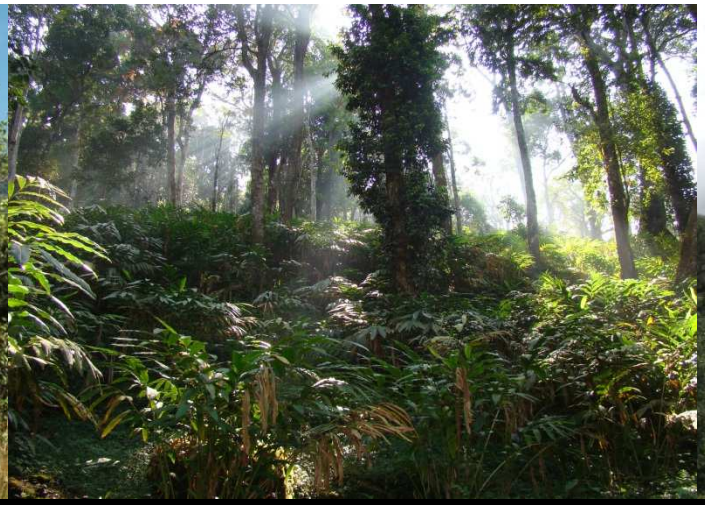
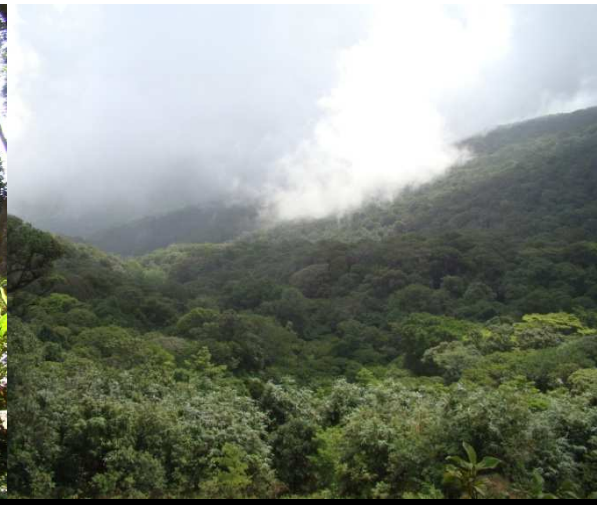




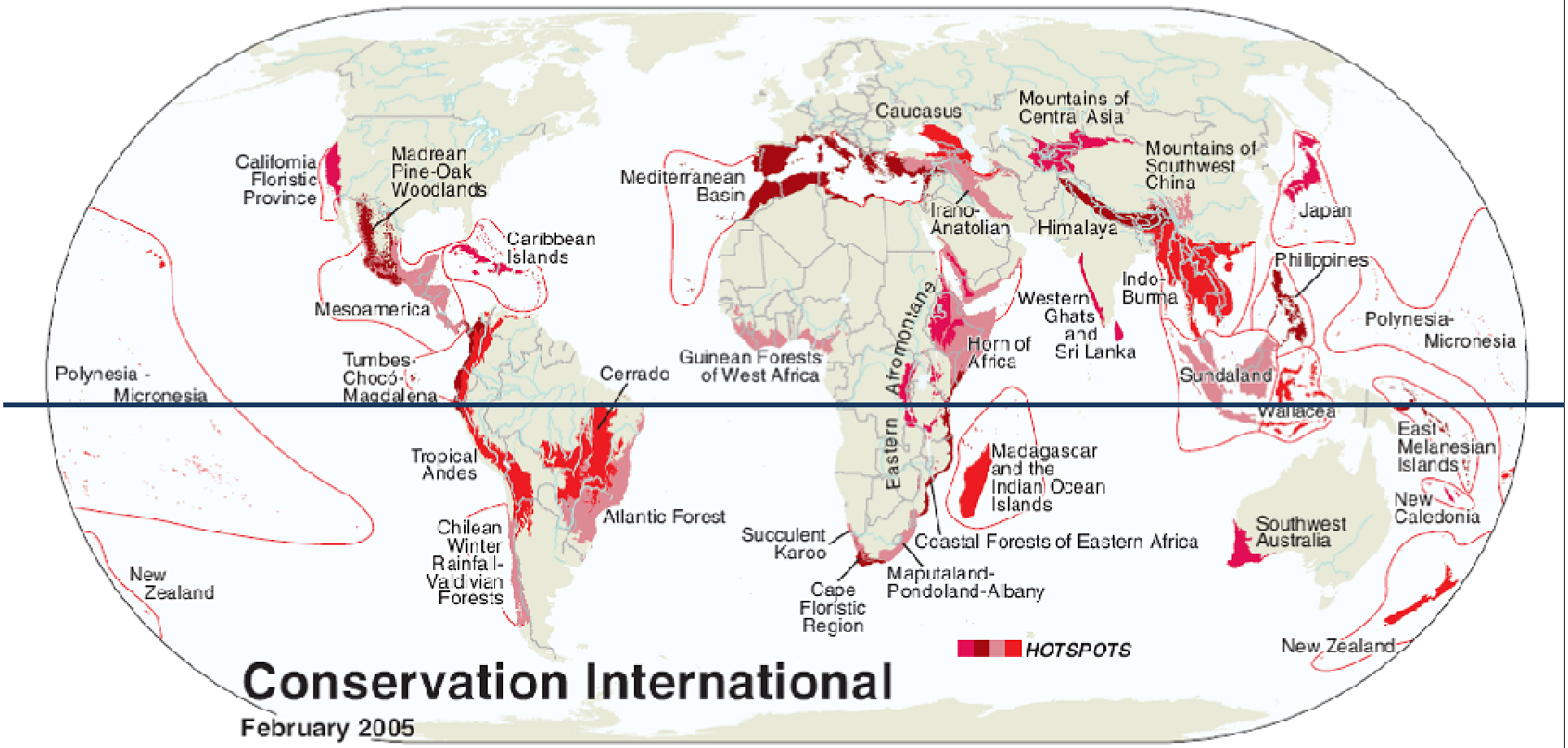
HISTORY, BIODIVERSITY, BIOGEOGRAPHY AND BIO-PROSPECTING OFTHE WESTERN GHATS

I MSc Botany

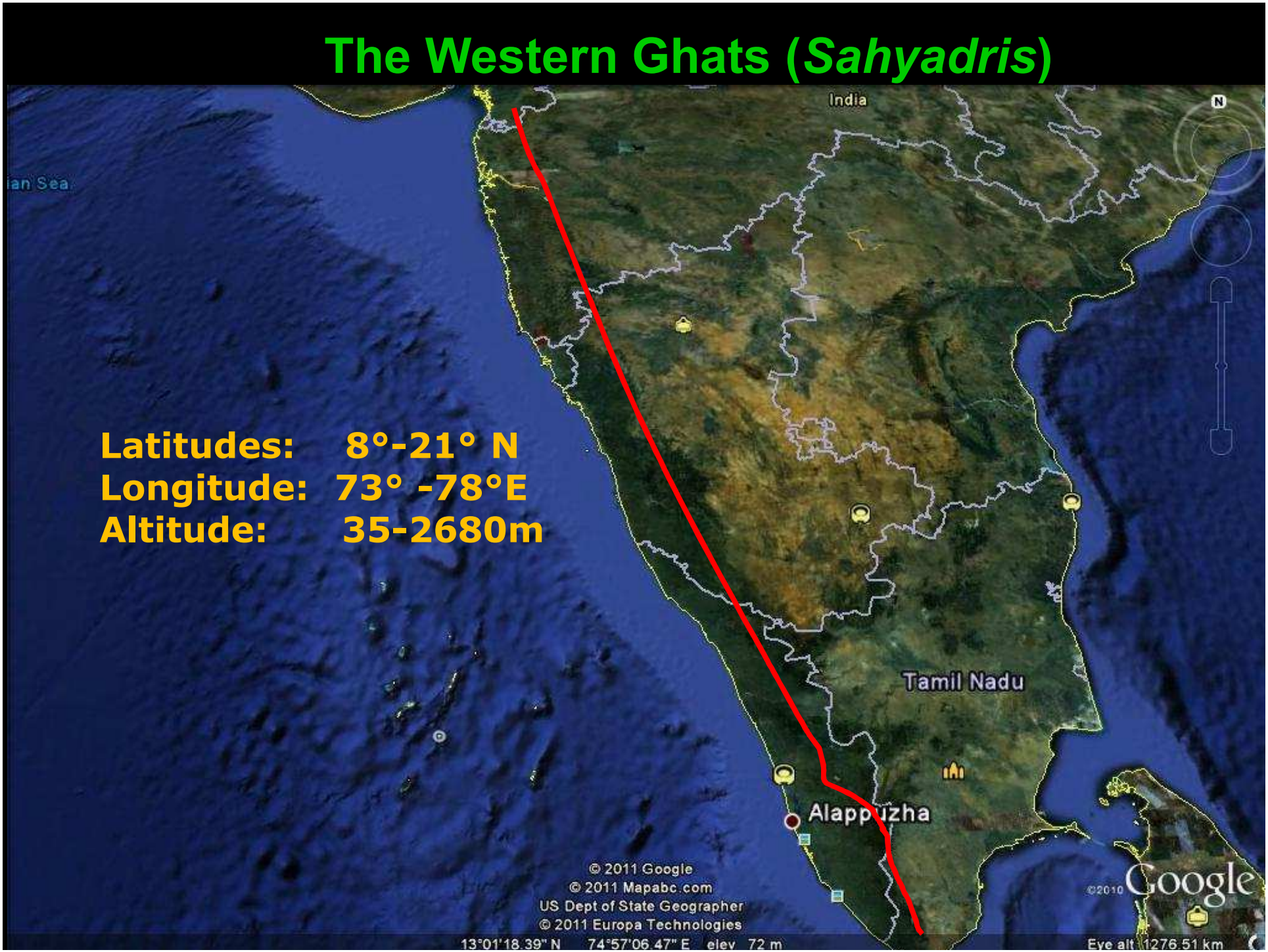
Giby Kuriakose

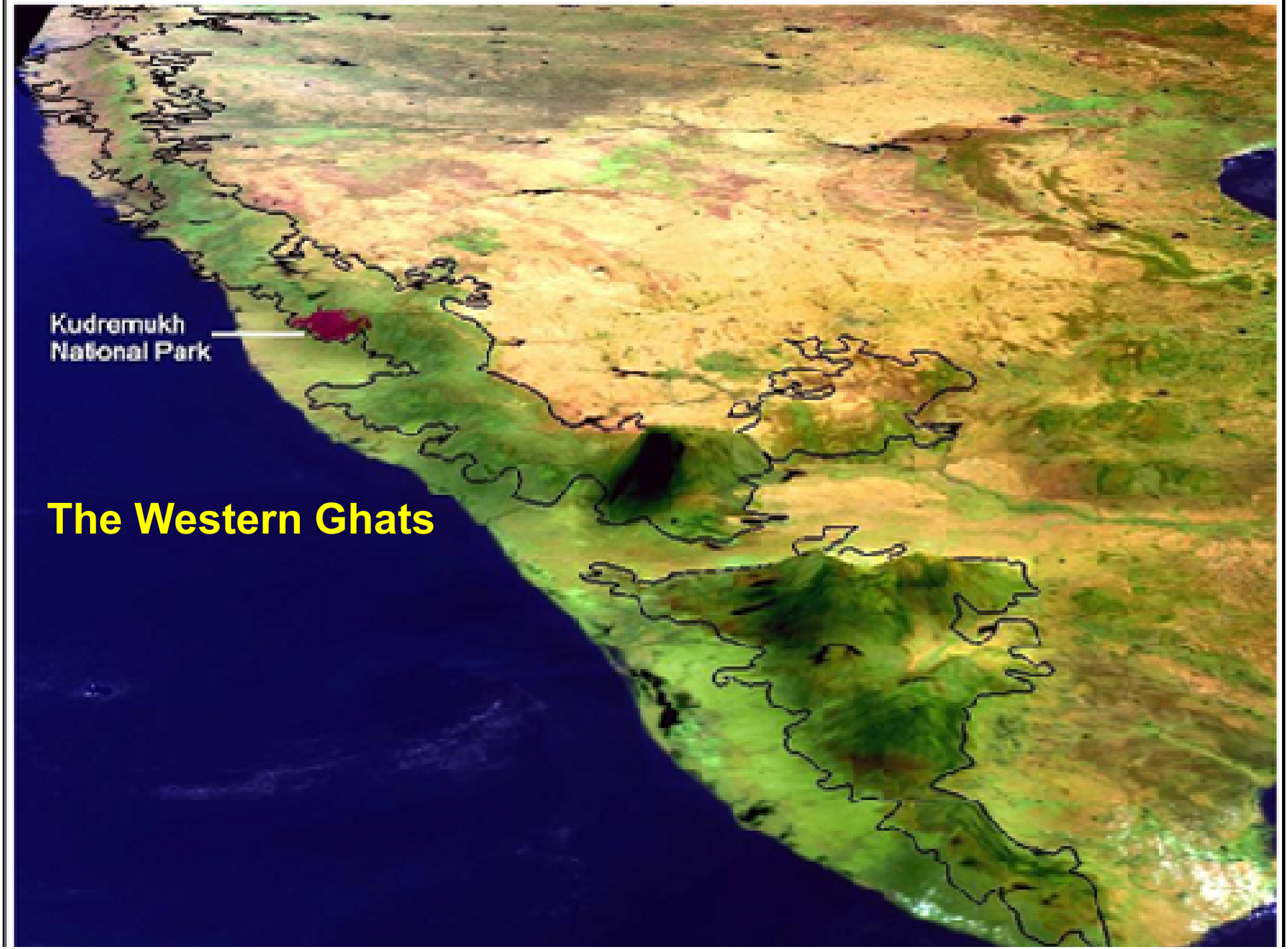


“Hot Spots”

