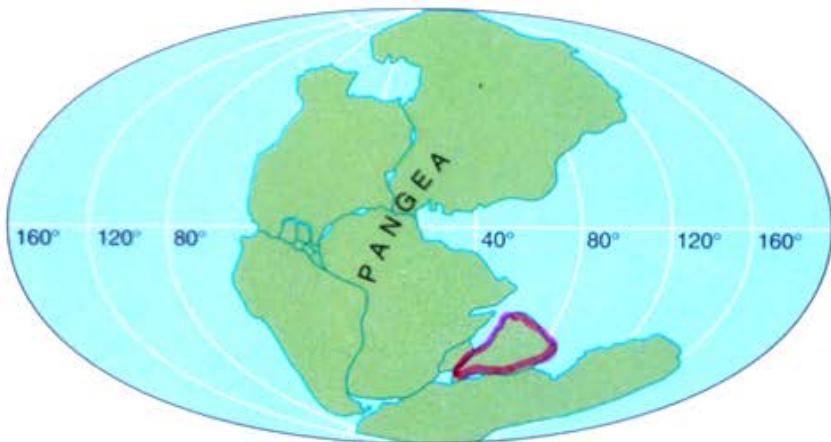


BIODIVERSITY & ENVIRONMENT

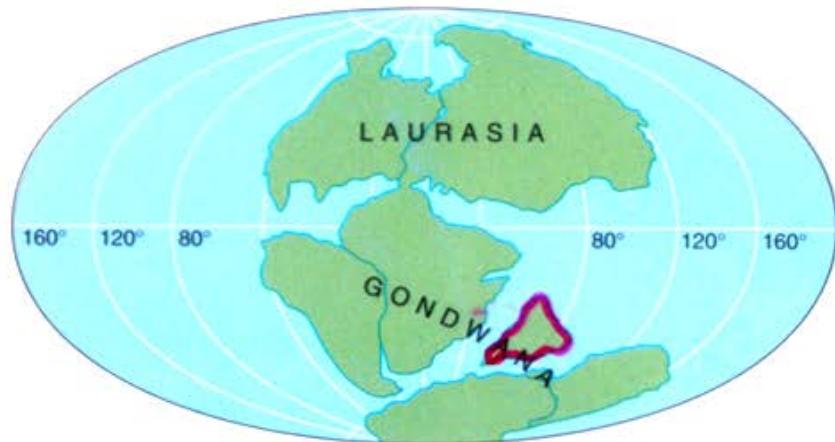
D. NARASIMHAN

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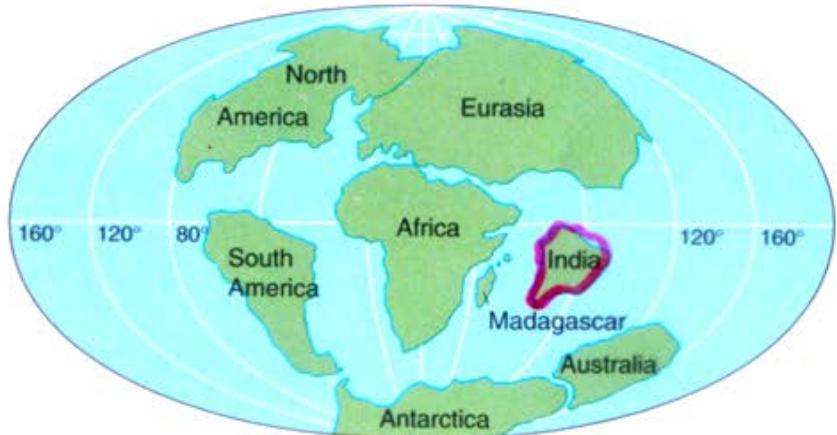
Continental Drift



