

### Dominant flora of Sundarban

#### Distribution

It is located on Gangetic delta on the southern part of Bengal and Bangladesh. There is Hooghly river on the west part of Sundarban, comprise low laying swampy small islands, vegetation of this zone is Mangroves type. Adaptation is halophytic type. The main adaptation are- 1. Root characters modification and new types root formation such as- Prop root, Pneumatophore, still root, and aerial roots. 2. Viviparous germination due to the saline water. 3. Leaf character modification due to strong frequent strome. The leaf become mostly succulent and Glossy as water storage tissue exists in leaves.

Vegetation: According to the vegetation, Sundarban divided into 3 main parts-

- (a).Southern Coastal strip and south western part containing mainly mangroves species.
- (b).The central zone.
- (c).The North Eastern part of savannah type of vegetation.

#### Southern Coastal strip and south western part:

- The muddy flats are colonised by Rhizophora, Salicornia. Slopes covered with fresh water during rainy season bear luxuriant crop of *Oryza coarctata* which is the 1st species in the Mangroves succession.
- Fresh mud Banks of rivers are covered by *Sonneratia apetata*.
- Banks of large rivers are associated with *Rhizophora* sp., *Ceriops* ssp. Of the family Rhizophoraceae
- Banks of smaller channels and distributed with *Sonneratia apetata*, *Cerbera adollum*, *Dalbergia spinosa*, *Hibiscus tiliaceus*, *Clerodendron* , *Phoenix* etc.
- Banks of narrow channels are covered by *Aegiceras majus* etc.
- Banks of narrowest channels are covered by *Nipa fruticans* .

(b) The central zone: Here mainly *Acanthus clicifolius*, *Pandanus* ssp, *Avicennia officinales*, *Cynometra* ssp, *Carapa gangetica* etc. are present. Also in Sundarban flora of West Bengal and Bangladesh is represented by many climbers from *Asclepidaceae* and *Leguminosae* are *Hoya parasitica*, *Sarcolobus globosus*, *Derris sinuata*, *Dalbergia* sp etc.

(c). The Savannah vegetation: The savannah of Sundarban flora is composed of *Cyperus exaltatus*, *Scirpus* ssp., *Saccharum spontaneum*, *Andropogon intermedius* etc.

Orchids are- *Cirrhopetalum roxburghii*, *Acampe dentata*, *Acampe longifolium* etc. Common ferns are *Drymoglossum pilosselloides*, *Aerostichum aureum* etc. In addition to typical mangrove species, many other common species belonging to different families are also occurring. These are- *Aegle marmelos*(*Rutaceae*),*Cassia fistula*(*Caesalpinaceae*),*Acacia arabica*(*Mimosaceae*), *Vitex nigundo*(*Verbenaceae*), *Ixora paniflora*(*Rubiaceae*) etc.

### Why Gangetic Plain have no endemic flora?

The Gangetic Plain is bounded by on North Himalayas and on South by the broad Peninsular which is also bounded on three sides by sea. The Himalayas contain several own endemic species which can migrate to Gangetic Plain during rainy season through seeds which are brought by the Himalayan rivers like Ganga, Jamuna, Tista etc. Also migration occurs due to the birds and many different agent. On the other hand, from Indian Peninsular region. The endemic plants are migrated to Gangetic Plain by man-work, different types of agent, for cultivation, ornamentation, fooding etc. As a result the Gangetic Plain contains a mixed flora of Himalayas and Indian Peninsular. Also the Gangetic y contains their own endemic species but the numbers of these endemic plants are so less due to the deforestation for urbanization, industrialization and cultivation for large population situated here.

### Geographical Information System (GIS)

A geographical Information System (GIS) is a computer based system to collect, manage and analyse large volumes of spatially reference and associated data- GIS is used for solving Complex research, Planning and management problems.

The major concept of GIS are-

A user interface 2. Data base management system 3.

- (a) Data base creation and data entry
- (b) Manipulation & analysis of data
- (c) Display & product generation

- The user interface is the method by which the operator communications with the various data base and GIS application modules.
- The GIS data base management system (DBMS) provides the environment within which the GIS functions and the means by which data are controlled.
- Data base creation refers to the process of bringing data into the electronic environment of the GIS.
- Data entry is a process of loading data into a GIS data base.
- Data Manipulation is the process of extracting meaningful information from a GIS database.
- The display and product generation from GIS operation may be a hardcopy display of the matrix information on a printer.

## Endemism

Endemism is the phenomenon of the confinement of species, genera or other groups to a small area beyond which their existence is not found. Now a days, species confined to a large area are also regarded as endemics.

### ② Theories on Endemism:-

The cause of endemism or the endemic state of a species or a genus has been explained variously.

① Ridley (1922) holds that endemic species and genera are the survivors of the large groups of the past (relic type) which are now in course of gradual extinction. According to him, surviving species are 'epibiotics' i.e. they do not spread but remain as relics of the past in an isolated area, which due to some reasons, has not been overpowered by later invading flora. These survivors are not provided with suitable and enough means of dispersal. So that they are unable to cross the barriers of recent flora and to reach another area for their establishment —

Hence, they become confined to a limited area.