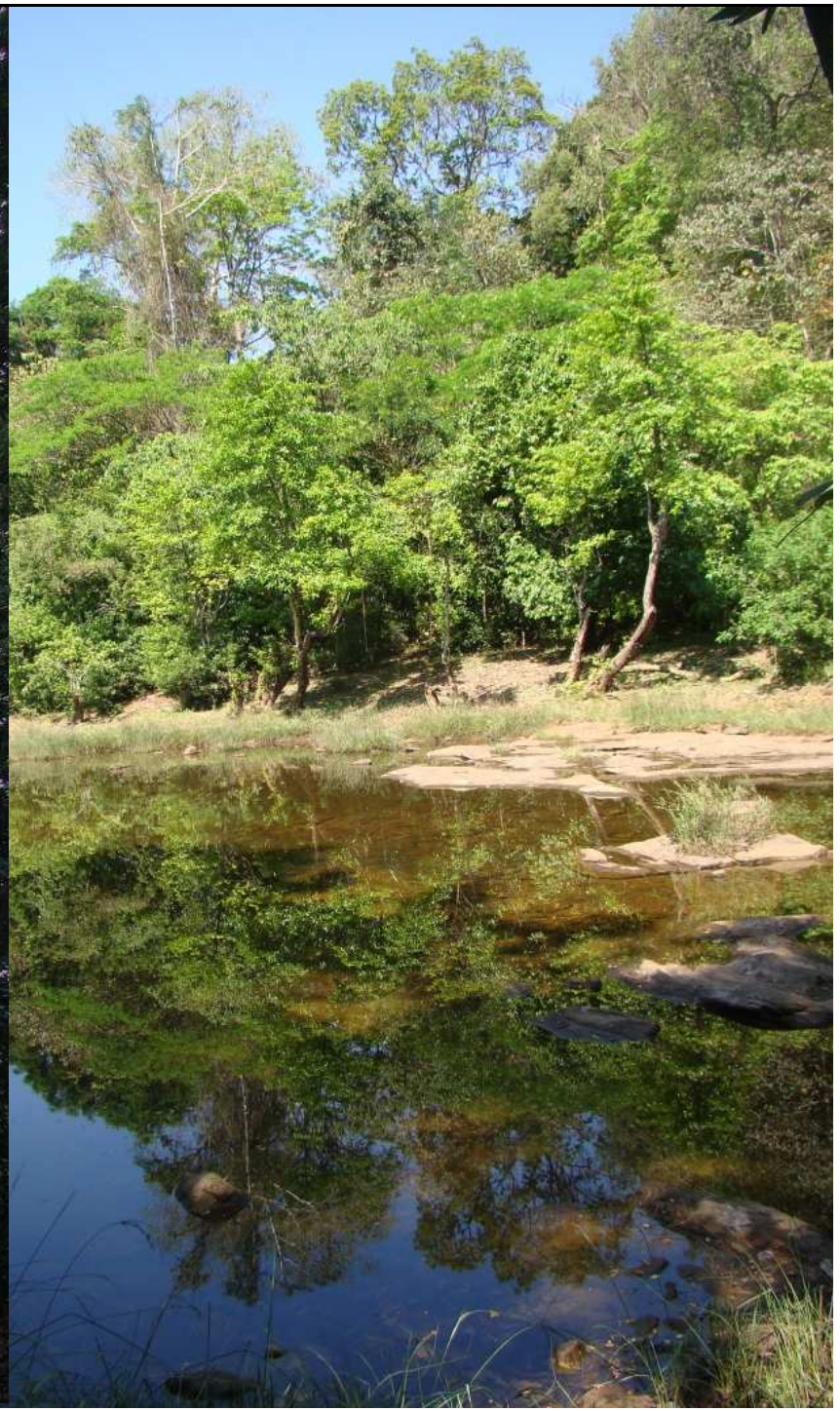

California Floristic Province
Madrean Pine-Oak Woodlands
Caribbean Islands
Mesoamerica
Tumbes-Chocó-Magdalena
Polynesia - Micronesia
Cerrado
Tropical Andes
Chilean Winter Rainfall-Valdivian Forests
Atlantic Forest
New Zealand
Mediterranean Basin
Caucasus
Irano-Anatolian
Mountains of Central Asia
Himalaya
Mountains of Southwest China
Japan
Philippines
Indo-Burma
Western Ghats and Sri Lanka
Horn of Africa
Guinean Forests of West Africa
Afromontane
Eastern
Madagascar and the Indian Ocean Islands
Coastal Forests of Eastern Africa
Maputaland-Pondoland-Albany
Succulent Karoo
Cape Floristic Region
Sundaland
Wallacea
Polynesia-Micronesia
East Melanesian Islands
New Caledonia
Southwest Australia
New Zealand
HOTSPOTS
Conservation International
February 2005

The Western Ghats (*Sahyadris*)



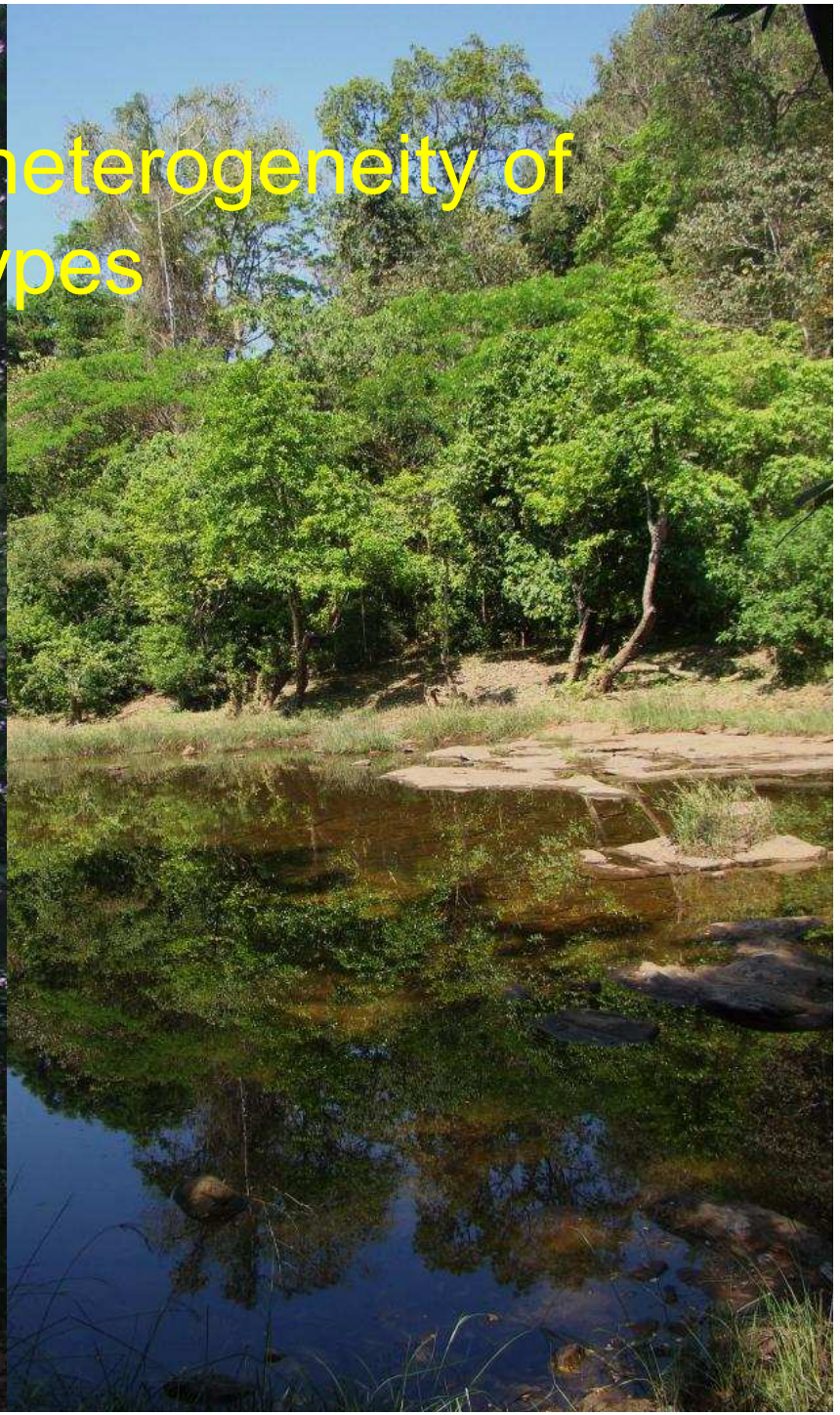

Kudremukh
National Park
The Western Ghats

- Area -1,60,000 Sq km (4% of India)
- Length- 1600 km
- Elevation-50 -2800 m MSL
- Rain Fall –2000-6000 mm /Year
- Climate – Monsoon, Tropical, high variation in wind speed
- Soil- Alluvial, Red Laterite
- Rivers-81

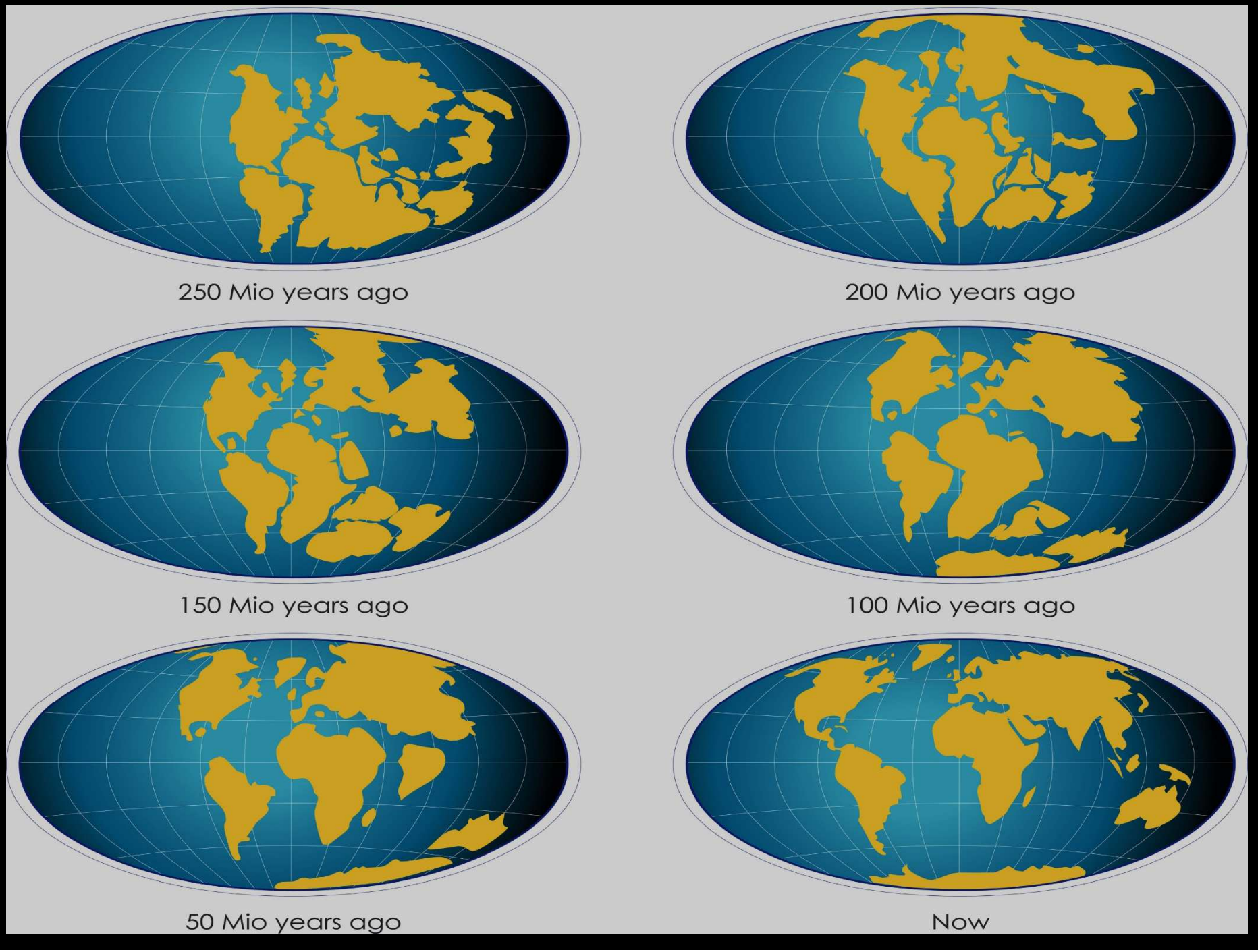


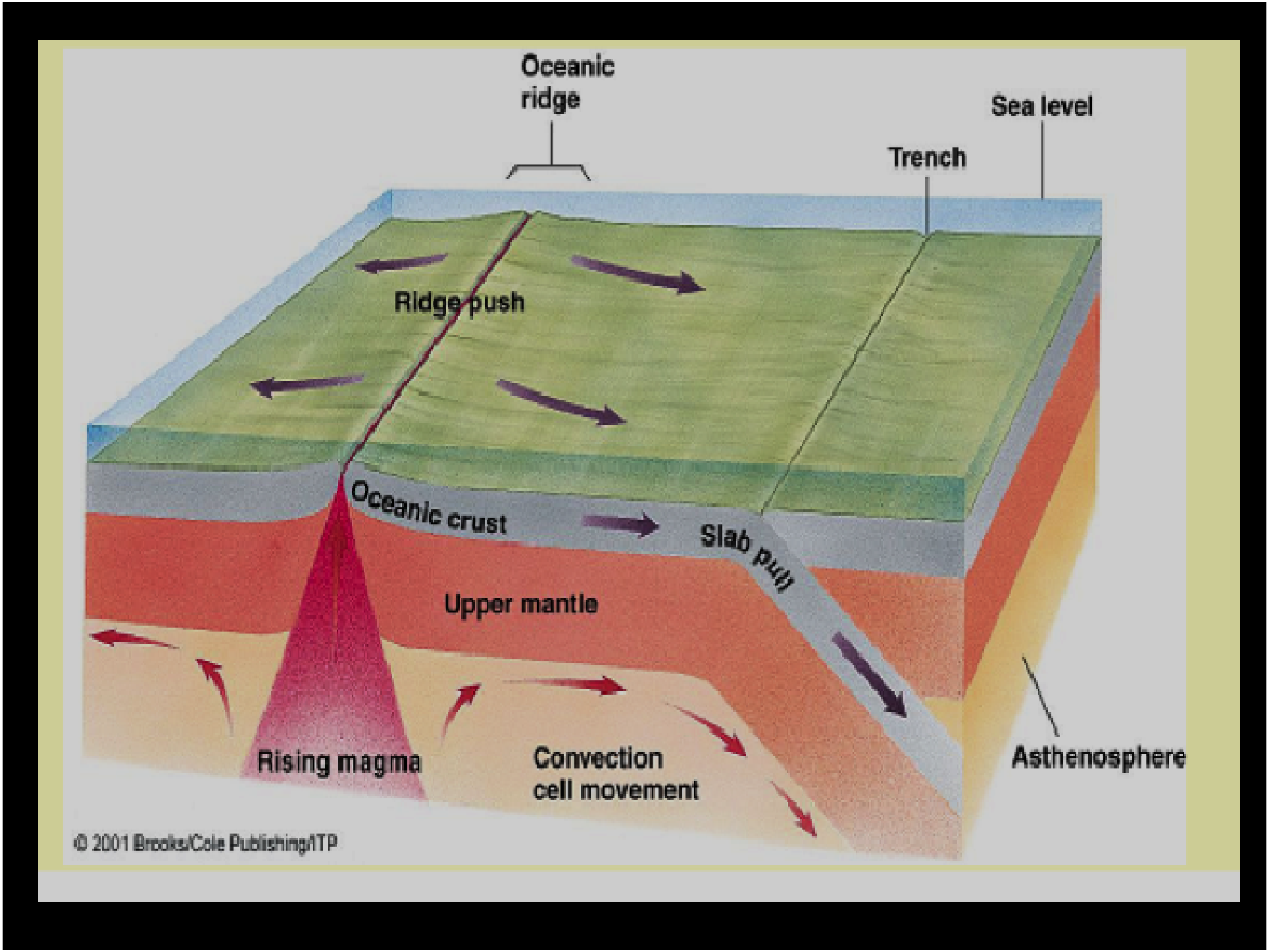
Factors influencing the heterogeneity of vegetation types

- High wind speed
- Torrential rain
- Temperature fluctuations
- varying dry month duration
- Topography
- geology



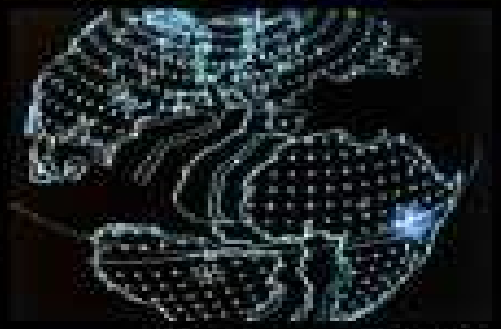
Origin and Elevation of the Western Ghats


250 Mio years ago
200 Mio years ago
150 Mio years ago
100 Mio years ago
50 Mio years ago
Now


Oceanic ridge
Sea level
Trench
Ridge push
Oceanic crust
Slab pull
Upper mantle
Rising magma
Convection cell movement
Asthenosphere
© 2001 Brooks/Cole Publishing/ITP

Christopher Scotese pushes continents around using a computer, to figure out how they once fit together.

Pushing Pangaea together again. This is what Planet Earth may have looked like some 200 million years ago, when the dinosaurs had just begun their reign.



Eighty million years ago, the South Atlantic had begun to open. The line that runs through its center is the mid-ocean ridge. There new sea floor is being forged.