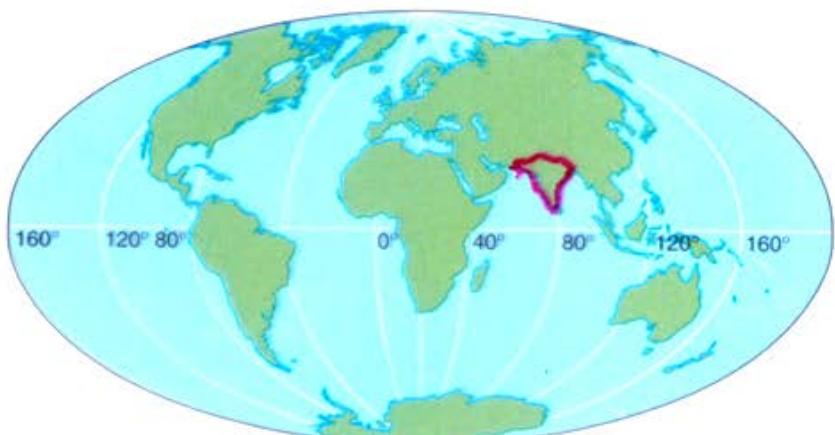
(a) 225 million years ago: Triassic



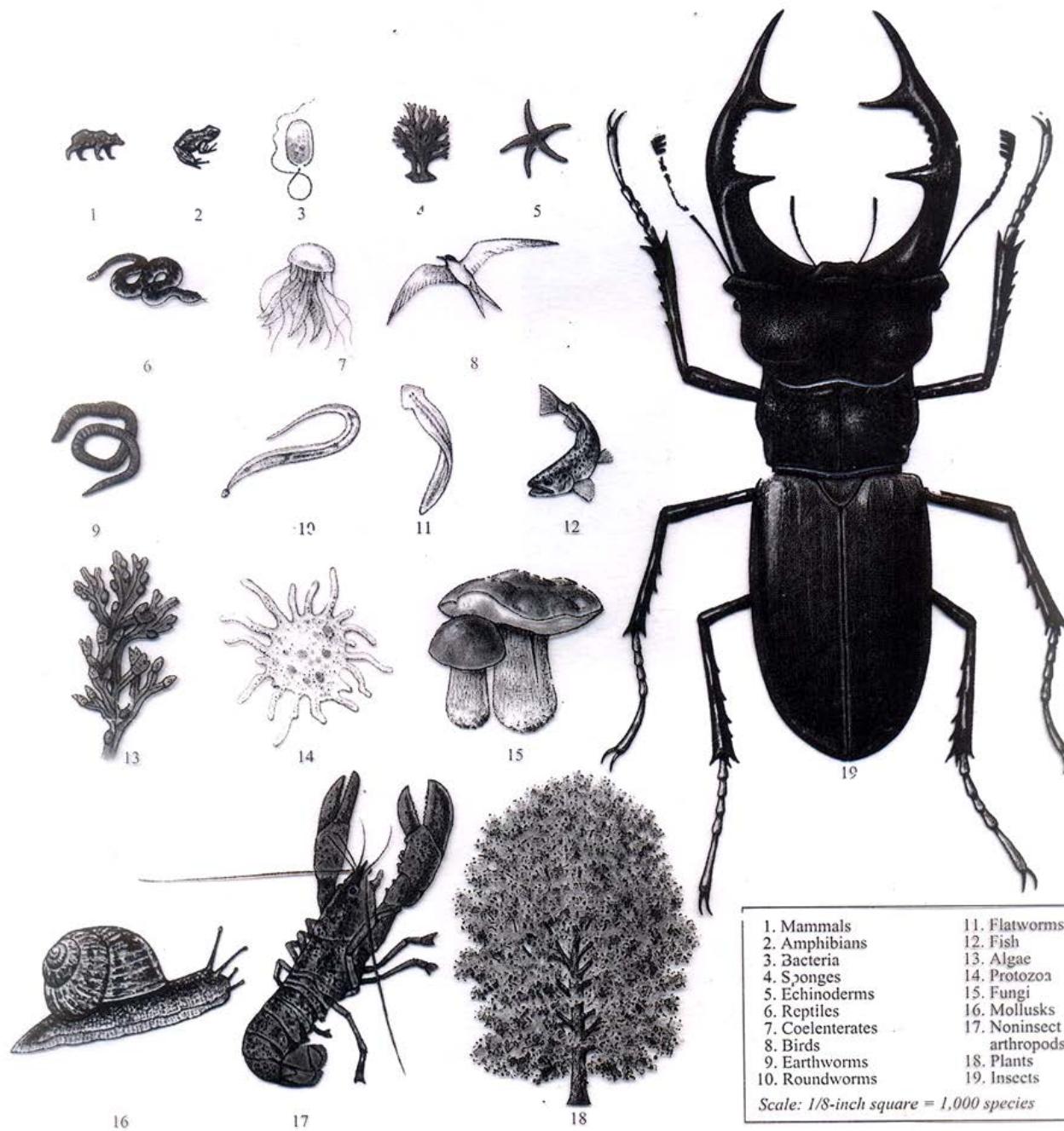
(b) 135 million years ago: Cretaceous



(c) 65 million years ago: Paleocene



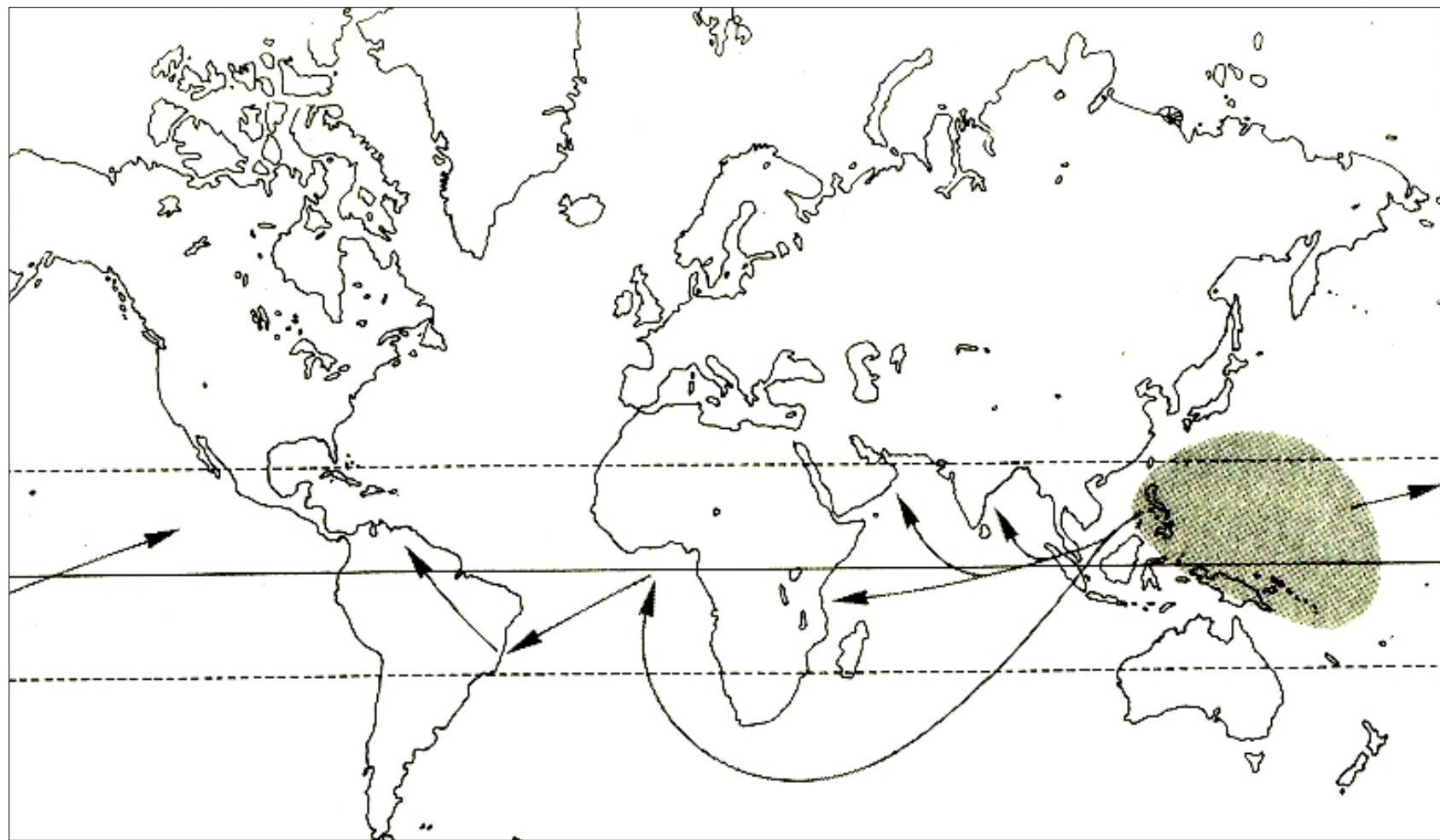
(d) Present



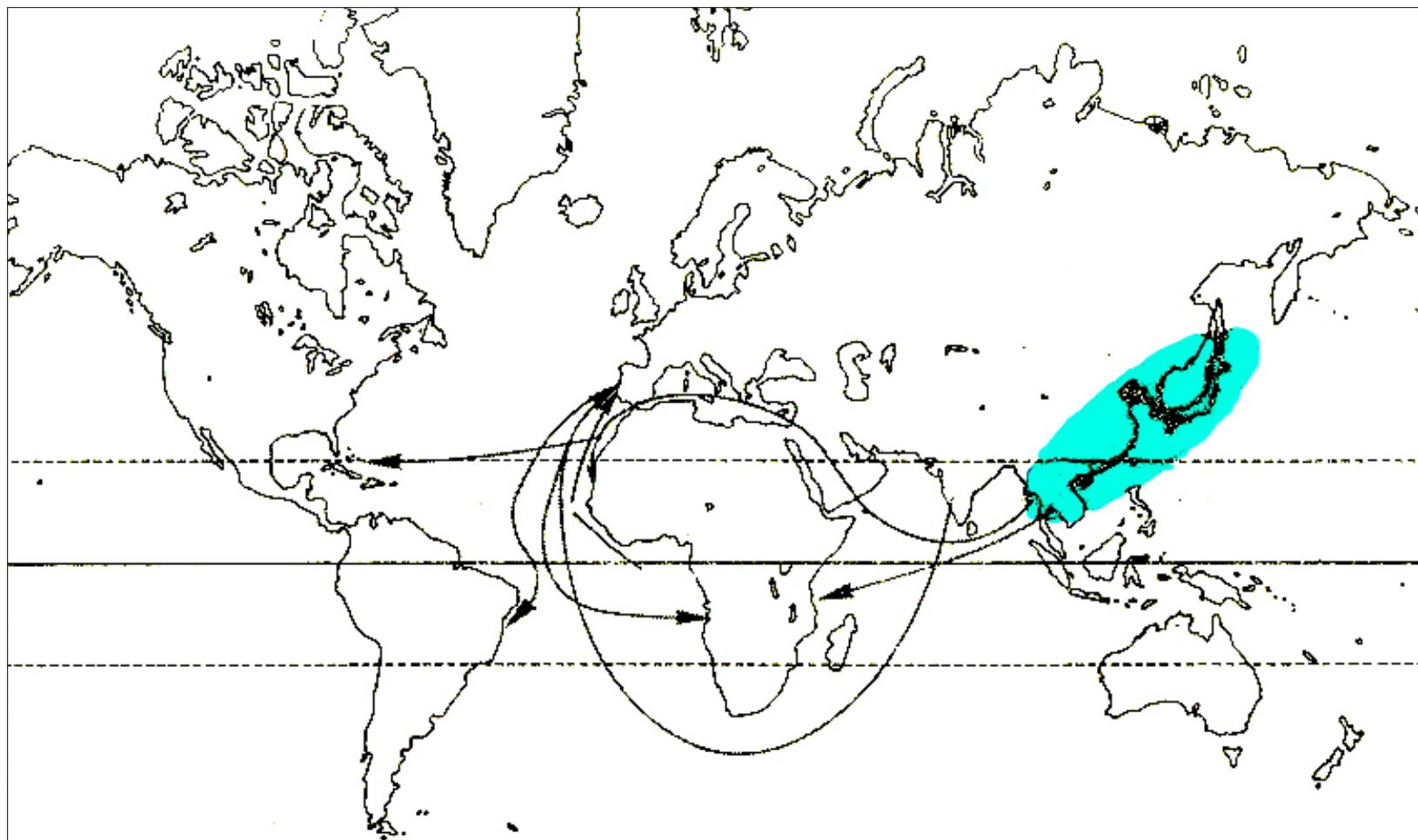




COCONUT



CITRUS





Per capita Ecological Footprint

2.23 ha



6.60 ha



2.52 ha



1.81 ha



0.88 ha



World

Industrial
Countries

Upper - Middle
Income

Lower - Middle
Income

Low Income

Economic Values of Biodiversity

Use Values	Option Value	Existence Value
<p>Direct Use Values</p> <ul style="list-style-type: none">• Fish and meat• Fuelwood• Timber & other Building material• Medicinal Plants• Edible wild fruits & plants• Animal fodder <p>Indirect Use Values</p> <ul style="list-style-type: