BHARATH

A vibrant country

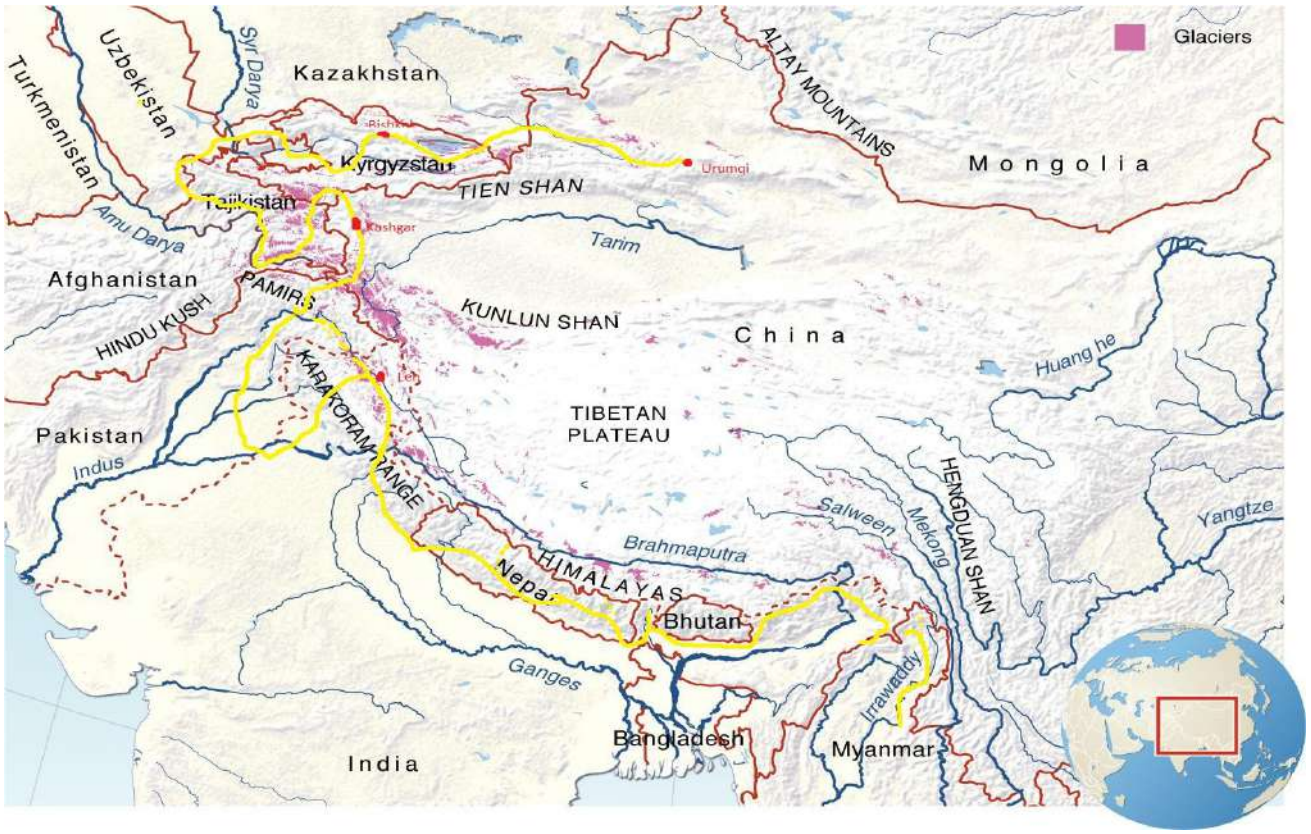
A concise narrative of the Land that has come to be called India