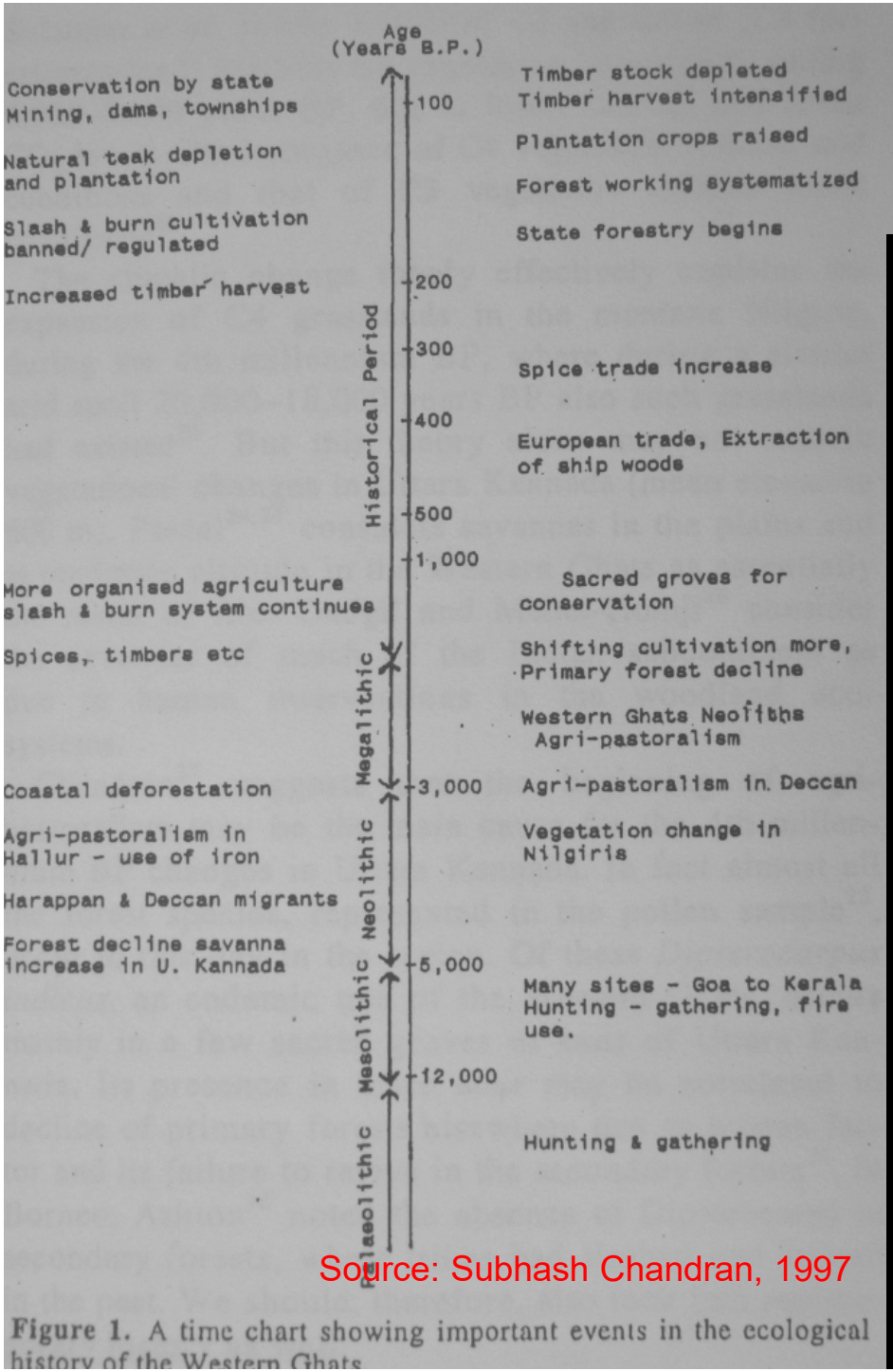
The North Atlantic opens. Note: Ninety-eight million years ago. The effect produced here was caused by Pure Imagination!

FOR "PANGAEA TO DRIFT APART" THERE WOULD HAVE TO BE A "CATACLYSMIC CHANGE" IN THE EARTH'S CRUSTAL MASS TO LEAVE THE "UNBURIED" SCARS ON THE OCEAN FLOOR THAT ARE THERE. THIS CRUSTAL CHANGE WOULD HAVE TO OCCUR WITHIN THE LAW OF CAUSE AND EFFECT; FOR EVERY ACTION THERE HAS TO BE AN EQUAL AND OPPOSIT REACTION. THE "PANGAEA" IN THE PAST WAS IN "GLOGAL EQUILIBRIUM!" WHAT CAUSED IT TO LOOSE ITS EQUILIBRIUM??

- The creation of the escarpment was related to the formation of new continental margin with the break up of Gondwanaland and the opening of the Arabian Sea which occurred at the Cretaceous-Tertiary boundary, the time of the extrusion of the Deccan Basalt (Ollier and Powar 1985)

- The Geological history of the Western Ghats goes back to the time when the earth's crust was being formed

- EG and the Himalayas are younger than when compare to the WG



Source: Subhash Chandran, 1997

Figure 1. A time chart showing important events in the ecological history of the Western Ghats

History of Land-use in the Western Ghats

First Human inhabitation – About 12,000 years

First Agricultural Practice – About 9000-10000 years

Slash and Burn Cultivation – 5000 Years

Domestication of Animals – 3800- 4500 years

Shifting Cultivation – 1000-2000 Years

Sacred Groove – 1000-2000 Years

European Trade – 400-500 Years

Spice Trade – 300-450 Years

Increased Timber Harvest – 200 Years

Natural Teak Depletion – 150 Years

Plantation Crops – 120 Years

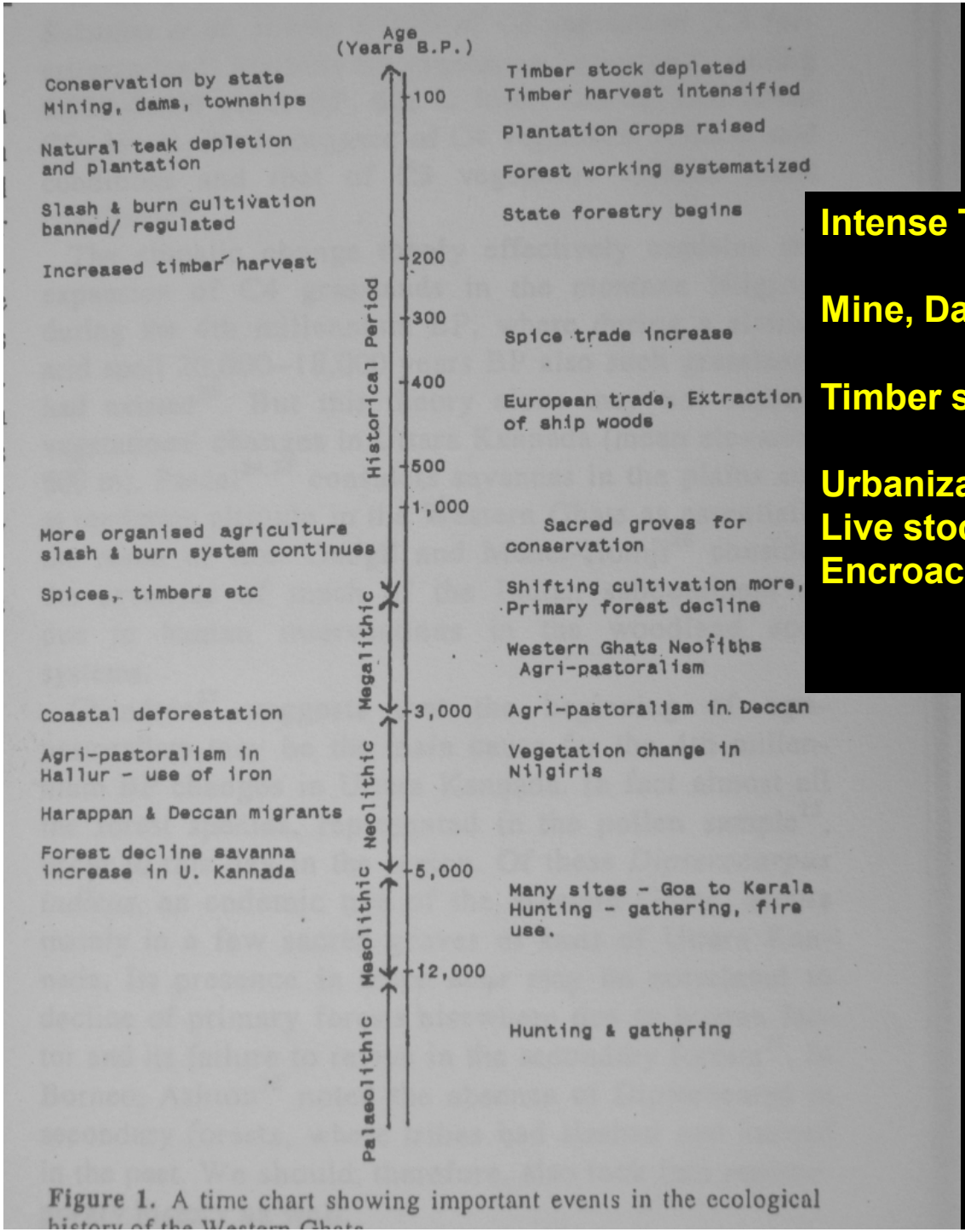


Figure 1. A time chart showing important events in the ecological history of the Western Ghats

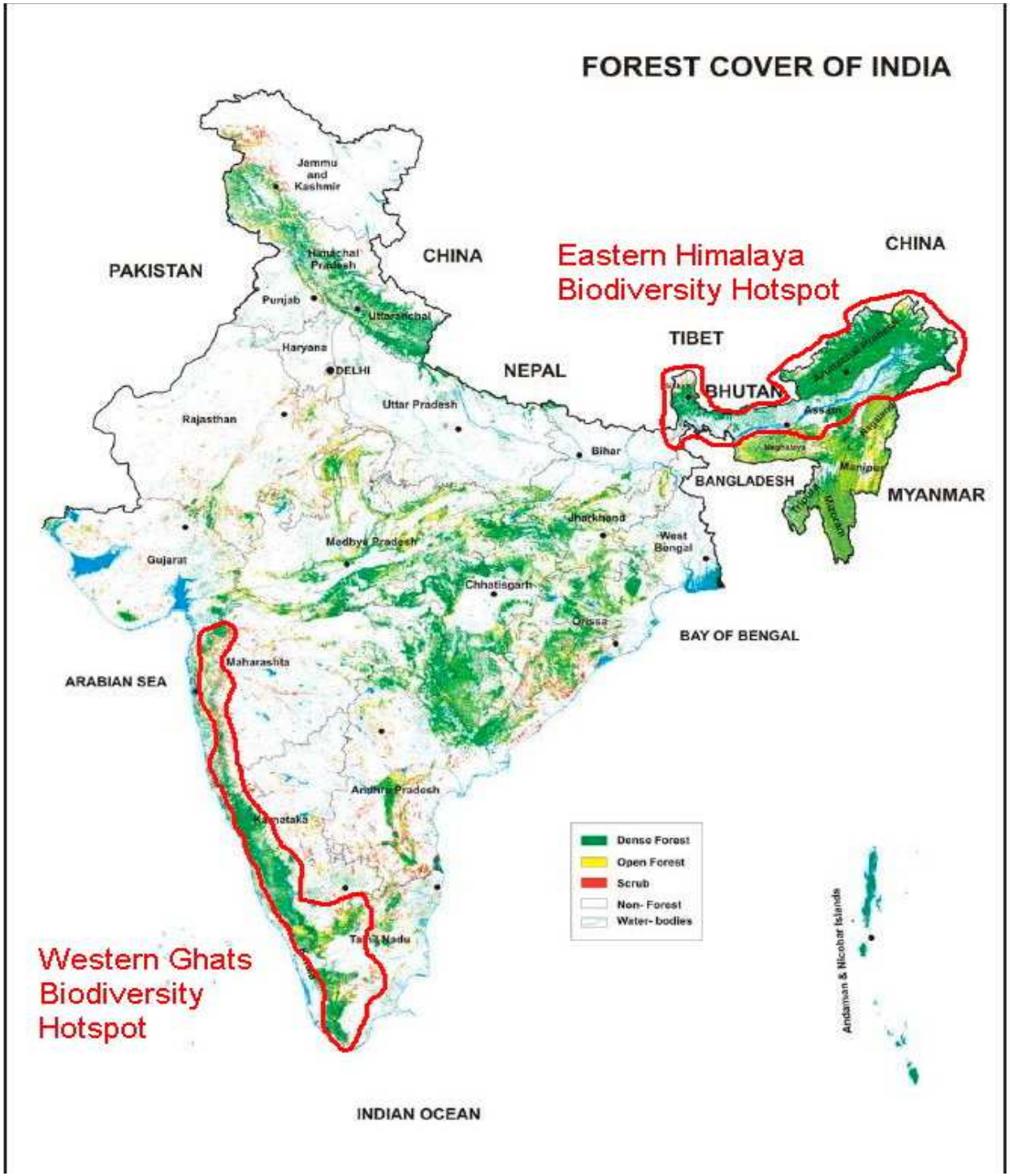
Intense Timber Harvest – 80-100 Years

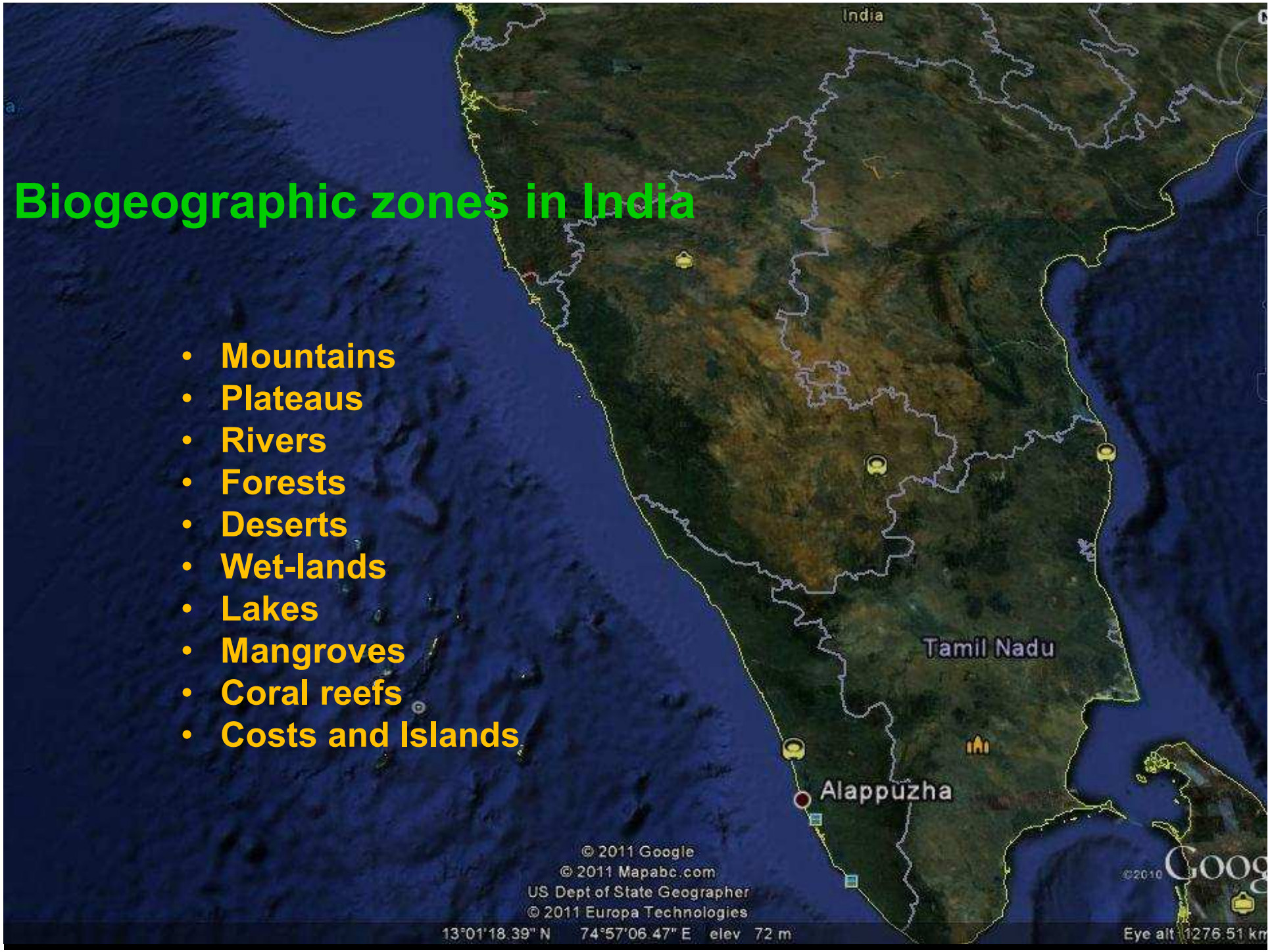
Mine, Dams & Town ships – 100 Years

Timber stock depleted – 80 Years

Urbanization, Plantations,
Live stock, Industries,
Encroachment, Buildings – Last 50 years