none">• Flood control• Soil fertility• Pollution control• Drinking water• Transportation• Recreation & tourism (eg. Bird-watching)• Education• Biological services (pest control, pollination)	<p>Future Products:</p> <ul style="list-style-type: none">• Medicines• Genetic Resources• Biological Insights• Food Sources• Building supplies• Water Supplies	<ul style="list-style-type: none">• Protecting biological diversity• Maintaining culture of local people• Continuing ecological and evolutionary processes

CULTURE AND KNOWLEDGE ON RESOURCES

Ethnically Rich

Papua New
Guinea
Nigeria
Cameroon

Bio – Ethnically Rich

Brazil
Mexico
Indonesia
India
Australia
Zaire

Biodiversity Rich

Peru
Malaysia
Columbia
Equator
China
Madagascar

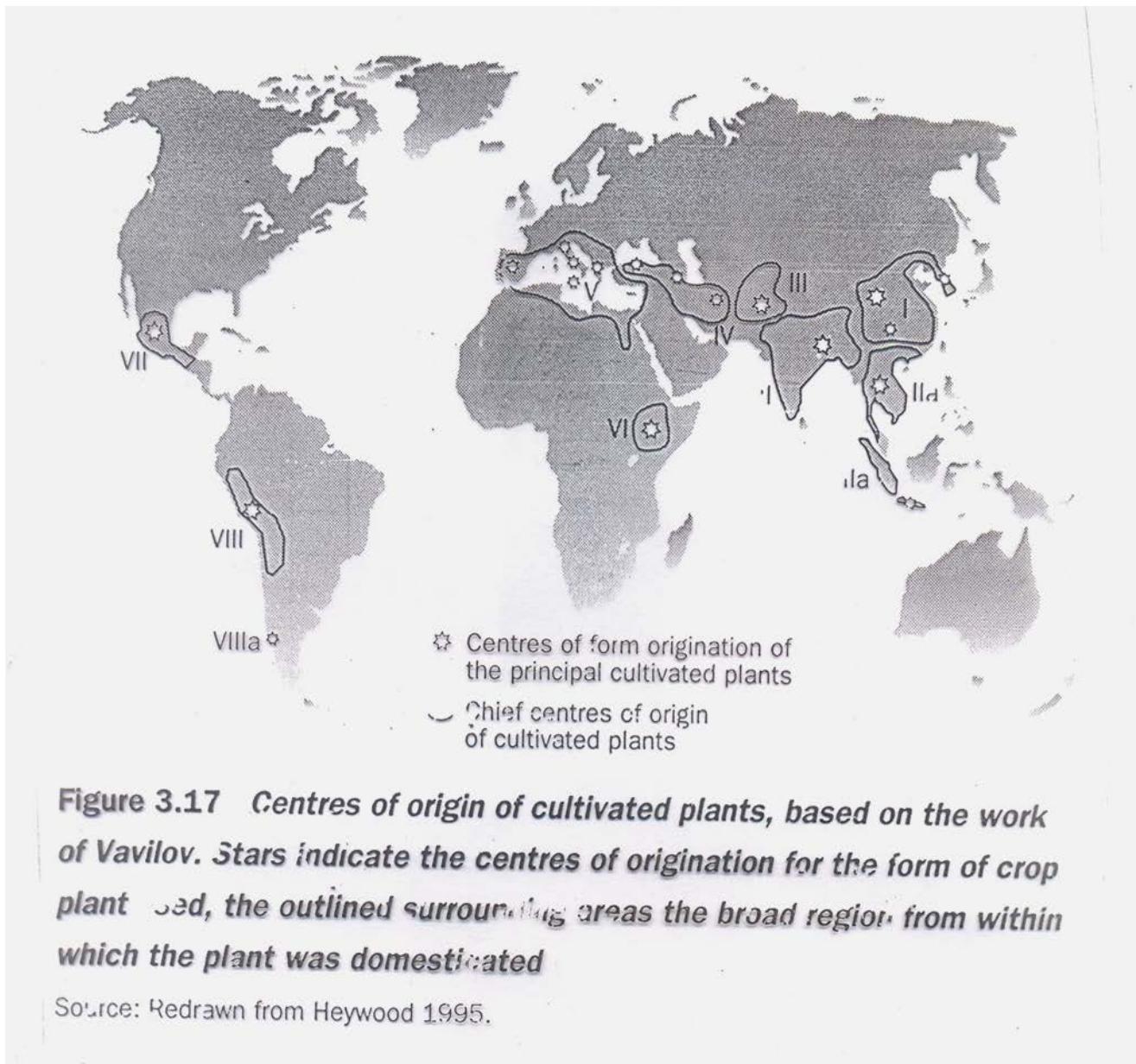
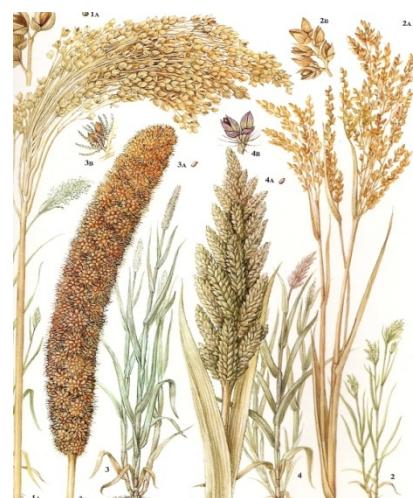


