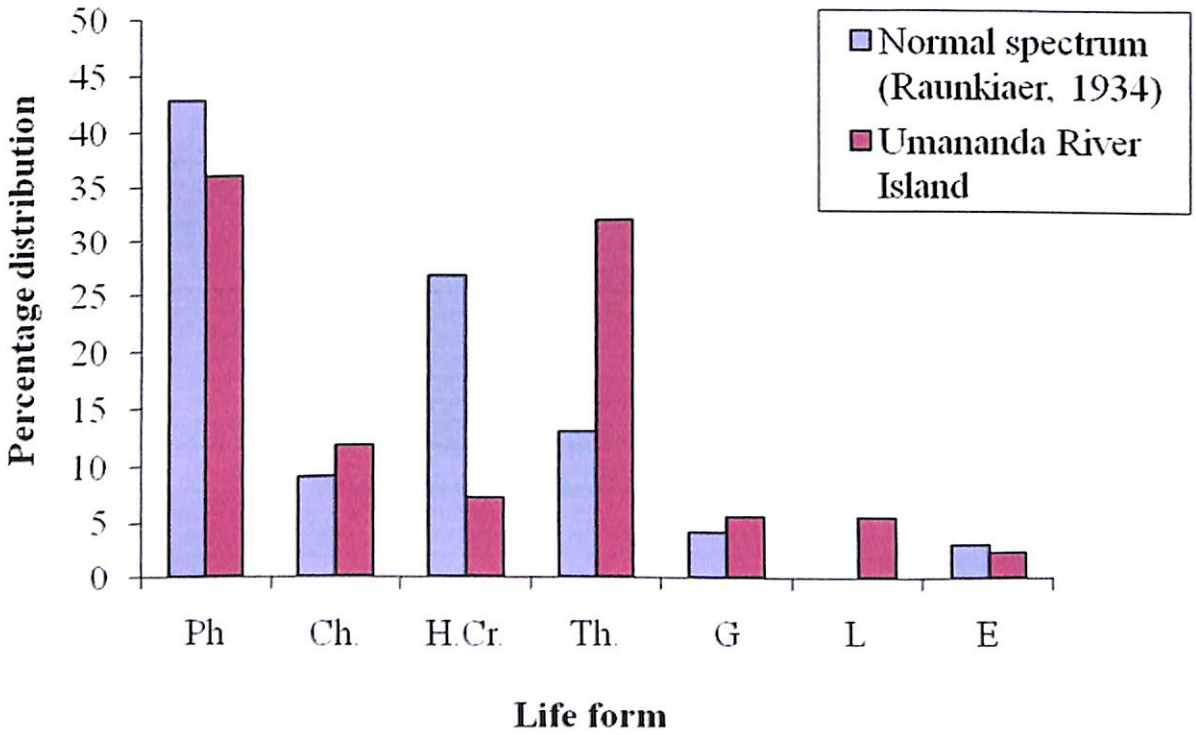


Fig. 1: Comparisons of biological spectrum of Umananda River Island with that of normal spectrum of Raunkiaer

Table 3: Biological spectrum of the flora of Umananda River Island

	Percentage distribution of life forms						
	Ph	**Ch.**	**H.Cr.**	**Th.**	**G**	**L**	**E**
Normal spectrum (Raunkiaer, 1934)	43	9	27	13	4	-	3
Umananda River Island	35.94	11.72	7.03	32.03	5.47	5.47	2.34