Biogeography

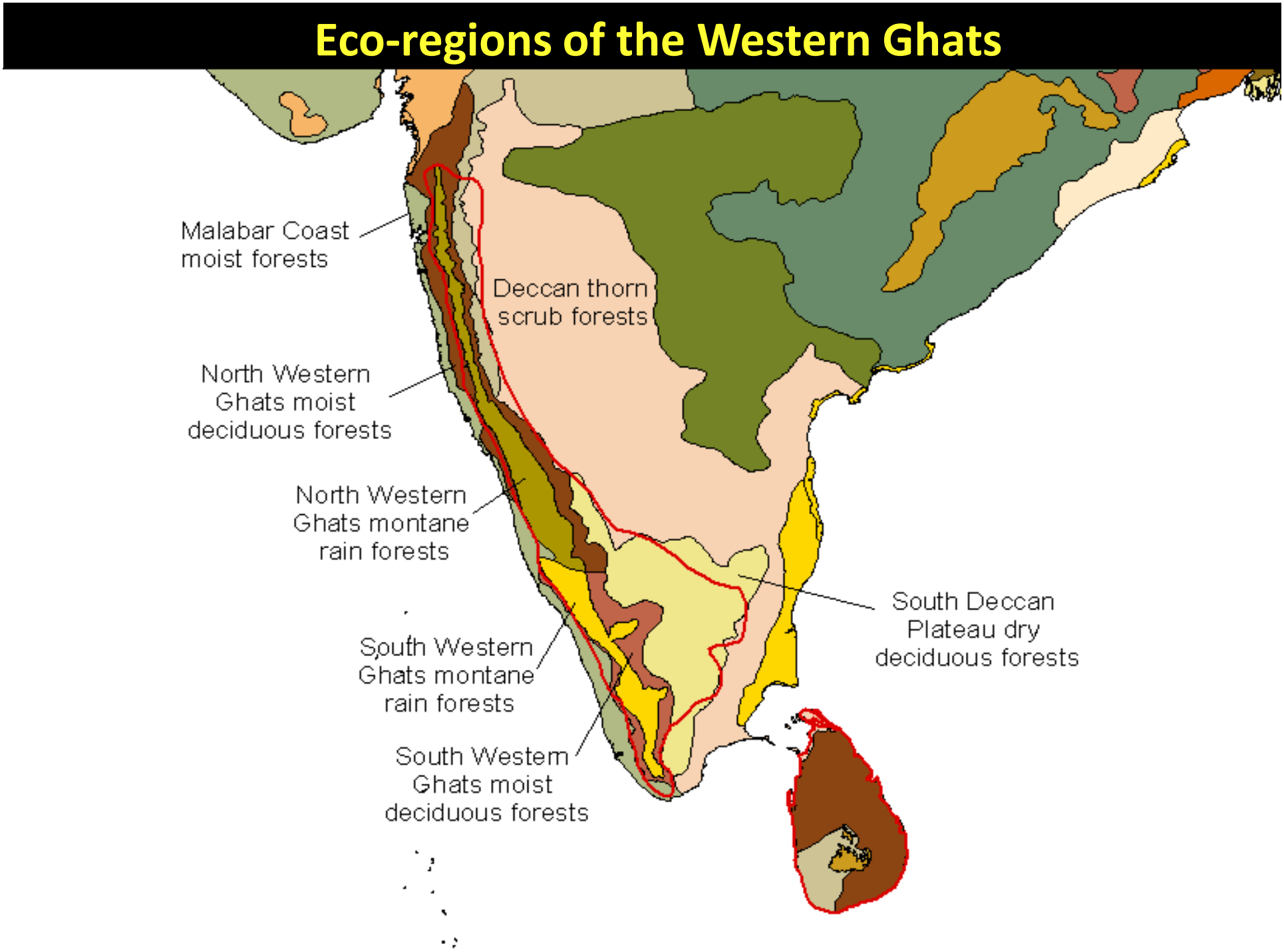

FOREST COVER OF INDIA
Jammu and Kashmir
PAKISTAN
CHINA
Himachal Pradesh
Punjab
Uttaranchal
Haryana
DELHI
NEPAL
Uttar Pradesh
Rajasthan
Bihar
Eastern Himalaya Biodiversity Hotspot
CHINA
TIBET
BHUTAN
Assam
Meghalaya
Manipur
BANGLADESH
MYANMAR
Jharkhand
West Bengal
Madhya Pradesh
Gujarat
Chhatisgarh
Orissa
BAY OF BENGAL
ARABIAN SEA
Maharashtra
Andhra Pradesh
Karnataka
Tamil Nadu
Western Ghats Biodiversity Hotspot
Dense Forest
Open Forest
Scrub
Non- Forest
Water- bodies
Andaman & Nicobar Islands
INDIAN OCEAN

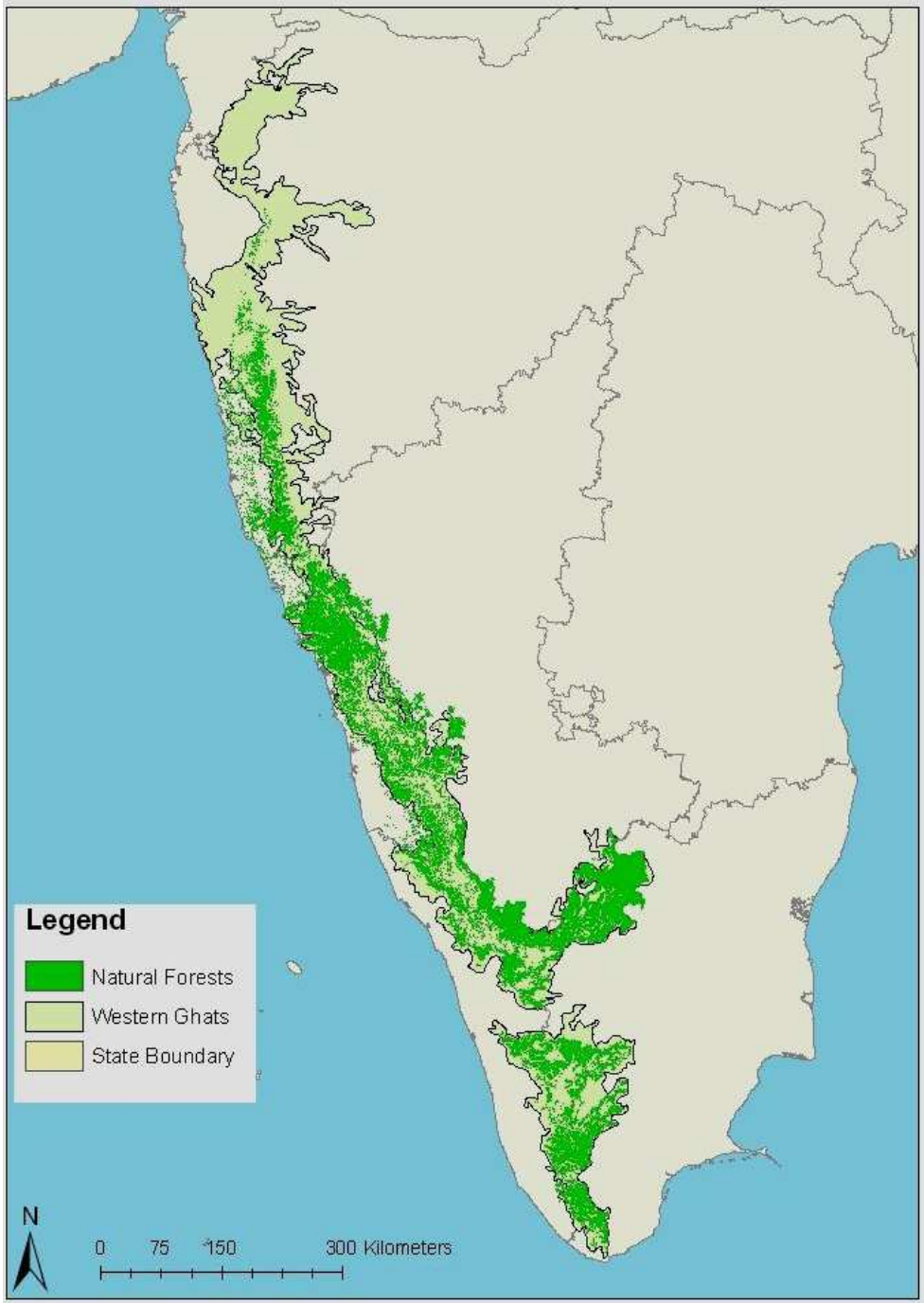


Biogeographic zones in India

- Mountains
- Plateaus
- Rivers
- Forests
- Deserts
- Wet-lands
- Lakes
- Mangroves
- Coral reefs
- Costs and Islands

Eco-regions of the Western Ghats



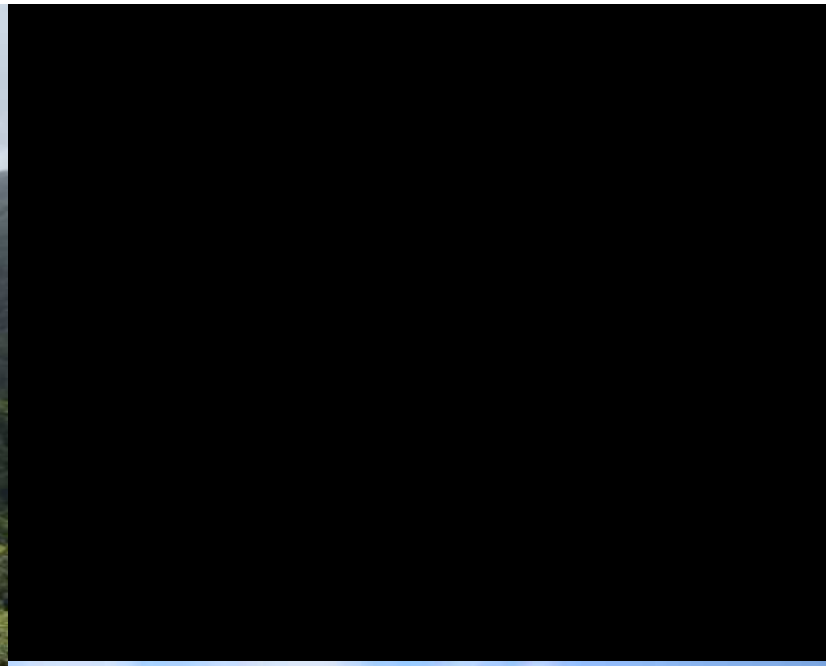


Natural Forests in the WG

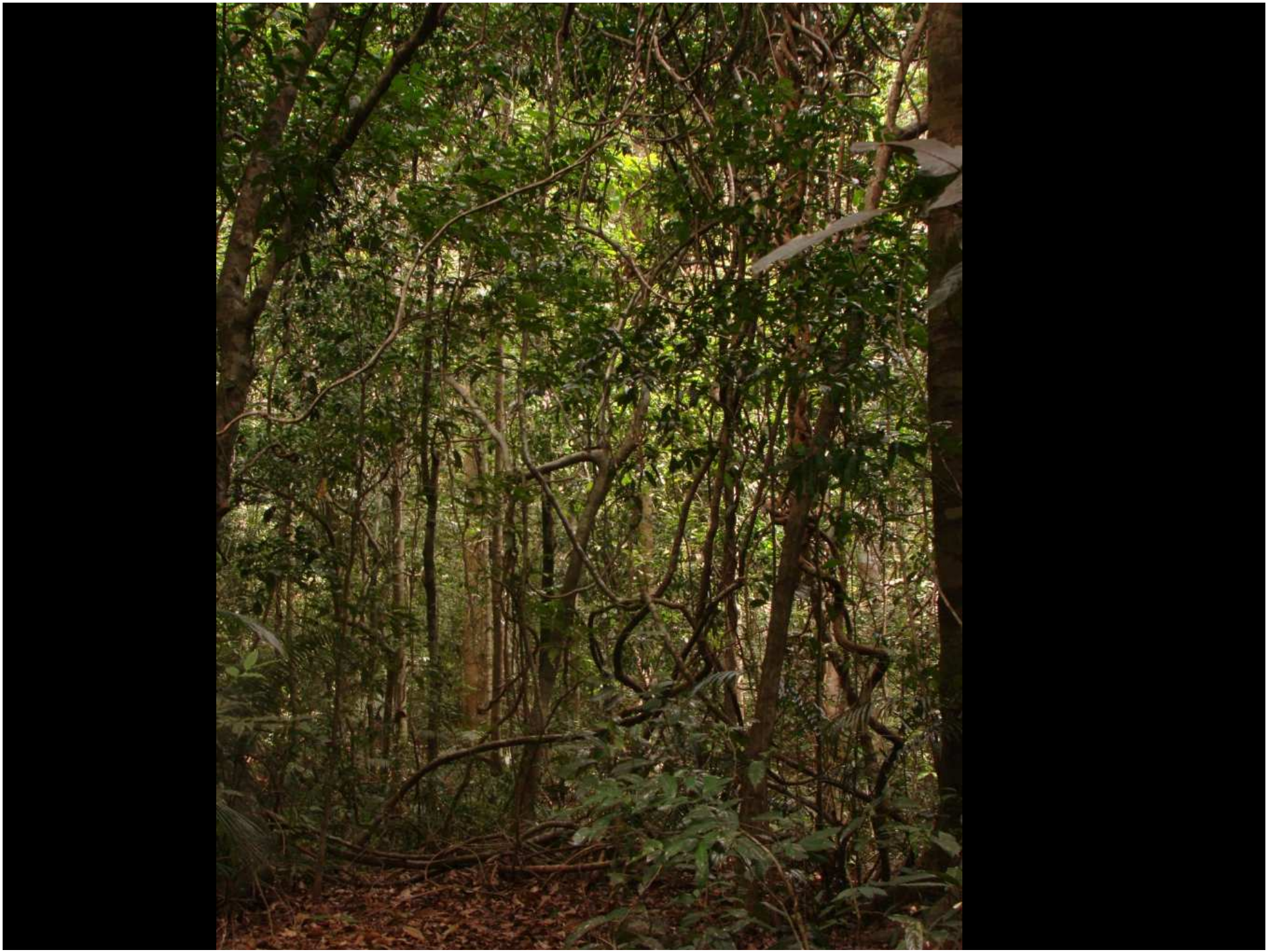
Total Geographical Area : 160000 Sqkm

Remaining Natural forest: 49000 Sqkm (31% , 2000 data)

Courtesy: Kiran, M.C. ATREE, Bangalore





Biodiversity

Group	Total Species	Endemic Species	% Endemism	Source
Angiosperms	7402	2300	31.08	https://en.wikipedia.org/wiki/Western_Ghats
Butterflies	330	37	11	Daniels and Vencatesan (2008)
Fishes	218	116	53	Dahanukar, *et al.,* (2004).
Amphibians	175	130	74.2	ENVIS,CES, IISc, (2009)
Reptiles	156	97	62	Daniels and Vencatesan, (2008)
Birds	580	19	4	Pande *et al.,* (2003)
Mammals	120	14	12	Daniels and Vencatesan, (2008)

- 496 plant, 91 amphibian, 41 mammal, 22 bird, 8 fish, 6 reptile and 3 insect species **threatened** (IUCN Red Data List) in the WG

- In the WG, 127 are Vulnerable, 145 are Endangered, and **51 are Critically Endangered**

- Inadequate published data on reptiles, freshwater fish and invertebrates. IUCN list is **data deficient** especially with regard to certain taxa.