Figure 3.17 Centres of origin of cultivated plants, based on the work of Vavilov. Stars indicate the centres of origination for the form of crop plant and, the outlined surrounding areas the broad region from within which the plant was domesticated

Source: Redrawn from Heywood 1995.

- **Earth contains about 75,000 edible plants**
- **People use around 3000 plants**
- **Only about 150 are cultivated**
- **Just 3 grasses supply food for 60% of the world's population (Wheat, Rice & Maize)**

Cereals



SOUTH AMERICA

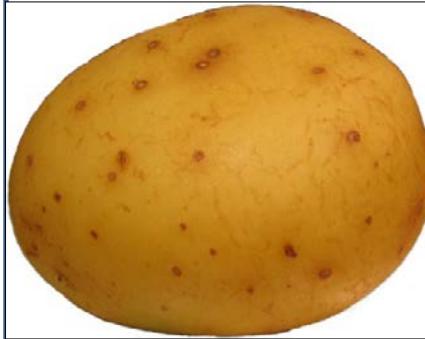
Capsicum



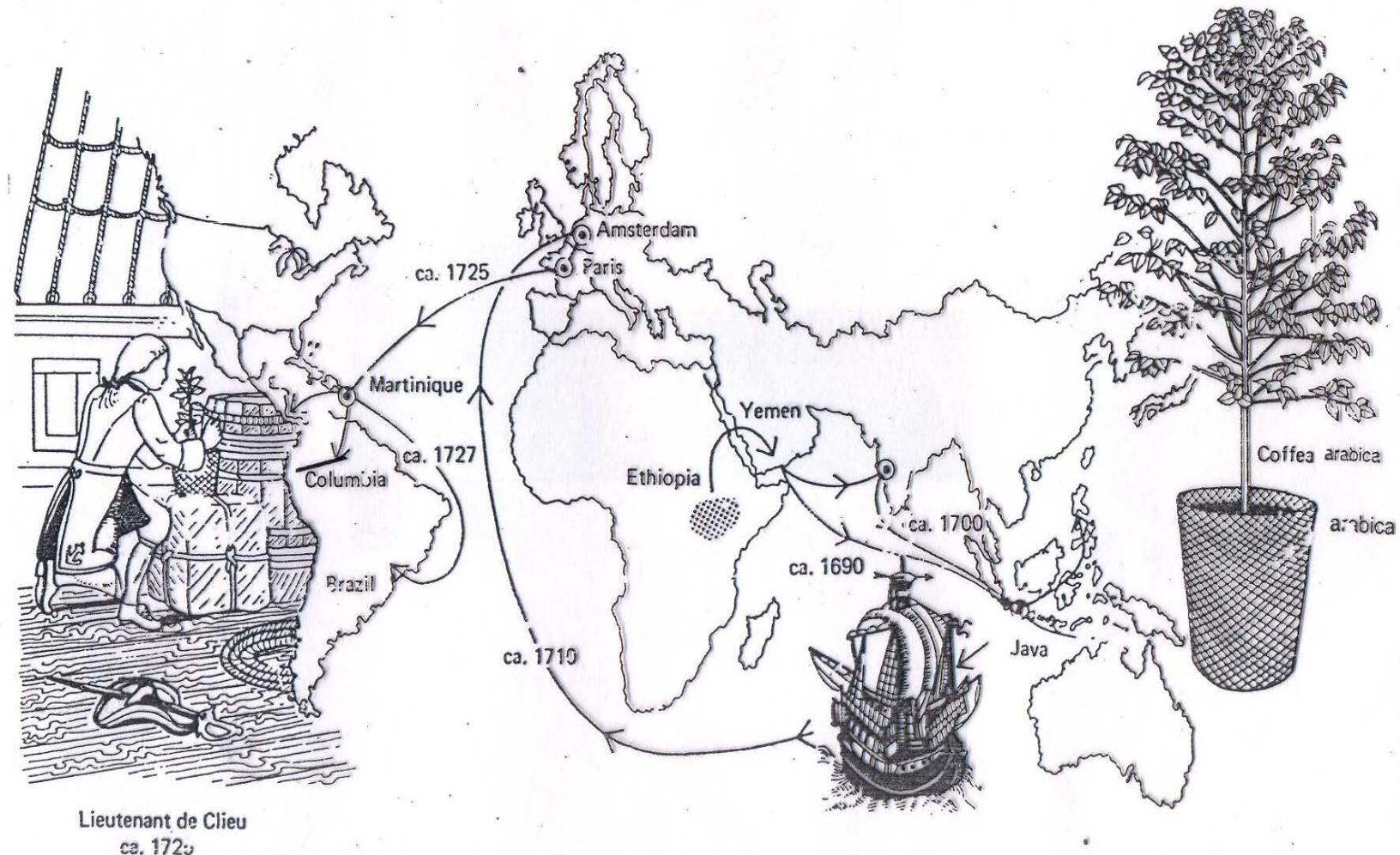
Tomato



Potato



Coffee, Wealth and Slavery



SATISFACTORY CURES REMAIN TO BE DEVELOPED FOR:

- **Viral diseases such as Herpes, AIDS and certain Cancers.**
- **Diseases of unknown Etiology, including Arthritis, some Cancers, Muscular Dystrophy and Parkinsonism.**
- **Self-inflicted diseases namely Alcoholism, Liver disease, Drug-dependency, Obesity, Smoking and the like.**
- **Genetic diseases ranging from Cystic Fibrosis and Hemophilia to Sickle Cell disease.**
- **The control of symptoms such as Pain, Elevated Cholesterol levels, Hypertension, and the general susceptibility to disease of various kinds.**

PHARMACEUTICAL COMPANIES AND RESEARCH ORGANIZATIONS INVOLVED IN SCREENING PLANTS FOR NEW NATURAL PRODUCTS SHOWING SOURCES OF SUPPLY

ORGANISATION	STATUS OF PLANT SCREENING PROGRAMME	SUPPLIED BY	REGION OF ORIGIN
Merck, Sharp Dohino Research Laboratories	Marine Organisms, plants and micro – organisms	New York Botanical Garden, Work with INBio. Costa Rica	South America
Monsanto/Searle	Micor-organisms and plants	Missouri Botanical Garden	North America
Shaman Pharmceuticals	Plants based on ethnobotanical information	Individuals, Institutions and government departments	Tropical South America, Africa and South East Asia.
Glaxo Smithkline Beecham	Marine organisms, Plants and mirco - organisms	Biotics Ltd., private individuals and own collectors	Malaysia and Micronesia

PHARMACEUTICAL COMPANIES AND RESEARCH ORGANIZATIONS INVOLVED IN SCREENING PLANTS FOR NEW NATURAL PRODUCTS SHOWING SOURCES OF SUPPLY

ORGANISATION	STATUS OF PLANT SCREENING PROGRAMME	SUPPLIED BY	REGION OF ORIGIN
American National Cancer Institute (NCI)	Large Scale screening of plants, also marine organisms	Missouri Botanical Garden, New York Botanical Garden, University of Illinois, Private contractors	Africa, Madagascar, Central and South America, South East Asia, Australia.
Bristol – Meyers	None at present. Evaluating whether to include plants or not. Developed taxol from Pacific Yew (<i>Taxus</i>)	Not applicable	Taxol material from USA
Glaxo	Natural products discovery department. Many therapeutic areas	Commercial and academic institutions, Royal Botanic Gardens, Kew.	South America, Africa

COST AND TIME OF SCREENING AND PRODUCT DEVELOPING PROGRAMMES

Sector	Year to develop	Cost (US\$ m)
Pharmaceutical	10 -15+	800
Botanical Medicines	< 2 -5	0.15-7
Commercial agricultural seed	8-12	1-2.5
Transgene	4+	35-75
Ornamental Horticulture	1 - 20 +	0.05-5
Crop Protection (Biocontrol agents)	2 -5	1-5
Industrial Enzymes	2-5	2-20
Personal care and Cosmetics	< 2-5	0.15-7

BIOTECHNOLOGY PHARMACEUTICALS

- **More than 2000 Biotechnology companies in the world**
- **Biotech product sales will increase from 11% – 17 % by 2010**
- **Biopharmaceutical require access to genetic resources including**
Genes from Humans and Domestic Animals
Genes from Plants

WHAT IS BIOTECHNOLOGY?

- **It is both new and old**
- **Three generation of biotechnology**

First generation biotechnology - beer brewing and bread making

Second generation biotechnology - Production of antibiotics, tissue culture, plant and animal breeding

Third generation biotechnology - Genetic engineering, Transgenic organisms



Dams & Displacement of Tribal people

Project	State	Population facing displacement	Tribal people as % of displaced
Karjan	Gujarat	11,600	100
Sardar Sarovar	Gujarat	200,000	57.6
Maheshwar	M.P	20,000	60
Bodhghat	M.P	12,700	73.91
Icha	Bihar	30,800	80
Chandil	Bihar	37,600	87.92
Koel Karo	Bihar	66,000	88
Mahibajaj Sargar	Rajasthan	38,400	76.28
Polavaram	A.P	150,000	52.9
Maithon & Panchet	Bihar	93,874	56.46
Pong	H.P	80,000	56.25
Inchampalli	A.P -Maharashtra	30,100	76.28
Upper Indravati	Orissa	18,500	89.2