② Willis (1922) holds that endemic species are new and recent forms in course of gradual spread and extension. This theory is based on his 'Age and area hypothesis'. According to this hypothesis, the occurrence of diversified species and genera in a particular place is proportional to the age in the evolution. So, a small area containing definite plant groups where they are endemic indicates their relatively recent age.

Supporters of the former i.e. Epibiotic theory put forward examples of tree ferns, Ginkgo biloba etc. which are relic species and endemic in China and Japan.

Supporters of the latter theory cite examples like numerous species of primula, Impatiens, Rhododendron etc. which are endemic in particular areas.

### Types of Endemism:

Endemism is basically of following types:

- (a) **Neo-endemism:** A taxon is evolutionarily young and not yet spread over the new area e.g., *Senecia combrensis*.
- (b) **Palaeo-endemism:** The taxon is restricted now but once it was widely distributed. The restriction of species in a pocket is due to physical barrier like deserts mountain, sea, etc. or change in climate or soil type etc.
- (c) **Relic Endemics:** The plants belong to fossil groups and are restricted to few pockets due to favourable climate, lack of competition e.g., *Ginkgo biloba* which is restricted to China but widely spread in the north temperate zone as a fossil, *Sequoiadendron giganteum* is now restricted to Californian Sierra Nevada.
- (d) **Pseudo Endemics:** Endemics arising due to mutation are called Pseudo endemics, for example, *Franklinia alatamaha*. It is now vanished but its progeny is found in gardens.

### Factors Responsible for Endemism:

Factors responsible for the production of endemics are Natural crossing among the closely related plants growing under favourable conditions and Mutations. If the condition of isolation is developed the effects become more pronounced.

Endemism is found in isolated e.g., islands, isolated areas etc. According to Wulff 85% of Flora of St. hair, 80% of Hawaii islands and 72% of New Zealand is endemic. Mountains also have more endemic species as they are isolated e.g., 70% sp. of Himalayas is endemic. Climate also is one of the factors e.g., North of Himalaya is dry plateau of Tibet and South Himalayan range has alluvial fertile soil.

According to Chatterjee the percentage of endemic species of Dicot plants in India is more than 50. Maximum endemic plants are found in the Himalayas and South India.

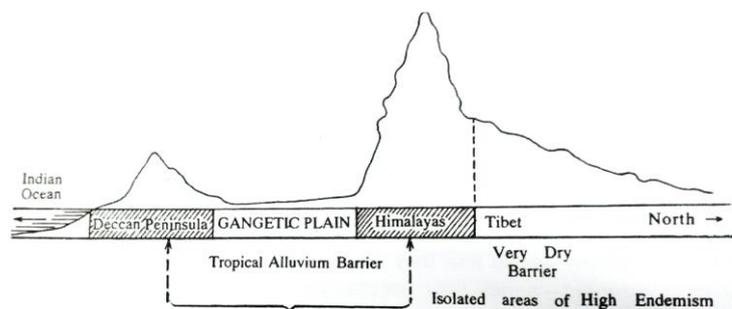


Fig 3.1 : Figure showing the influence of barriers in the induction of endemism in South India and the Himalayas (after D Chatterjee, 1939).

Indo-Gangetic plains have a very small number of endemic species.

### **Endemism in Indian flora**

The word 'endemic' is ascribed to any taxon which has a restricted distribution. Endemics are commonly categorized in four contexts of spatial distribution: site or restricted area, biotope, biogeographical region and political area. Because of their narrow distributional zonation, endemics receive high priority for conservation. Endemism is a special criterion in conservation of any area.

The flora of India shows close affinity with the flora of Indo-Malaya and Indo-Chinese regions. According to Nayar (1977), 35% of Indian flora has south-east Asian and Malayan, 8% temperate, 2% African and 5% Mediterranean-Iranian elements. The adventive weeds and naturalised aliens constitute only 18%. This fact prompted Hooker (1904) to arrive at the erroneous conclusion that India has "no flora of its own" (as a separate entity) but is an admixture of the floras from adjacent countries. For the first time, Chatterjee (1939) reported 6,850 plant species as endemic to India. The subsequent phytogeographers, after critical analysis of flora, have convincingly concluded that India has a flora of its own. Of the 5400 taxa, 33% are endemic (confined to present Indian boundaries). In fact, India is said to harbour more endemic plant species than any other region of the world except Australia. There are about 140 endemic genera distributed over 47 families. The total endemic genera in India represent 6.5% of the 2984 genera occurring in India. The largest endemic genera are *Pteracanthus* and *Nilgirianthus* of Acanthaceae, with 20 species each. There are 8000 species of flowering plants in the Himalaya. Of these, 3,165 are endemic. The areas rich in endemism are the northeast India, followed by southern parts of peninsular India, and northwestern Himalaya. The northwest Himalaya is estimated to harbour about 1000 endemics, of the 3000 total species, while the Eastern Himalaya has about 1500 endemic species of 4500 species. Peninsular India has 6000 species of which 2000 are endemic. The Andaman and Nicobar Islands contribute 353 species to the endemic flora of India. The Poaceae are one of the largest families, having about 360 endemic taxa.