We are seen only in the Western Ghats

Who identify plants in Kerala

- 4700 flowering plants (1637 endemic to Sahyadri) including 1016 tree species (319 endemic to Sahyadri)
- About 1000 plants can be identified by traditional ayurvedic practitioners, plant collectors, timber merchants old aged people
- About 2000 plants can be identified by less than 40 trained taxonomists
- Above 80% of plants can be identified with the help of less than 10 expert taxonomists in Kerala

Tasks ?

We are seen only in the Western Ghats

We are seen only in the Western Ghats

We are seen only in the Western Ghats

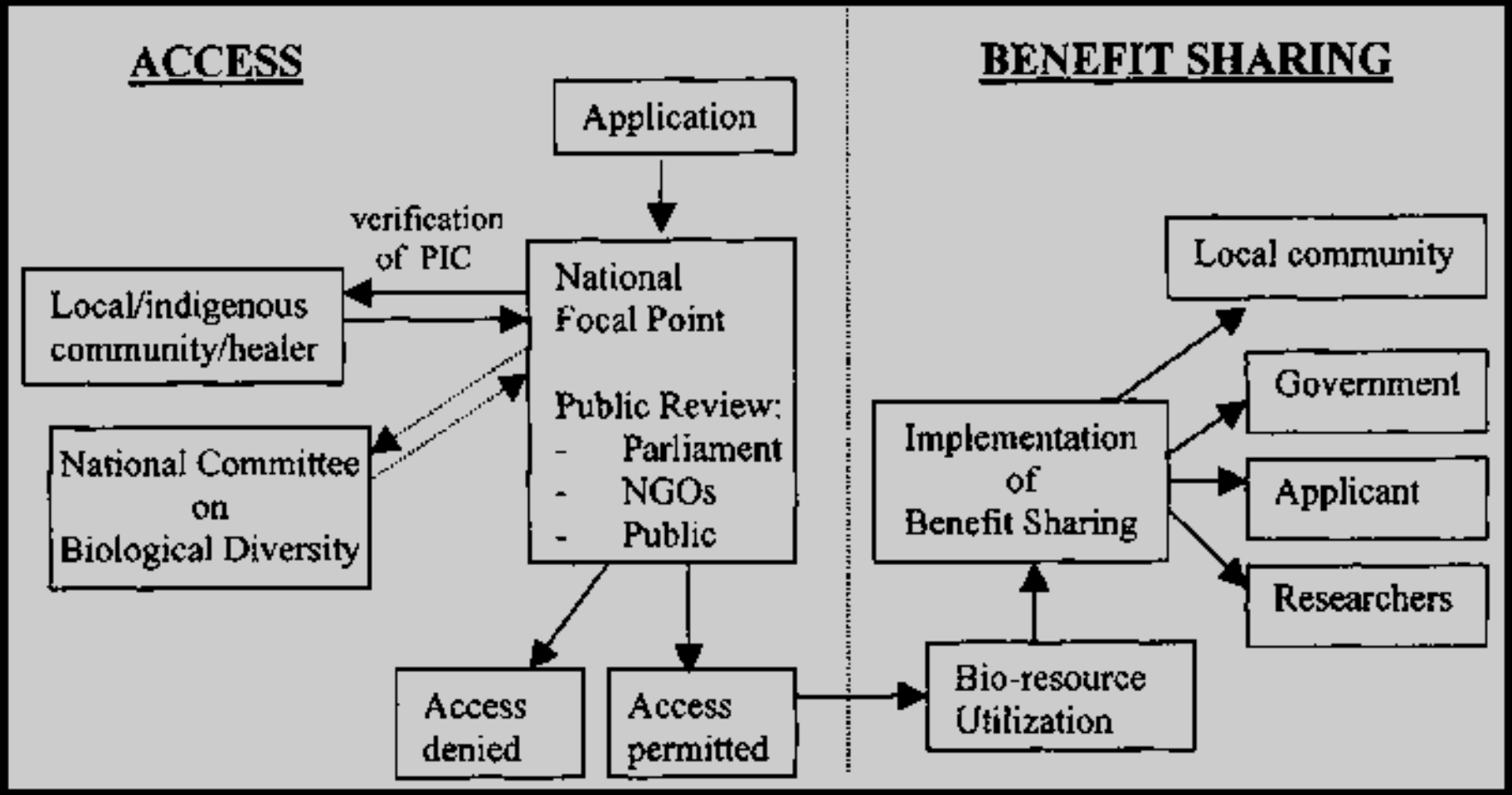
Indrella ampulla

Bio-prospecting

- Systematic search for and development of new sources of chemical components, genes, micro and macro organisms and other valuable products
- Looking ways to commercialise biodiversity
- Sustainable use of biological resources and the rights of local and indigenous communities
- Generate income for developing countries
- Incentives towards conservation
- Development of new products including medicines

Problems

- Unauthorized exploitation
- Social economic problems (unfair sharing of benefits)
- Total absence of sharing benefits
- Disrespect rights, knowledge and dignity of local community
- Exploitation of natural resources by foreign organizations or individuals
- Biopiracy



- **Access can be authorized or unauthorized**
- **Institutional or individual**
-

How to solve Problems

- Authorized exploitation
- Fair sharing of benefits
- Respect rights, knowledge and dignity of local community
- Control or check the exploitation of natural resources by foreign organizations or individuals
- To have a national policy
- Intellectual property right (Copyright, Patents, and Industrial Design Rights, Trademarks, trade dress, and in some jurisdictions trade secrets)

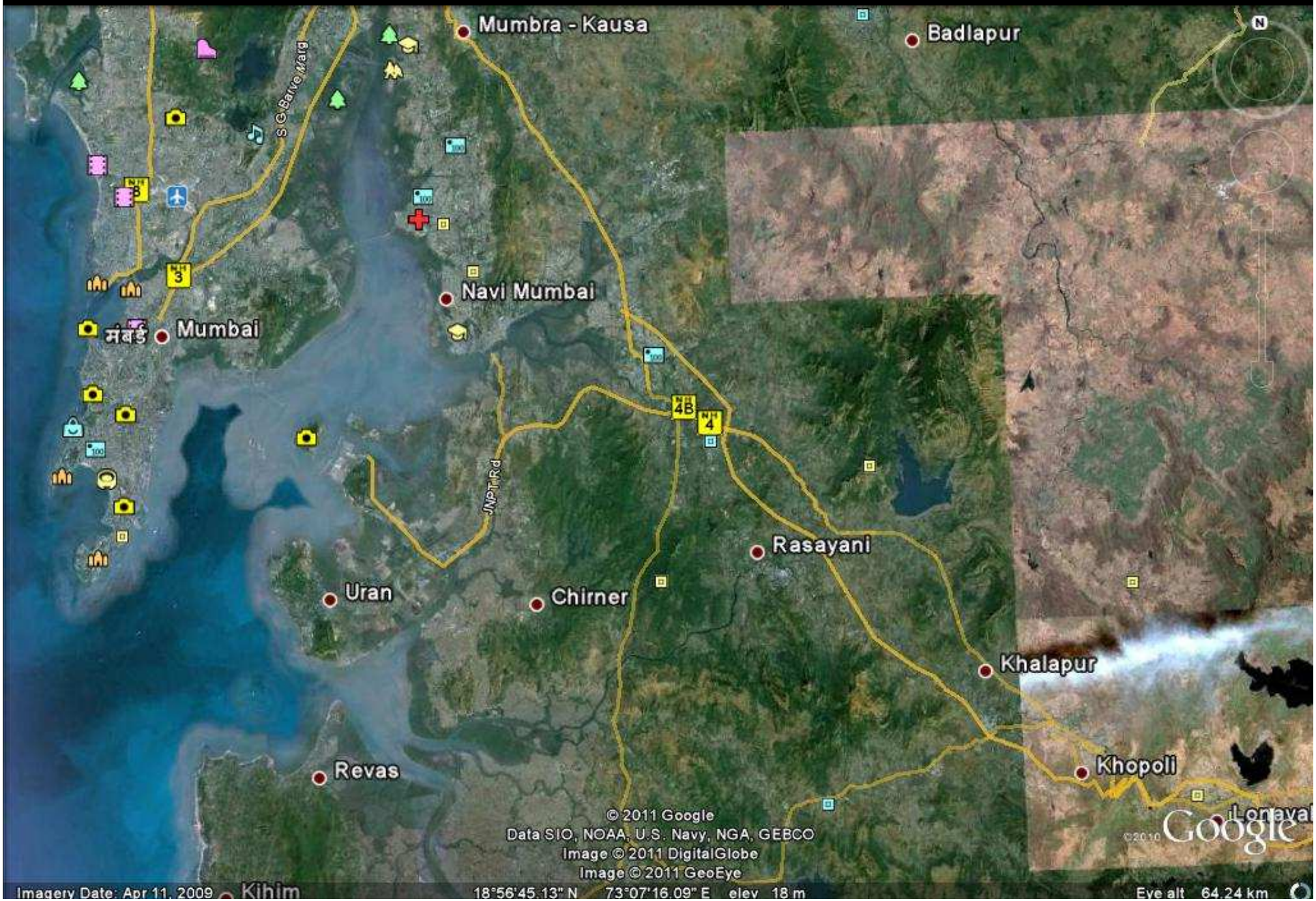
- CBD (Convention on Biological Diversity)-1993
- Patent Law
- Bio prospecting Contracts
- Traditional Knowledge Database
- Ethical Committees
- Regional Biodiversity Register
- Research and Development (R & D)

Bio prospecting Policy

- Legislation and Regulation
- Benefit Sharing Mechanism
- Capacity building
- Financing
- Assessment
- Participatory policy making & resource management
- Monitoring and Evaluation

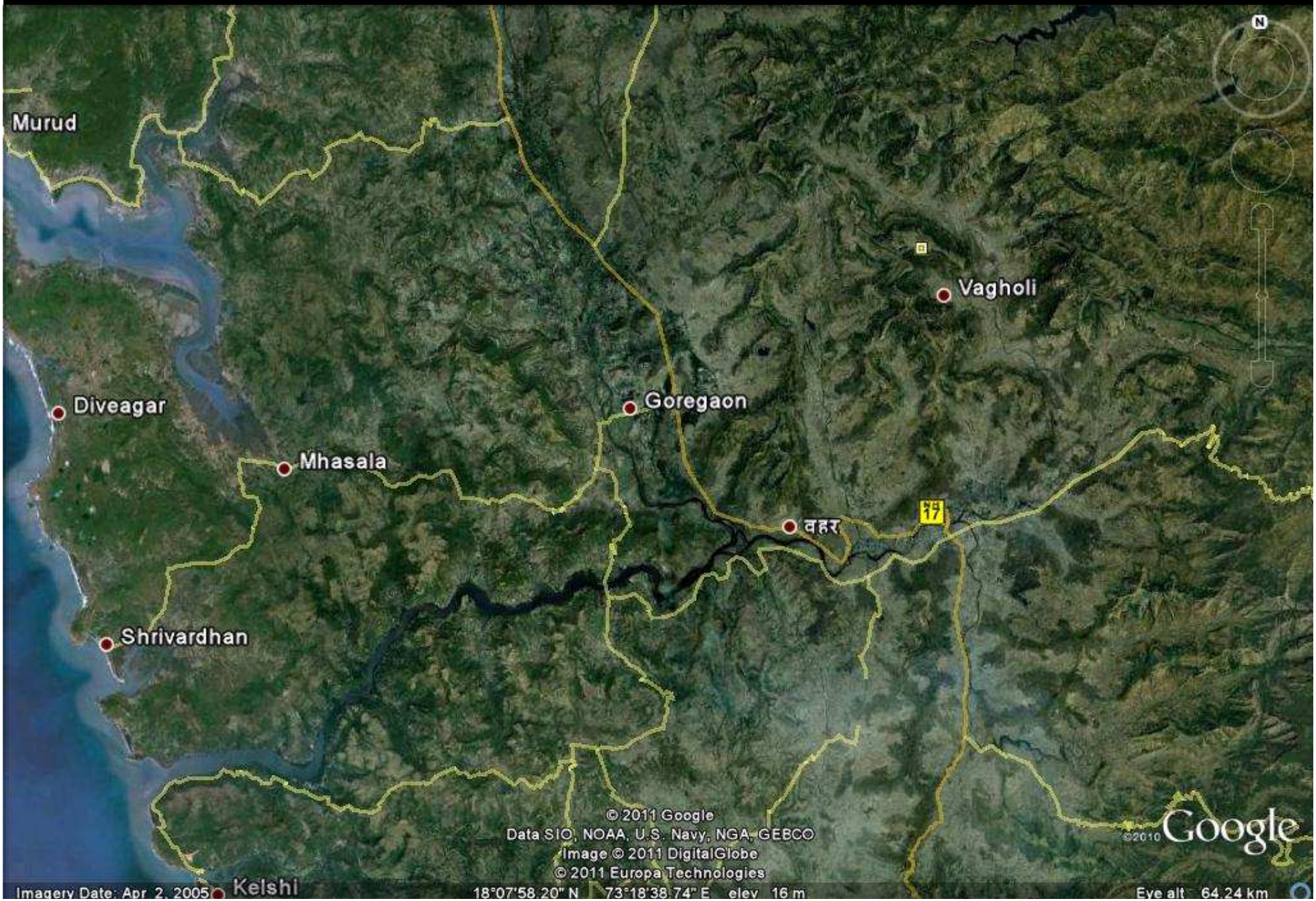
Starting Point of WG-Thapthi

Mumbai


Mumbra - Kausa
Badlapur
S G Barve Marg
Navi Mumbai
मंबई
Mumbai
JNPT Rd
Rasayani
Uran
Chirner
Khalapur
Revas
Khopoli
Lonavala
© 2011 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2011 DigitalGlobe
Image © 2011 GeoEye
Imagery Date: Apr 11, 2009
Kihim
18°56'45.13" N 73°07'16.09" E elev 18 m
Eye alt 64.24 km
Google