Forest people Vs Agricultural People

Ecosystem People Vs Biosphere People

Ecological Refugees

Forest dwellers & Tribal Rights Act

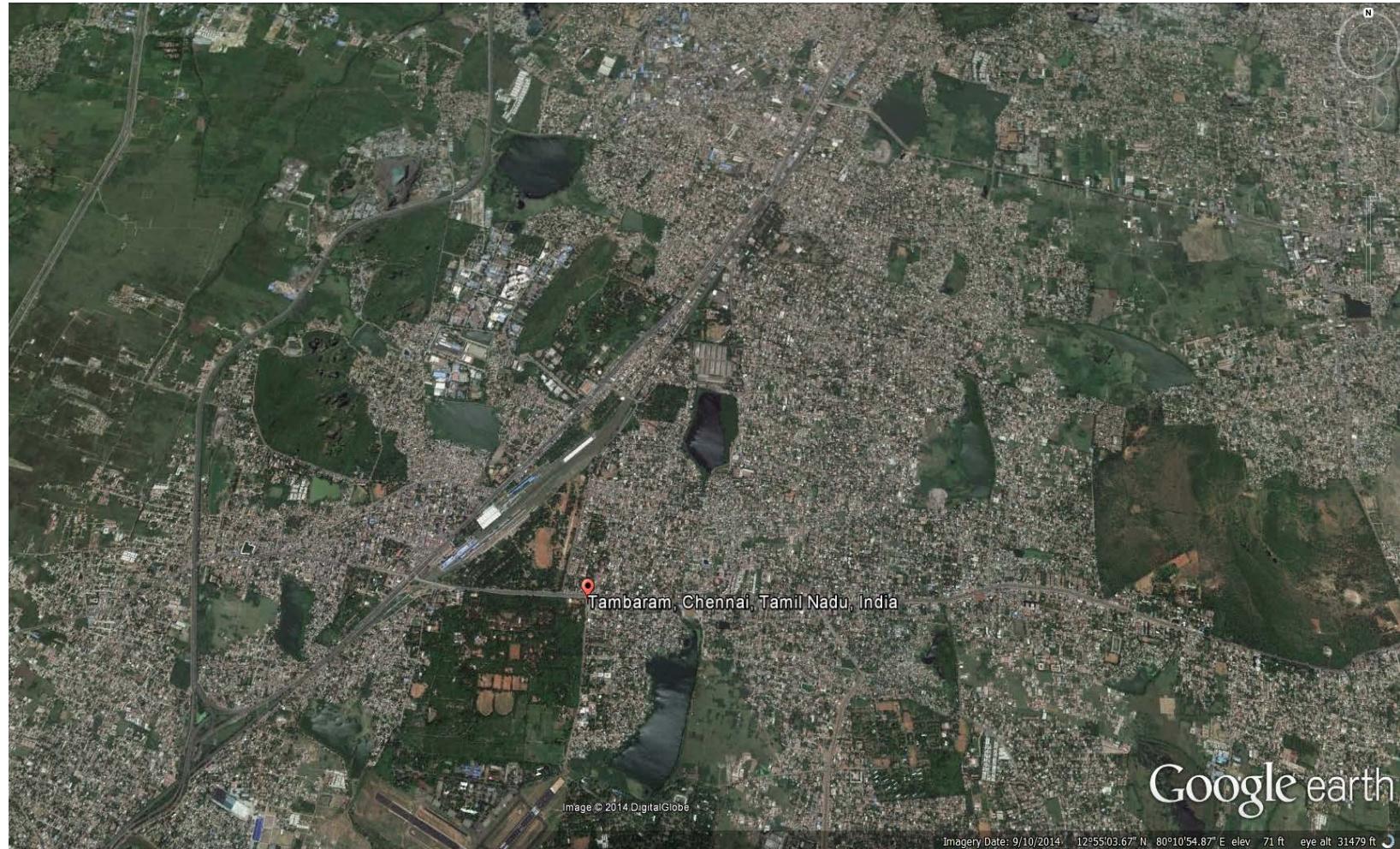
Death of a Lake



Dead Lake



Tambaram, Chennai, Tamil Nadu



Lakes, Agriculture and Livelihood



Invasive Species and Wetlands

Eichhornia crassipes (Mart.) Solms-Laub



Ludwigia peruviana (L.) Hara



Typha angustifolia L.



Ipomoea carnea Jacq.

A few temperate weeds were introduced from Mediterranean Region and East Africa

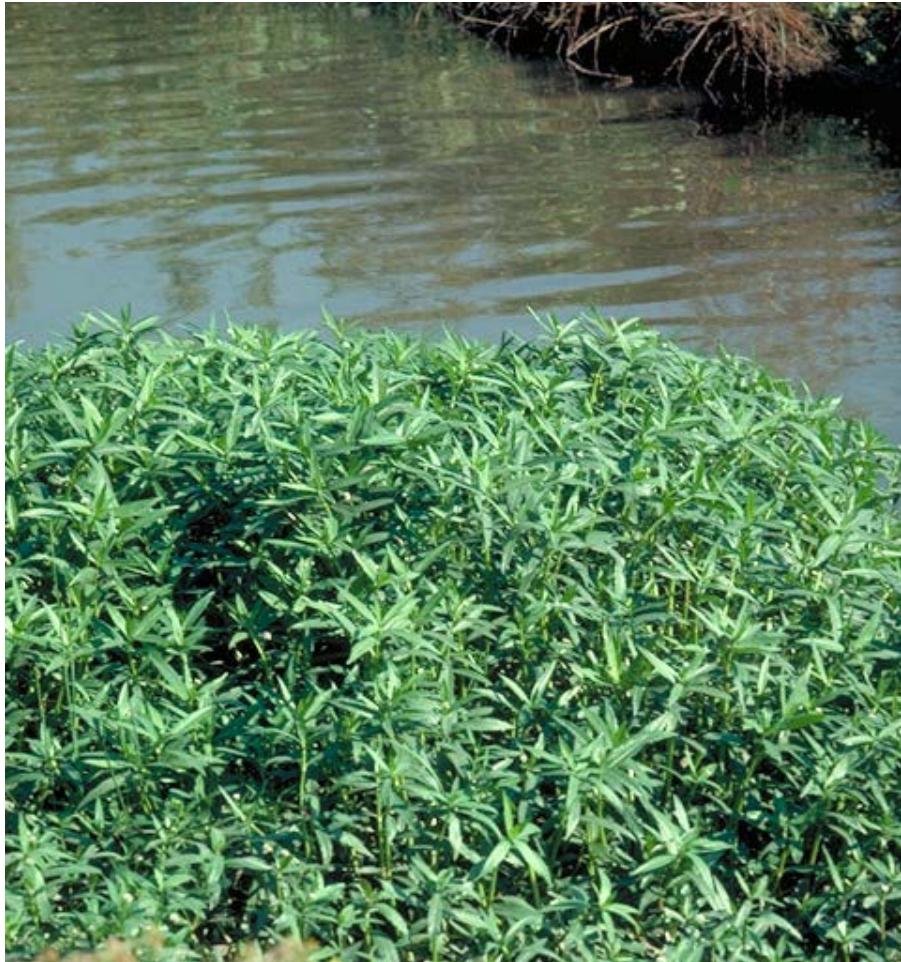
Rorippa nasturtium - aquaticum (L.) Hayek.



Zantedeschia aethiopica (L.) Spreng.



Alternanthera philoxeroides (C. Martiu) Griseb. – rapidly spreading wetland invasive species



Sphagneticola trilobata
a potential marsh land invasive species







Butea monosperma - ಮುತ್ತುಗೆ





Longan Fruit

Dimocarpus longan







Endemic genera of Angiosperms in India: A Review

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Abstract

This is an earnest effort to review the earlier recorded endemic genera of angiosperms in India and assess those present within the political boundaries of India. It is concluded that only 49 genera are endemic to India, of which 36 are unispecific. Peninsular India has a high concentration of endemic genera (40 genera). Four are confined to Indian Himalaya and three to Andaman & Nicobar Islands. Genus *Hardwickia* is widely distributed in the dry deciduous forests of Peninsular and North India, excluding Northeast India. *Bentinckia* which is distributed in Peninsular India and Nicobar Islands is the only genus with disjunct distribution. About 71% of the genera are herbaceous and their concentration is more in wet evergreen forests and grasslands. Threat assessment has not been made for majority of the species of these genera. There is an urgent need for an assessment based on current IUCN Criteria.