Contents

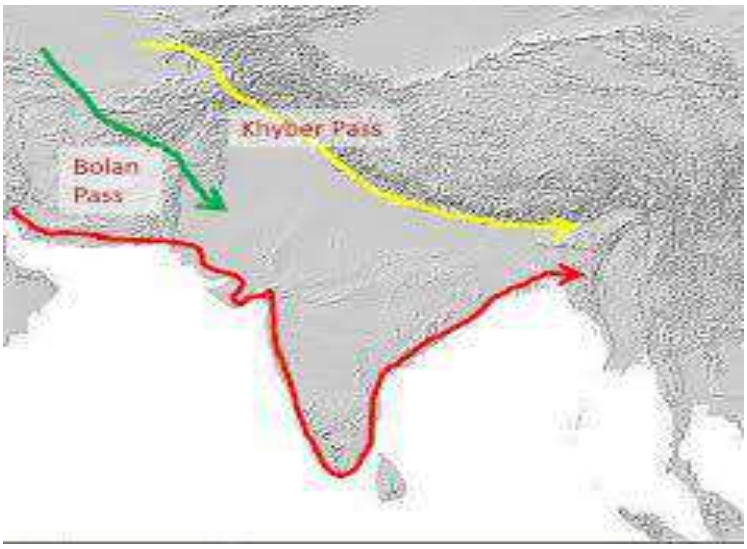
Chapter 1: Geography and Geology

The Indian continental plate moved north east from Gondwanaland to fuse with the Eurasian plate about 100 million years ago, creating the many mountain elevation ranges to the north. (Himalayas - Nanga Parbat in the west to Namcha Barwa in the east).

Mountain passes bordering North West, North and North East of India



Mountain ranges bordering North West, North and North East of India



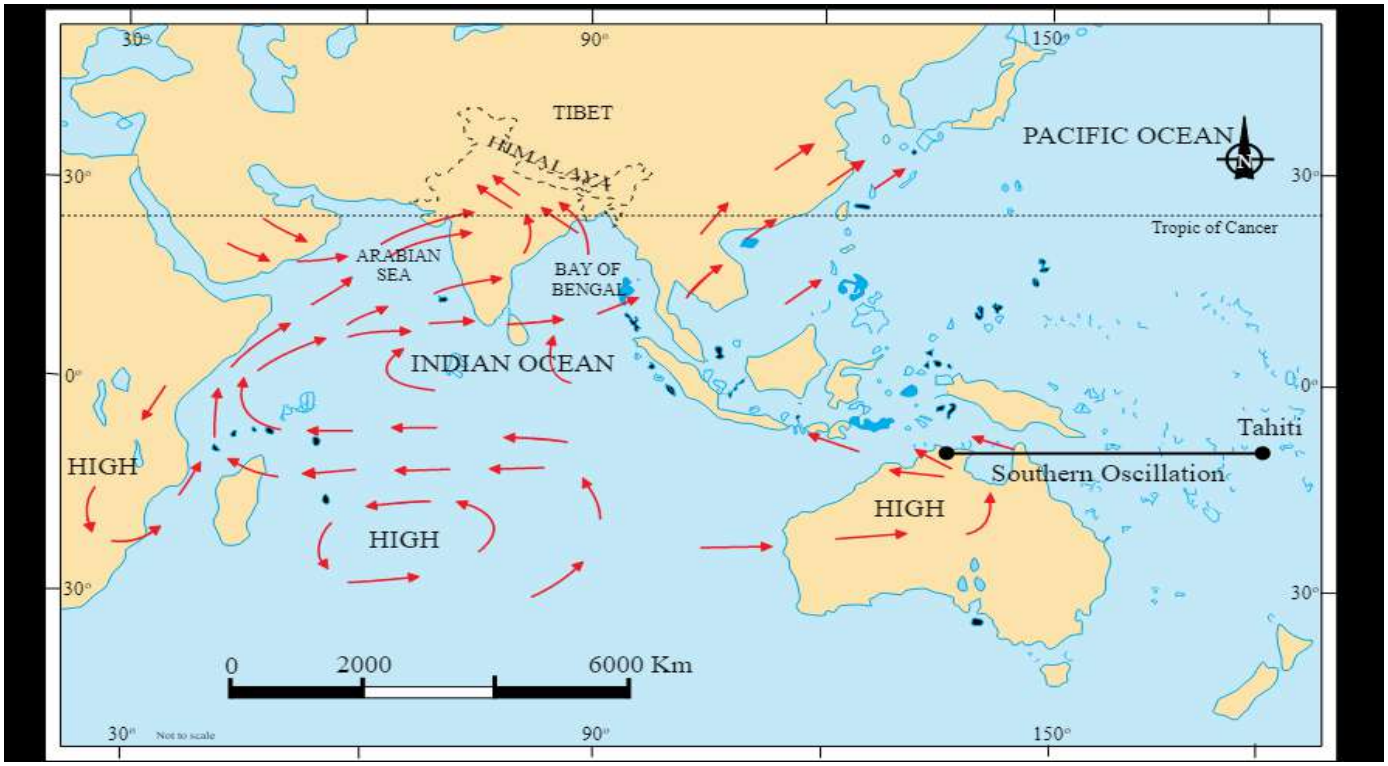
(Vahia et al.) – *Khyber and Bolan pass – the historic invasion routes*