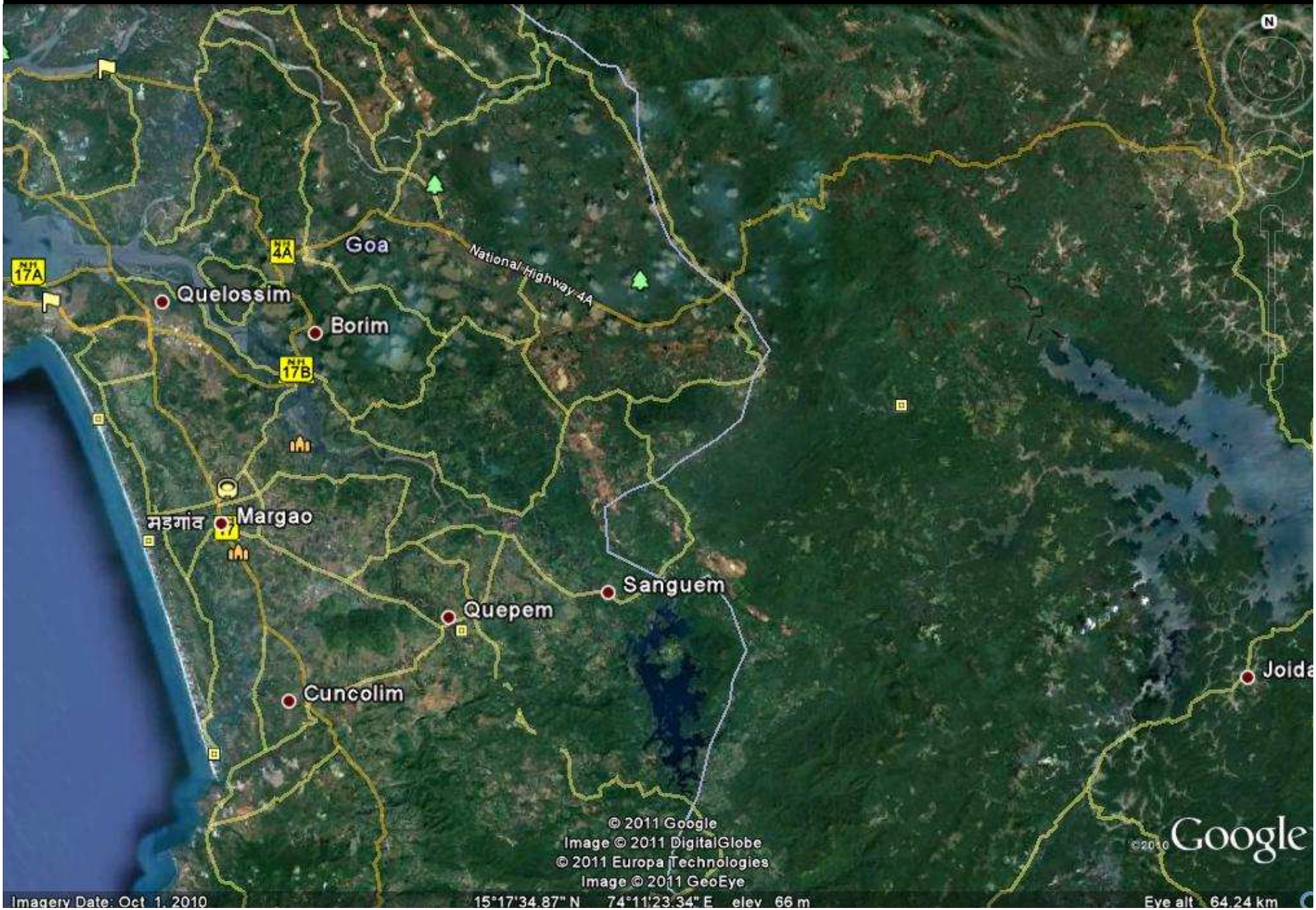
Maharashtra Above Mumbai

Maharashtra-1



Maharashtra-2

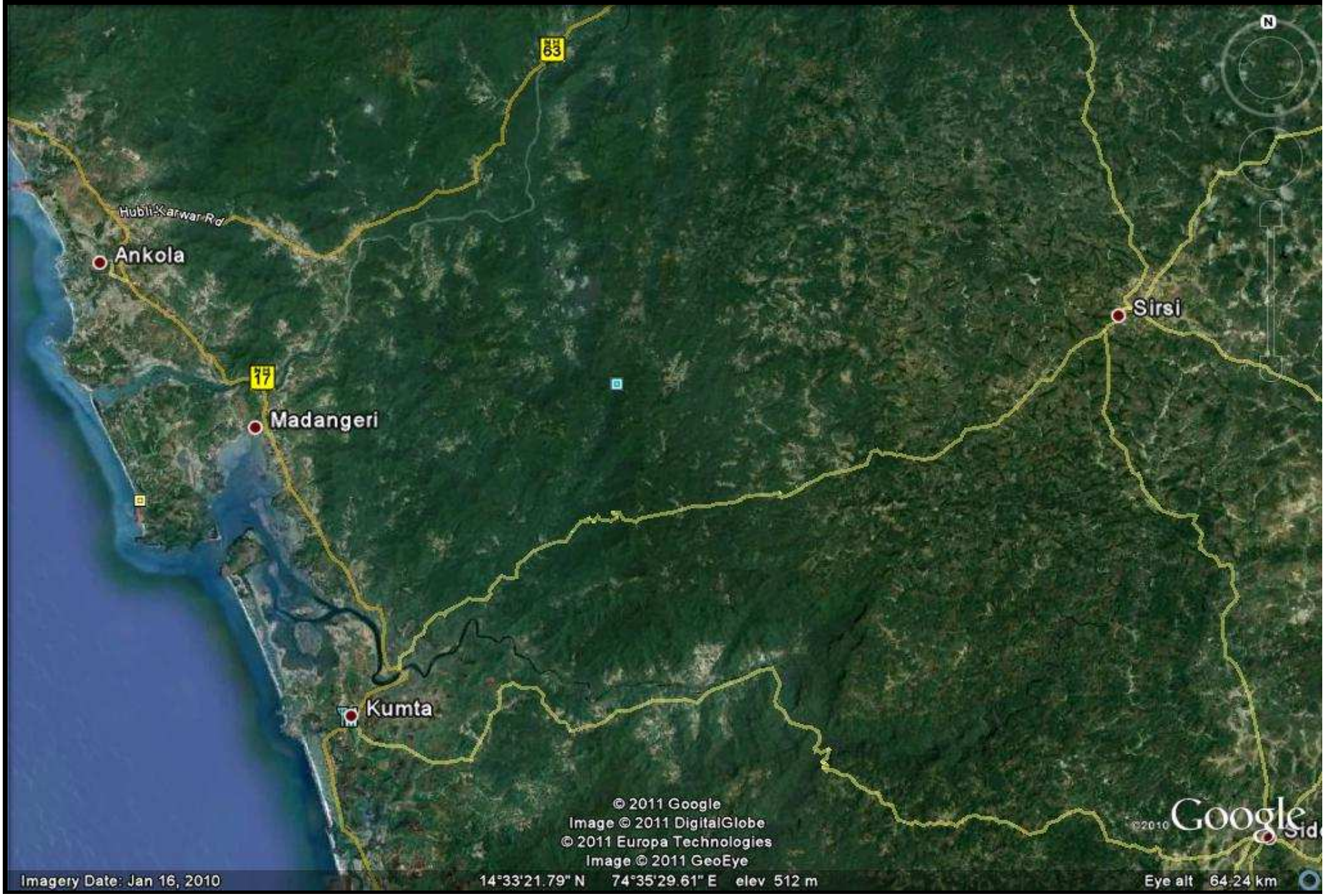
Goa


Goa
National Highway 4A
Quelossim
Borim
Margao
मडगांव
Sanguem
Quepem
Cuncolim
Joida
© 2011 Google
Image © 2011 DigitalGlobe
© 2011 Europa Technologies
Image © 2011 GeoEye
Google
Imagery Date: Oct 1, 2010
15°17'34.87" N 74°11'23.34" E elev 66 m
Eye alt 64.24 km

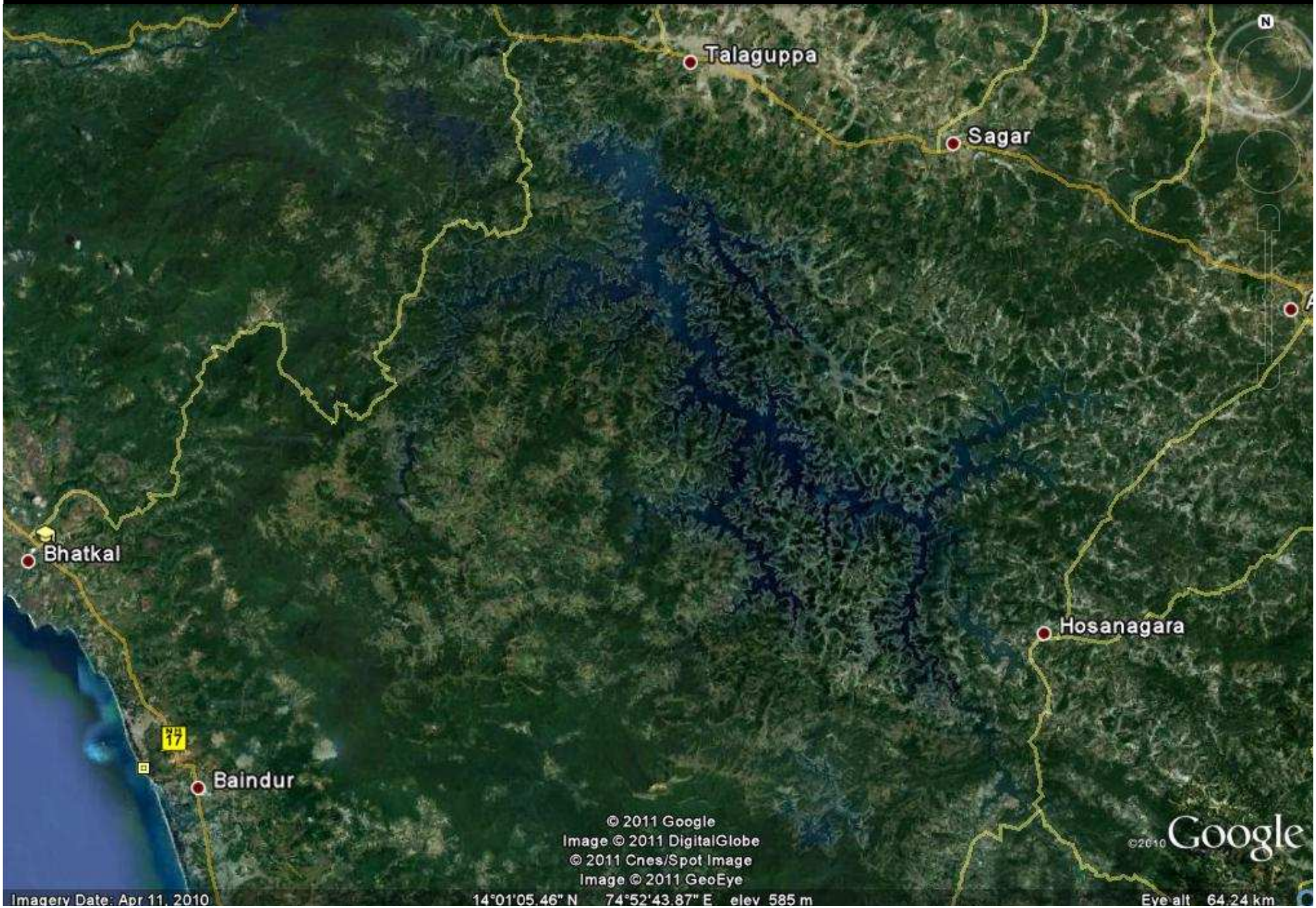
Karnataka


Vaghotan
Mond
Kasarde
Devgad
Kot Kamte
Achara
© 2011 Google
Image © 2011 DigitalGlobe
© 2011 Europa Technologies
Image © 2011 GeoEye
16°22'08.31" N 73°41'55.12" E elev 90 m
Eye alt 64.24 km
©2010 Google

Karnataka near Kumpta



Karnataka-1


Talaguppa
Sagar
Bhatkal
Hosanagara
Baindur
© 2011 Google
Image © 2011 DigitalGlobe
© 2011 Cnes/Spot Image
Image © 2011 GeoEye
Imagery Date: Apr 11, 2010
14°01'05.46" N 74°52'43.87" E elev 585 m
Eye alt 64.24 km
©2010 Google