Keywords: Angiosperm, Conservation, Endemic Genera, India

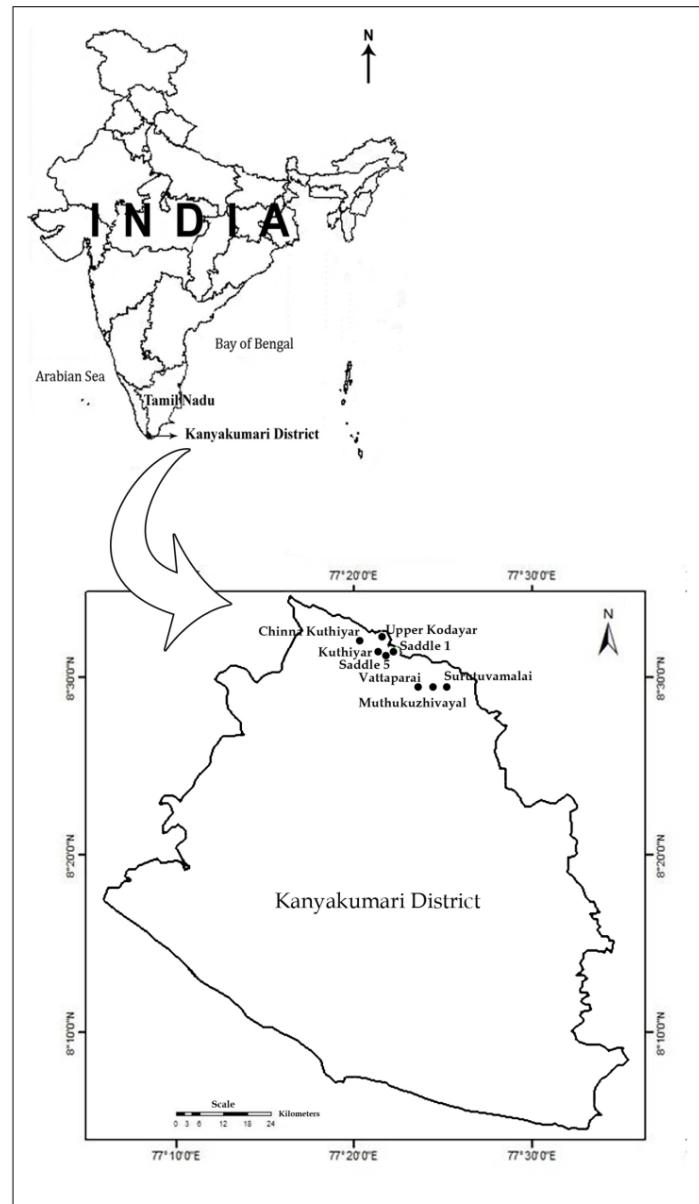
Introduction

Tropical forests show a high degree of species richness and endemism (Orians & Groom, 2005). Endemic taxa are restricted to specific areas such as oceanic islands, peninsular regions, mountain peaks and unique geographical areas. Globally 'botanically interesting' areas are rich in endemics, especially islands (Richardson, 1978). Regions with high concentration of endemic species are classified as 'Biodiversity Hotspots' by the Conservation International (CI). Of the 34 hotspots recognized by the CI, the following four hotspots fall within the Indian political boundaries (Mittermeier *et al.*, 2004): 1. Indo-Burma covering Mizoram, Manipur, Nagaland, Meghalaya, Tripura and Andaman Islands, 2. Himalaya covering Jammu & Kashmir, Himachal Pradesh, Uttarakhand, northern part of West Bengal (Darjeeling), Sikkim, northern part of Assam and Arunachal Pradesh, 3. Western Ghats falls within the states of Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra and Gujarat and 4. The Sundaland covering the Nicobar Islands. Of the 20,074 taxa of angiosperms reported from India (Karthikeyan, 2009), 5752 (29%) taxa are endemic and are distributed in three major phytogeographical regions, viz., Indian Himalaya, Peninsular India and Andaman & Nicobar Islands (Nayar, 1996). India harbours a large number of endemic species. However, the number of endemic genera is less and no family is endemic to India.

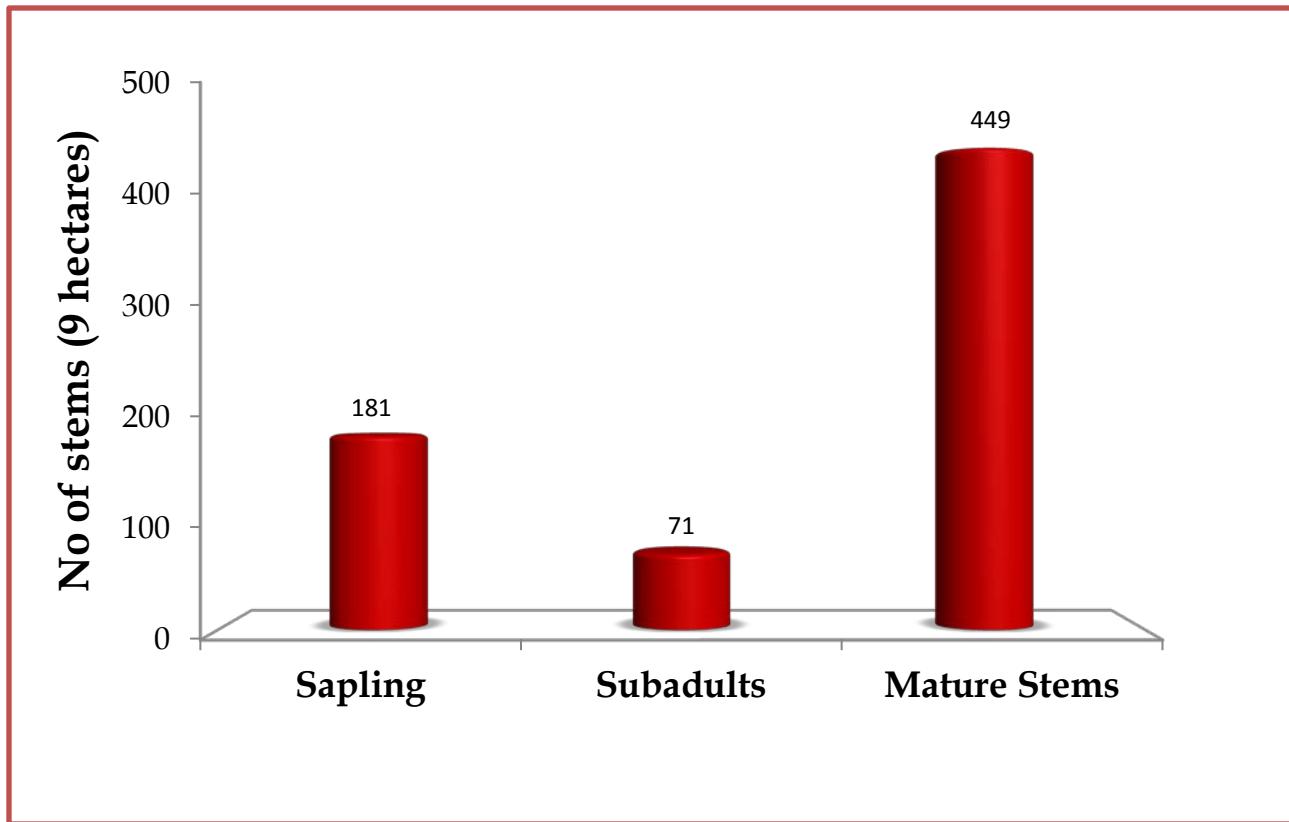
Methodology

Information on endemic genera of angiosperms were collected from the available literature (Cooke, 1901 – 1908; Chatterjee, 1939; Bor, 1949, 1954, 1958, 1960; Airy Shaw, 1952; Clifford, 1967; Ansari & Hemadri, 1971; Rao, 1972, 1979; Mukherjee & Constance, 1974; Saldanha, 1974; Sohmer, 1976; Hong, 1980; Chakraborti, 1981; Clayton, 1981; Nair *et al.*, 1982, 1983; Panigrahi & Das, 1983; Uniyal & Pal, 1983; Chakraborty & Rao, 1984; Pandurangan *et al.*, 1984; Bhat, 1986; Mukherjee & Constance, 1986; Rao & Chakrabarty, 1986; Takhtajan, 1986; Ahmedullah & Nayar, 1987; Kumar & Shetty, 1987; Deshpande *et al.*, 1989; Eriksson, 1990; Mathew, 1991; Mill, 1991; Mathew & Lakshminarasimhan, 1994; Kumar, 1995; Sarkar, 1995; Uniyal, 1995; ING, 1996 (<http://botany.si.edu/ing/>); Nayar, 1996; Sharma *et al.*, 1996; Kumar & Rasmussen, 1997; Shivamurthy & Sadanand, 1997; Yoganarasimhan *et al.*, 1997; Rao, 1998; Kumar & Coomar, 1999; Ahmedullah, 2000; Janarthanam *et al.*, 2000; Singh *et al.*, 2001; Yadav & Sardesai, 2002; Fonseca & Janarthanam, 2003; Sasidharan, 2004; Daniel, 2005; Govaerts, 2005 (<http://www.kew.org/wcsp>), 2006 (<http://www.kew.org/wcsp/monocots>); Nayar *et al.*, 2006; Venu, 2006; Balakrishnan & Chakrabarty, 2007; Mitra & Mukherjee, 2007; Rajkumar & Janarthanam, 2007; Anderberg & Pandey, 2008; Mabberley, 2008;

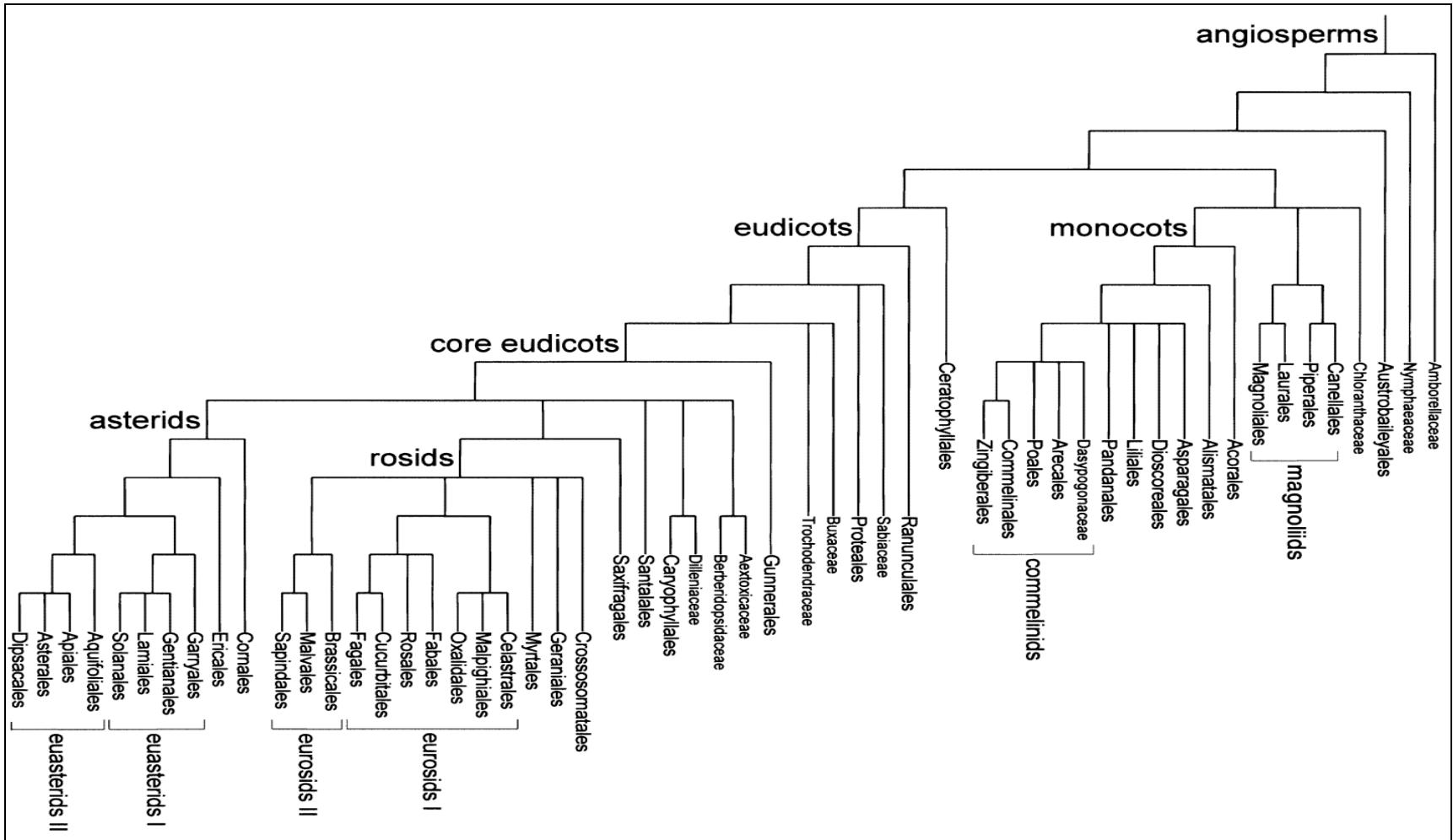
Population sites of *Elaeocarpus venustus* in Kanyakumari District, Tamil Nadu



Population Structure of *Elaeocarpus venustus* in Kanyakumari District



APG CLASSIFICATION



We think too much but feel little

Charlie Chaplin in the Movie The Great Dictator, (1940)



Thank you