Karnataka-2

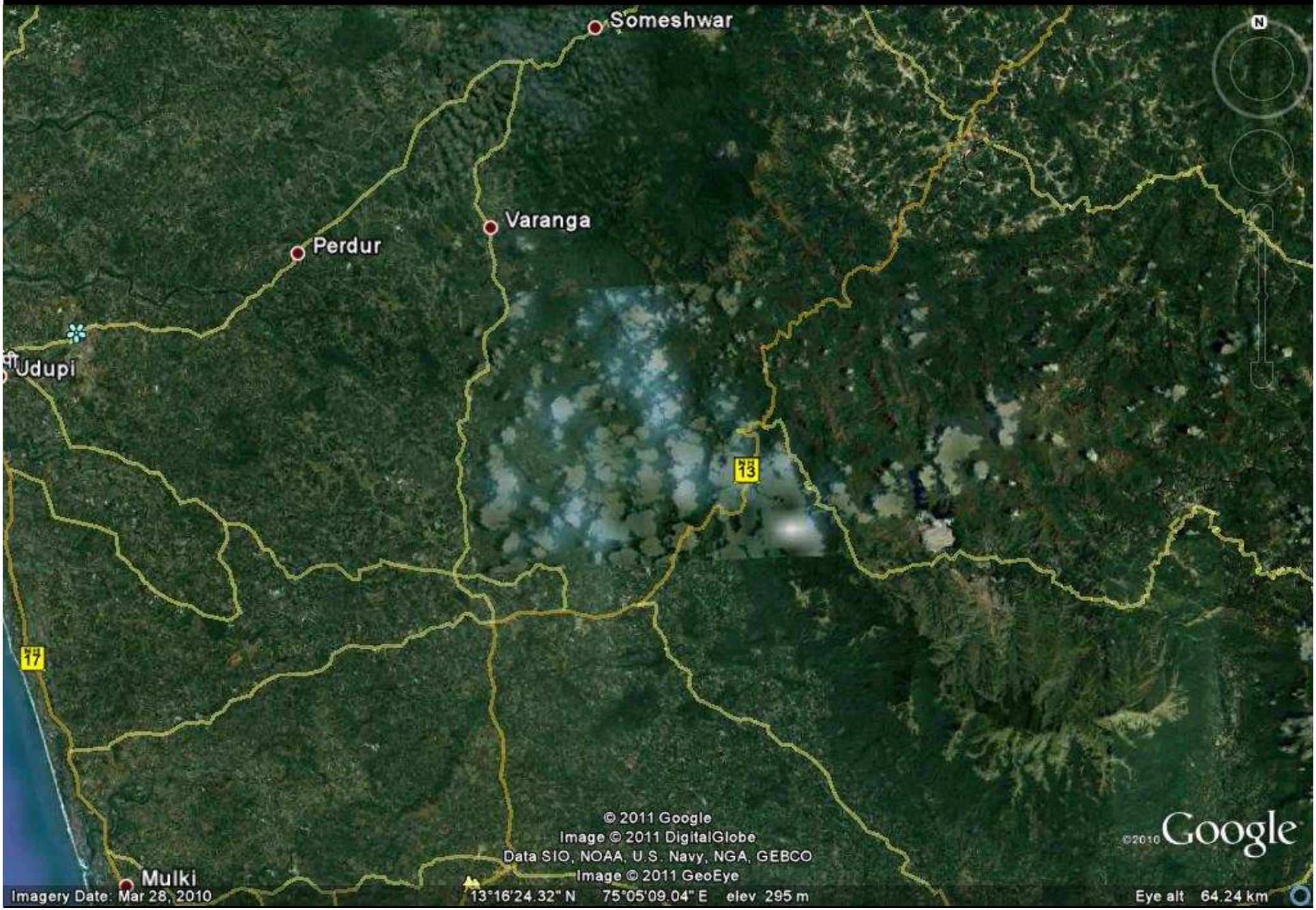

Someshwar
Varanga
Perdur
Udupi
Mulki
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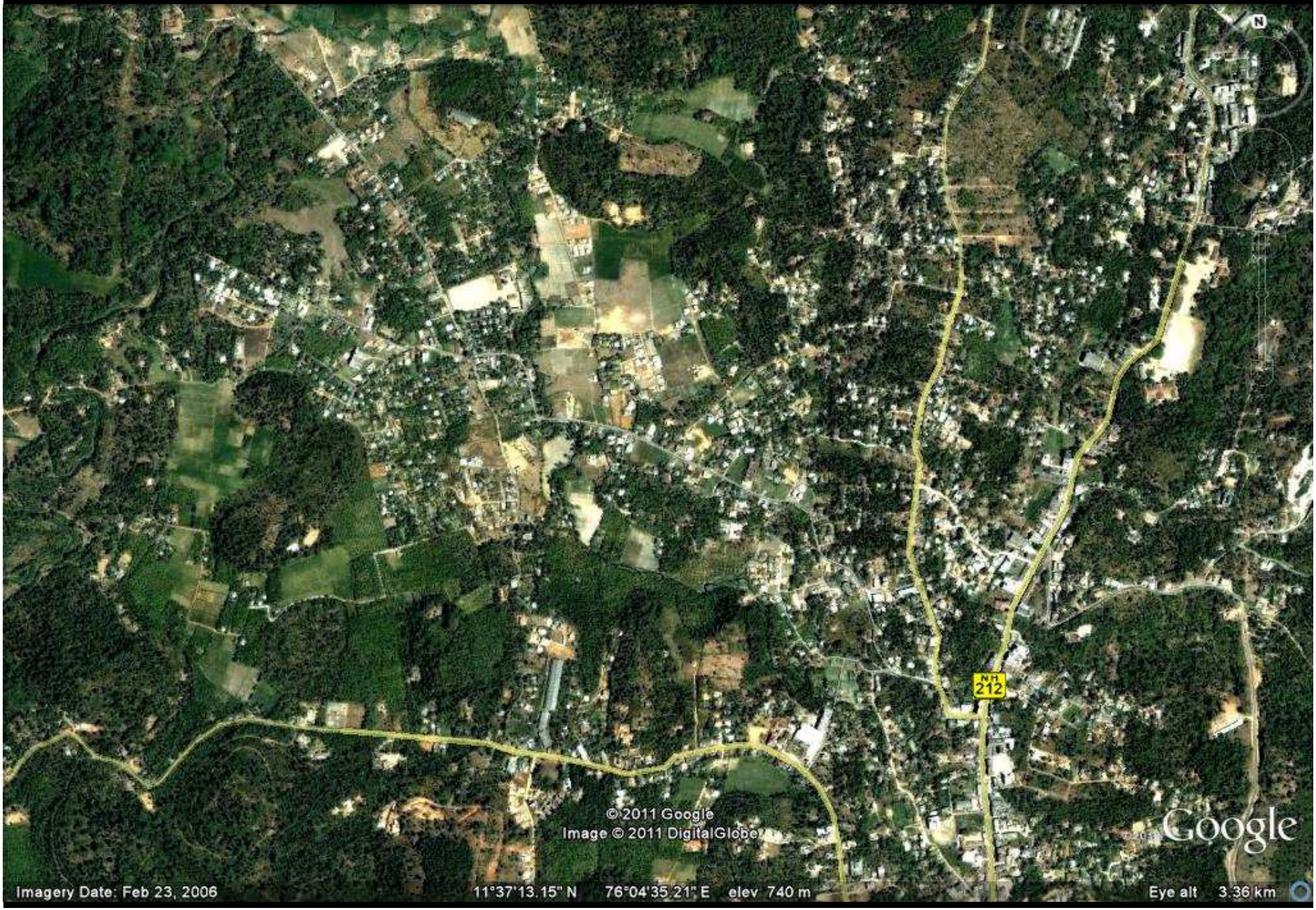
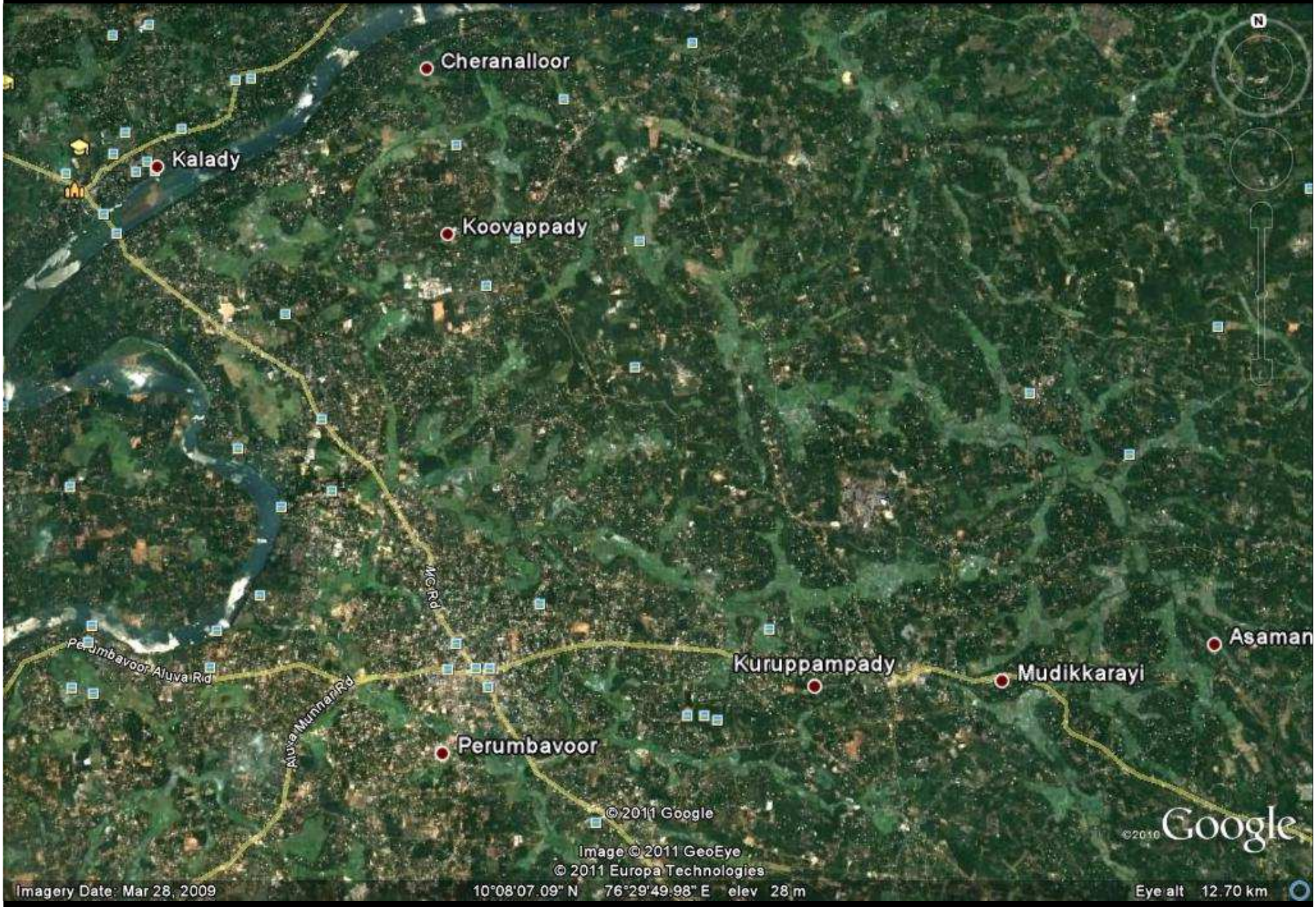
Image © 2011 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2011 GeoEye
©2010 Google
Imagery Date: Mar 28, 2010
13°16'24.32" N 75°05'09.04" E elev 295 m
Eye alt 64.24 km

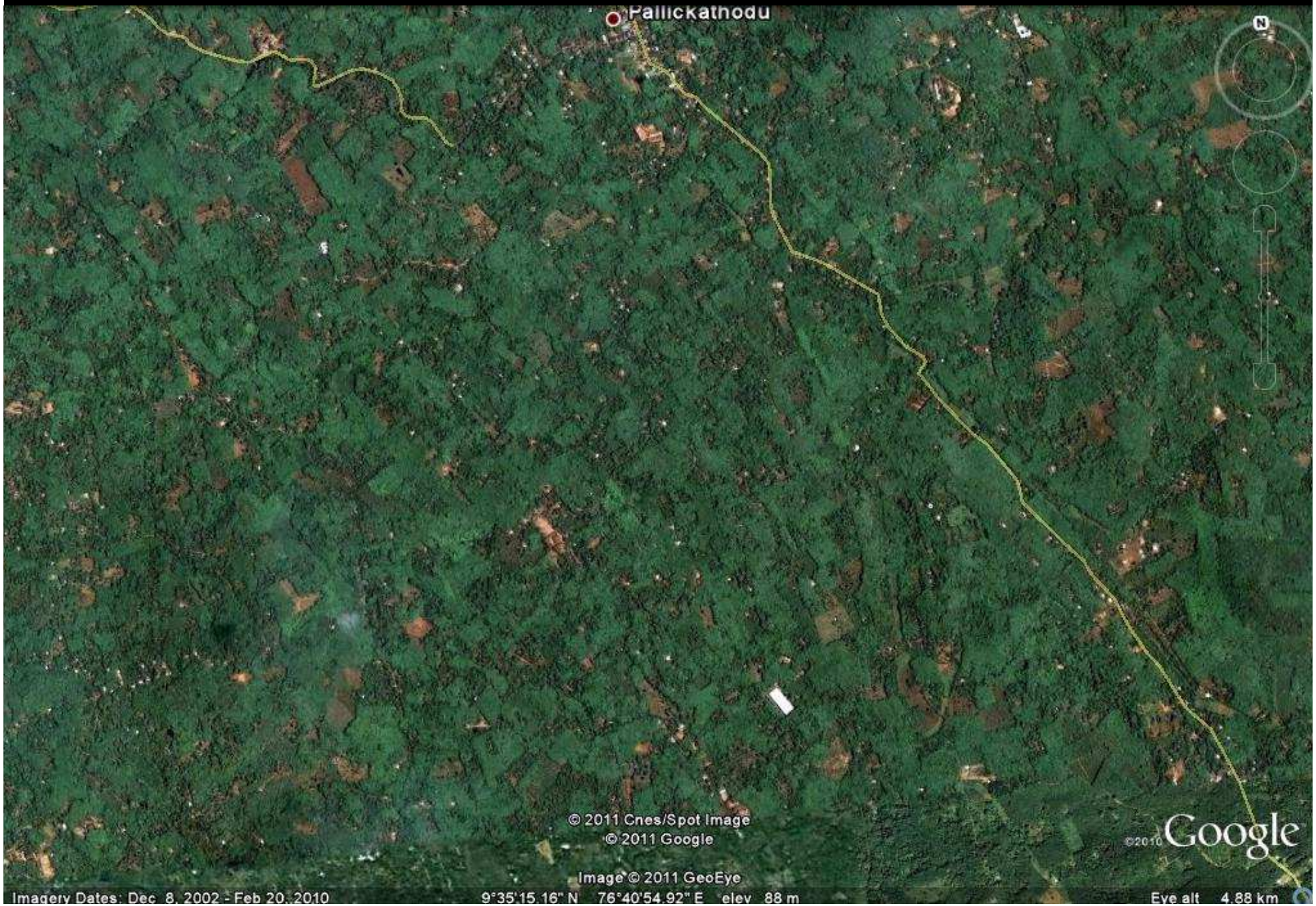
A hill range that was once the region for High altitude fresh water swamps…



Periyar @ Kerala



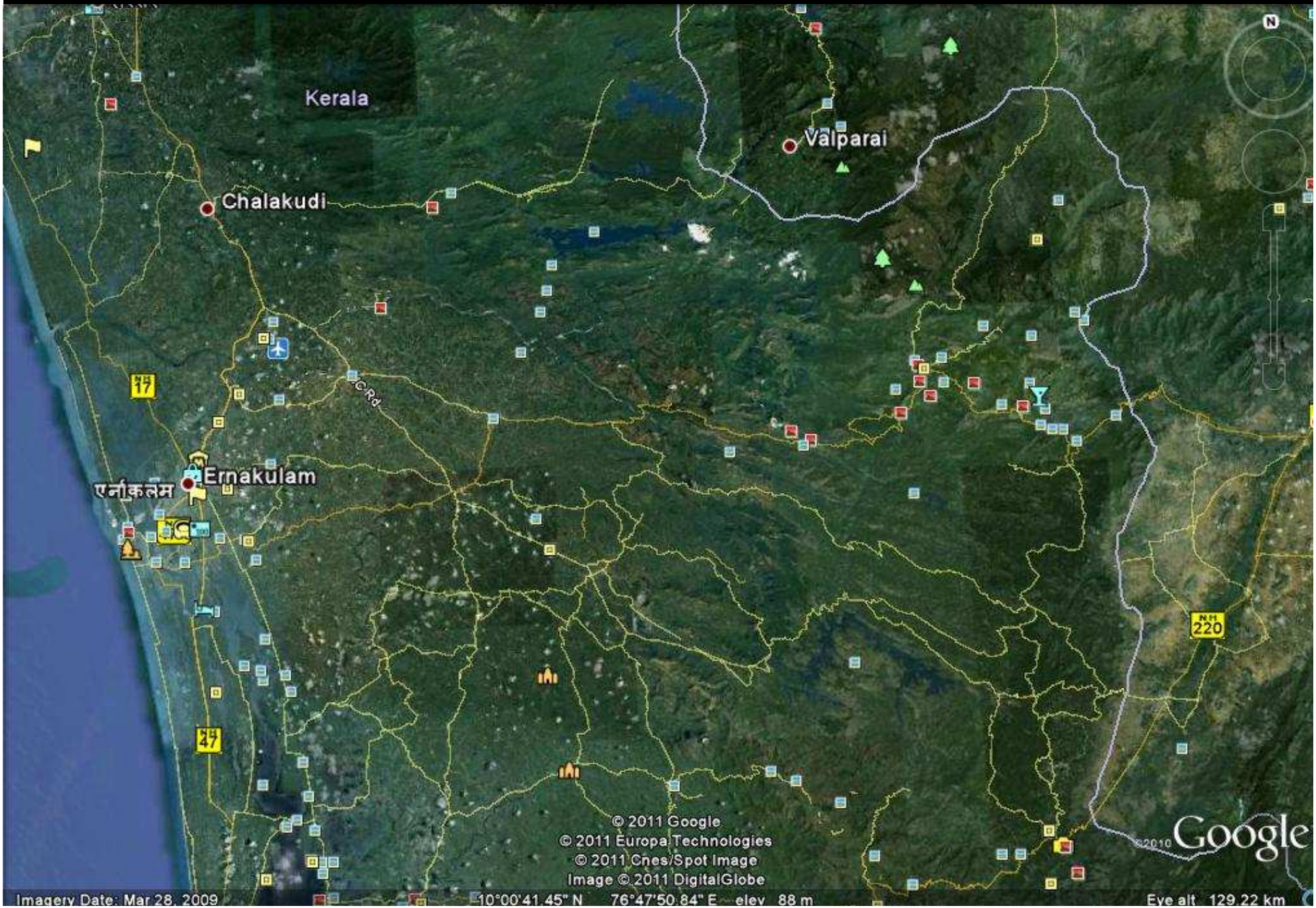
Rubber country



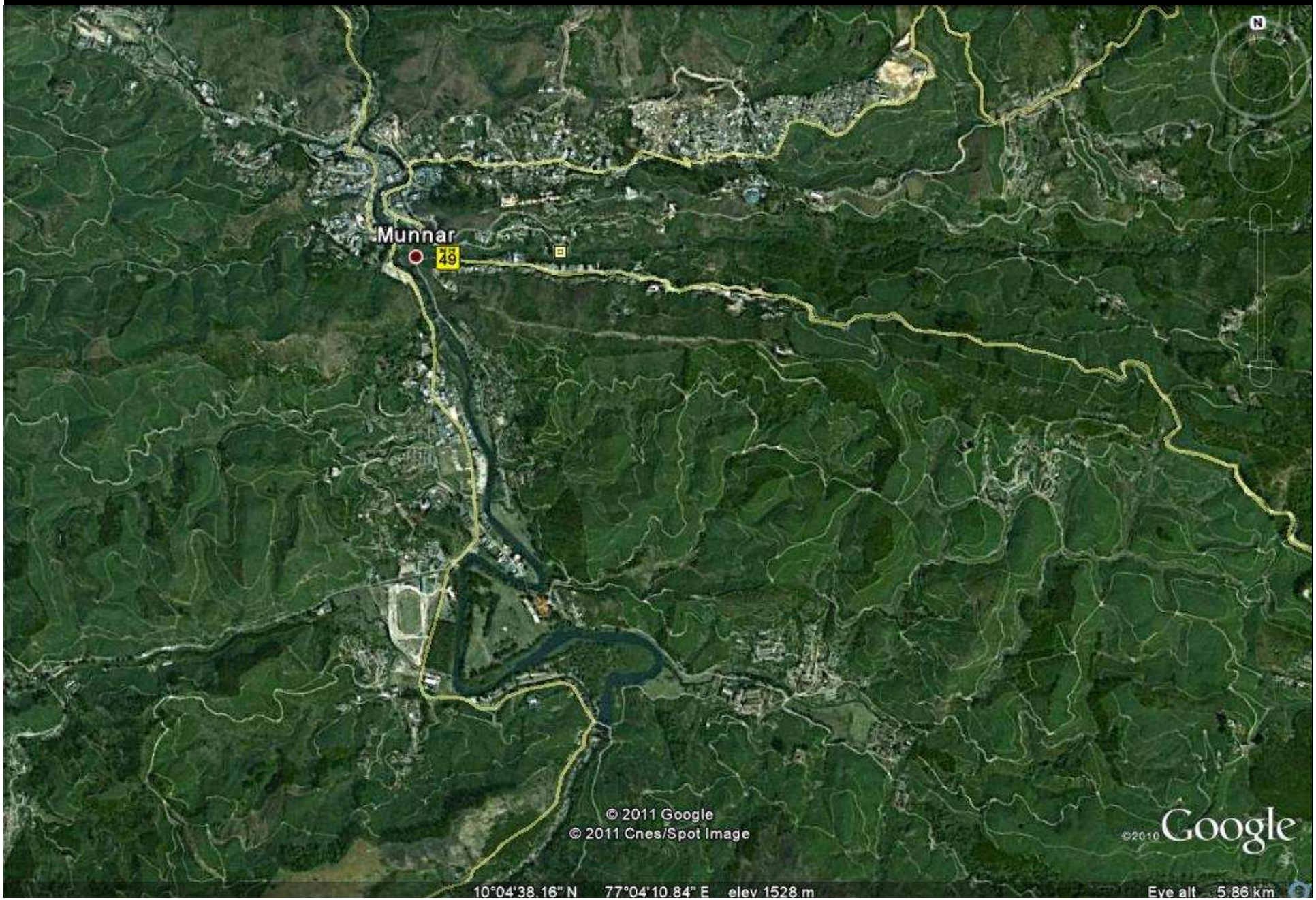
Devikulam


Manele Eastate
NH 49
© 2011 Google
© 2011 Cnes/Spot Image
©2010 Google
10°02'37.36" N 77°07'11.38" E elev 1583 m
Eye alt 5.86 km

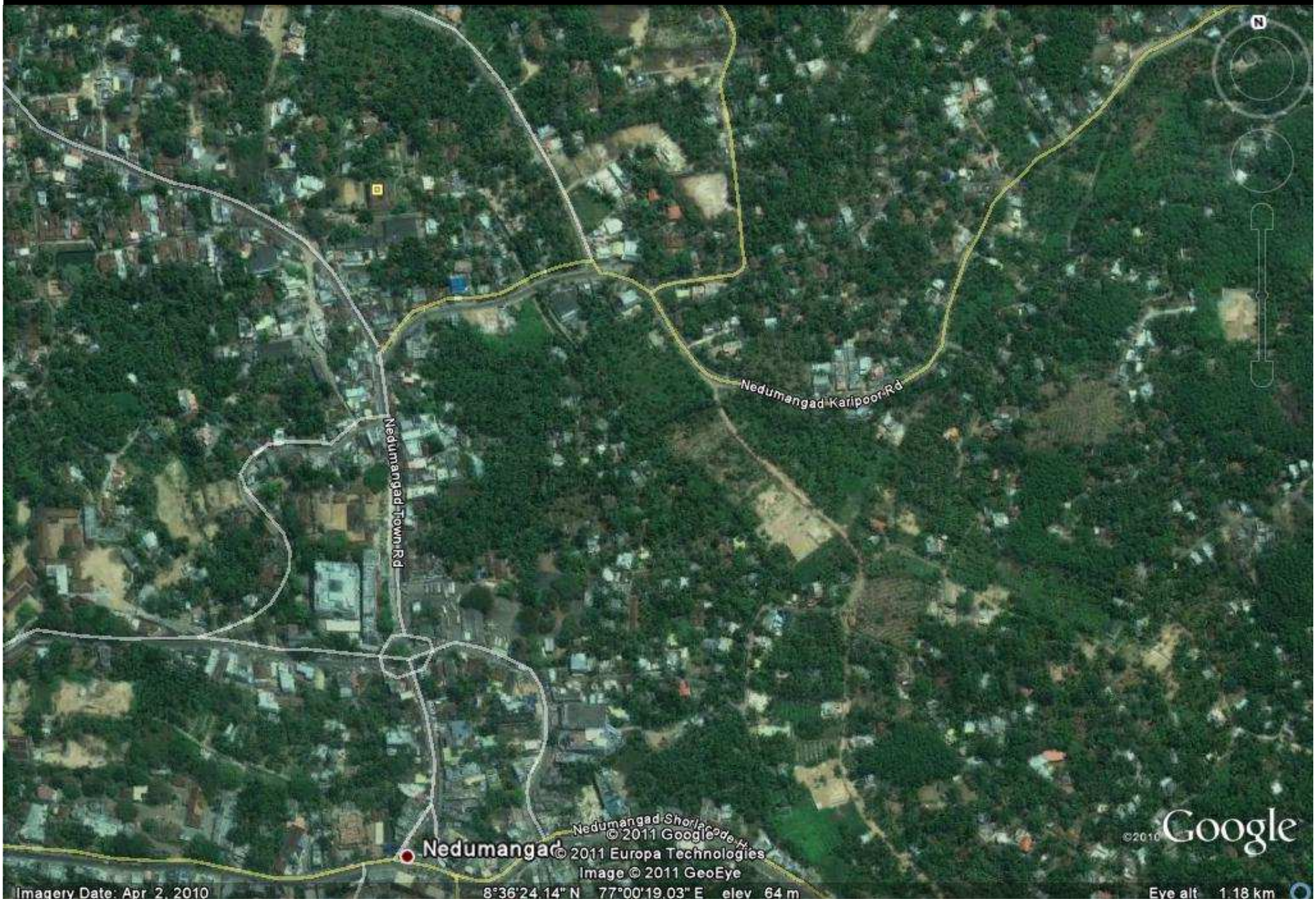
Ernakulam Dist



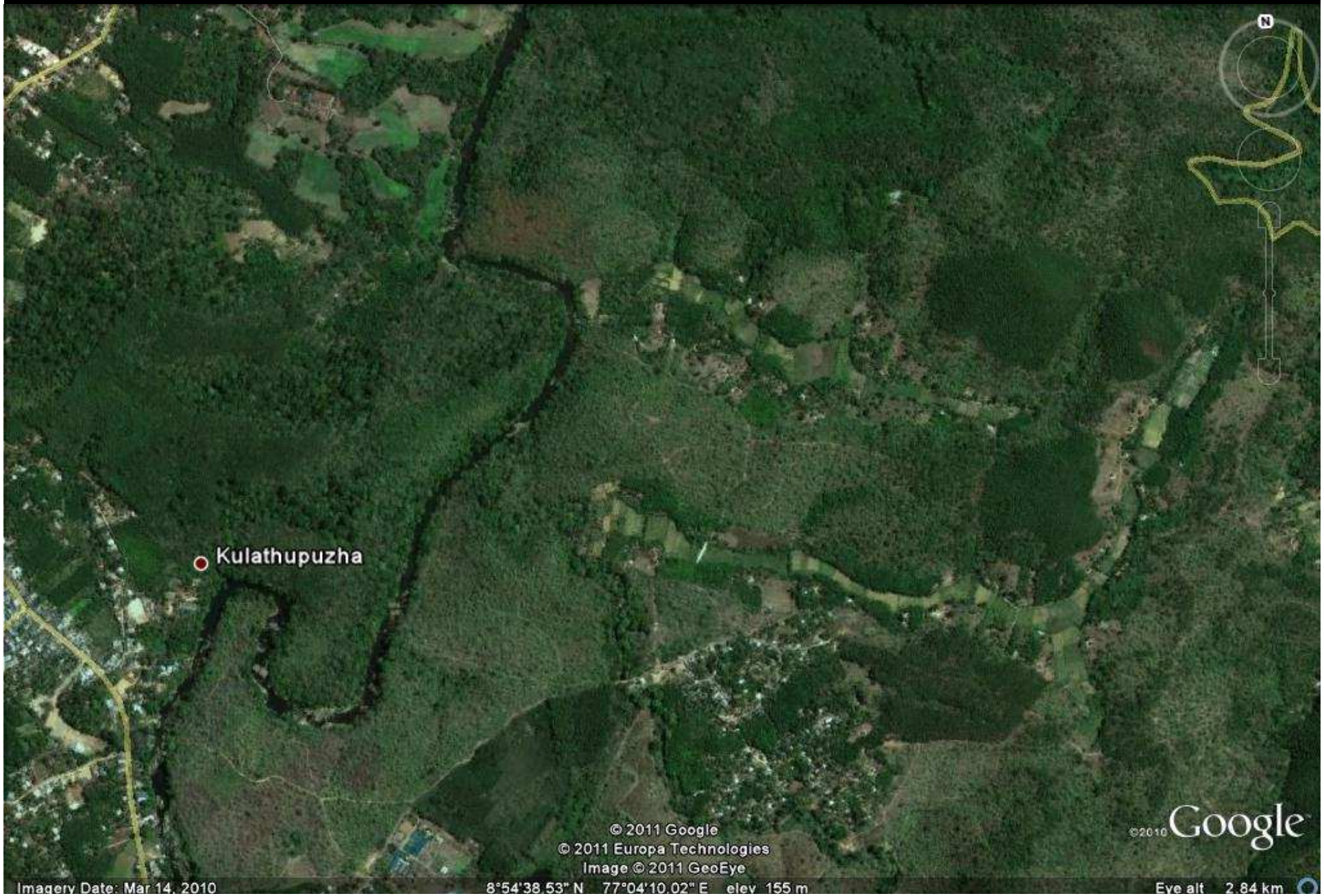
Munnar


Munnar
49
© 2011 Google
© 2011 Cnes/Spot Image
©2010 Google
10°04'38.16" N 77°04'10.84" E elev 1528 m
Eye alt 5.86 km

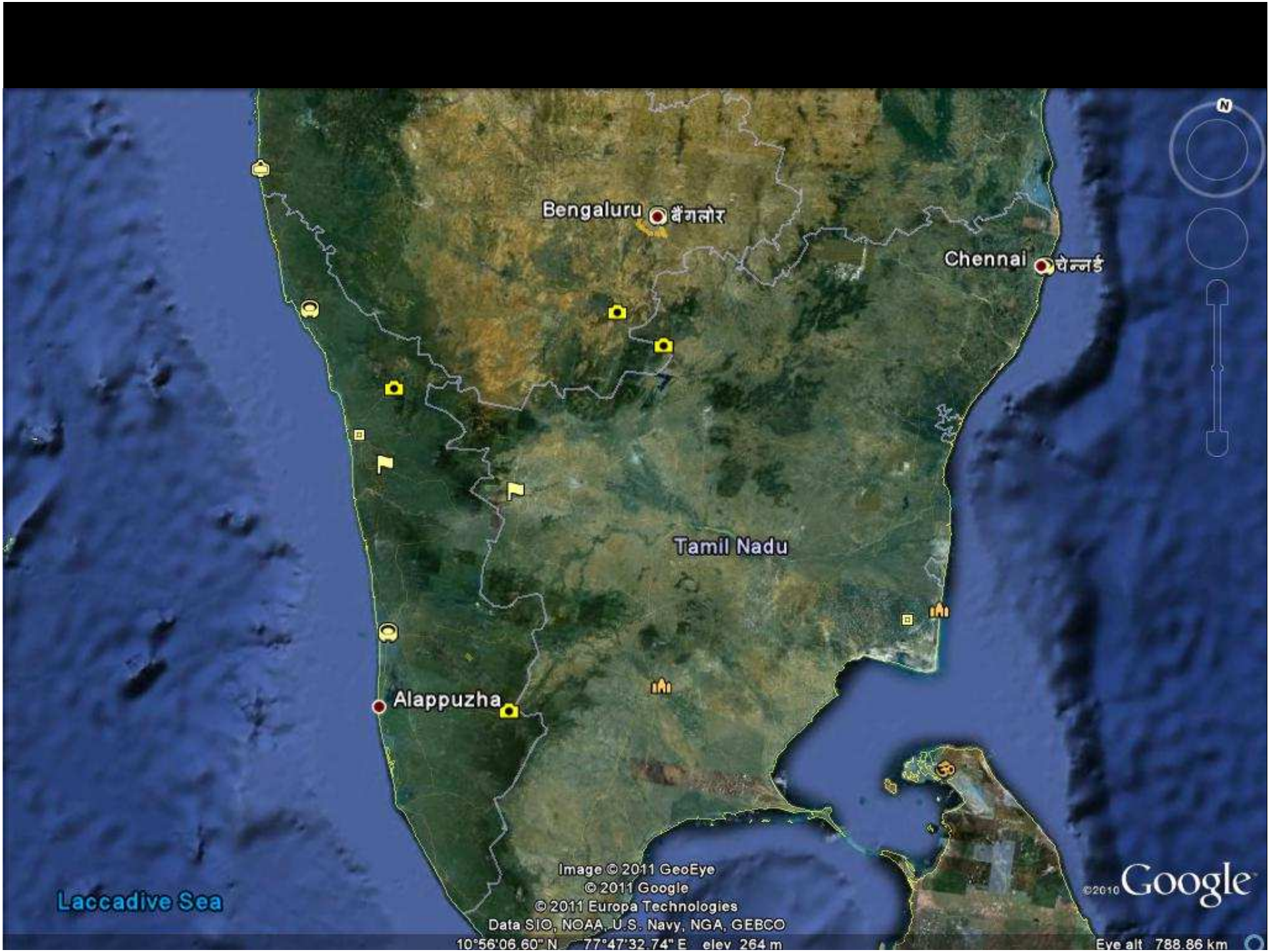
Thick wooded country



Kulathupuzha-Centre for Fresh water swamps in the WG



And we have this too….. with growing demand…


Bengaluru
बैंगलोर
Chennai
चेन्नई
Tamil Nadu
Alappuzha
Laccadive Sea
Image © 2011 GeoEye
© 2011 Google
© 2011 Europa Technologies
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
10°56'06.60" N 77°47'32.74" E elev 264 m
©2010 Google
Eye alt 788.86 km

References

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- Chandran M D S (1997). On the ecological history of the Western Ghats. Current Science 73(2)

- Subrahmaniyan K. A. (2010). Biodiversity and status of riverine Ecosystems of the Western Ghats. Western Ghats Ecology Expert Panel, CES, IISc, Bangalore

Acknowledgements

- Dr Kaleesh Eswaran
- Dr K. A. Subramanian, ZSI, Chennai.
- Mr Kiran M.C., ATREE, Bangalore
- Dr. Shaju Thomas, Nirmala College Muvattupuzha


Let us hope that our next generations will also enjoy the precious flora, fauna, resources and scenic beauty of the Western Ghats
Thank you