The Hindu Kush, Pamir, Karakoram, Zanskar and Himalayas form the west to east northern frontiers of India with about 23 passes in total along the entire frontier. The Khyber-pass is the entry point from central Asia into India and Bolan pass is the entry from middle east to India by land. The Purvanchal and other hill ranges in North east India form the eastern frontier. Thus, the mountainous Northwestern to northeastern ranges, provide natural barrier to enter the Indian subcontinent except for some strategic passes. The Indus river to the northwest along with Thar desert and Rann of Kutch form the formidable additional northwestern frontiers.

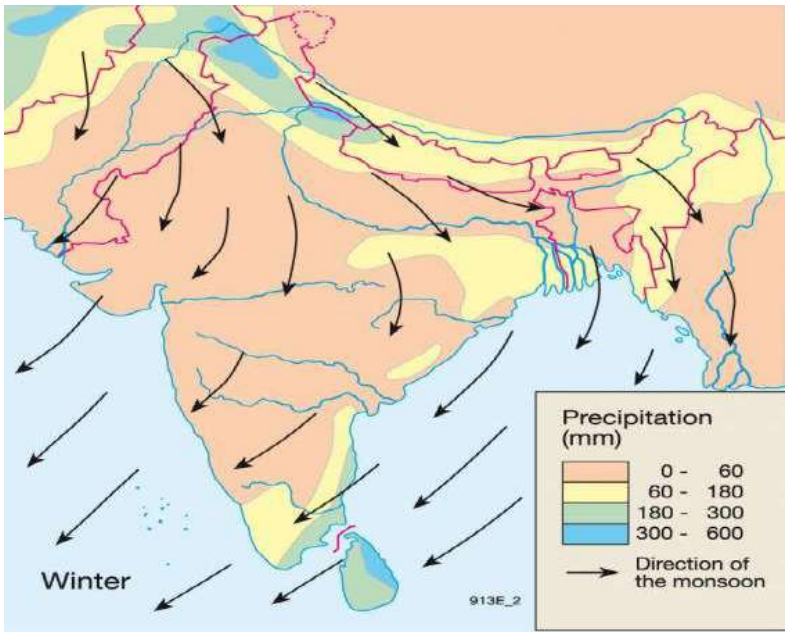
(Shahid Javed Burki and Ziring) – *disputed territories*

The Indus and Brahmaputra rivers originate in the Tibetan plateau and Ganga in Uttarakhand which receive their water source from the ice-melts of the Himalayas. The Western ghats in interaction with South West trade winds gives rise to the June – September South Western monsoon rains. The eastern Ghats in interaction with the North east trade winds gives rise to the North Eastern monsoon during October – March. The south west monsoon contributes to ~2/3 annual

rainfall and north eastern to the remaining; together replenishing the Deccan plateau rivers and also the northern and eastern states of India below the Himalayas.

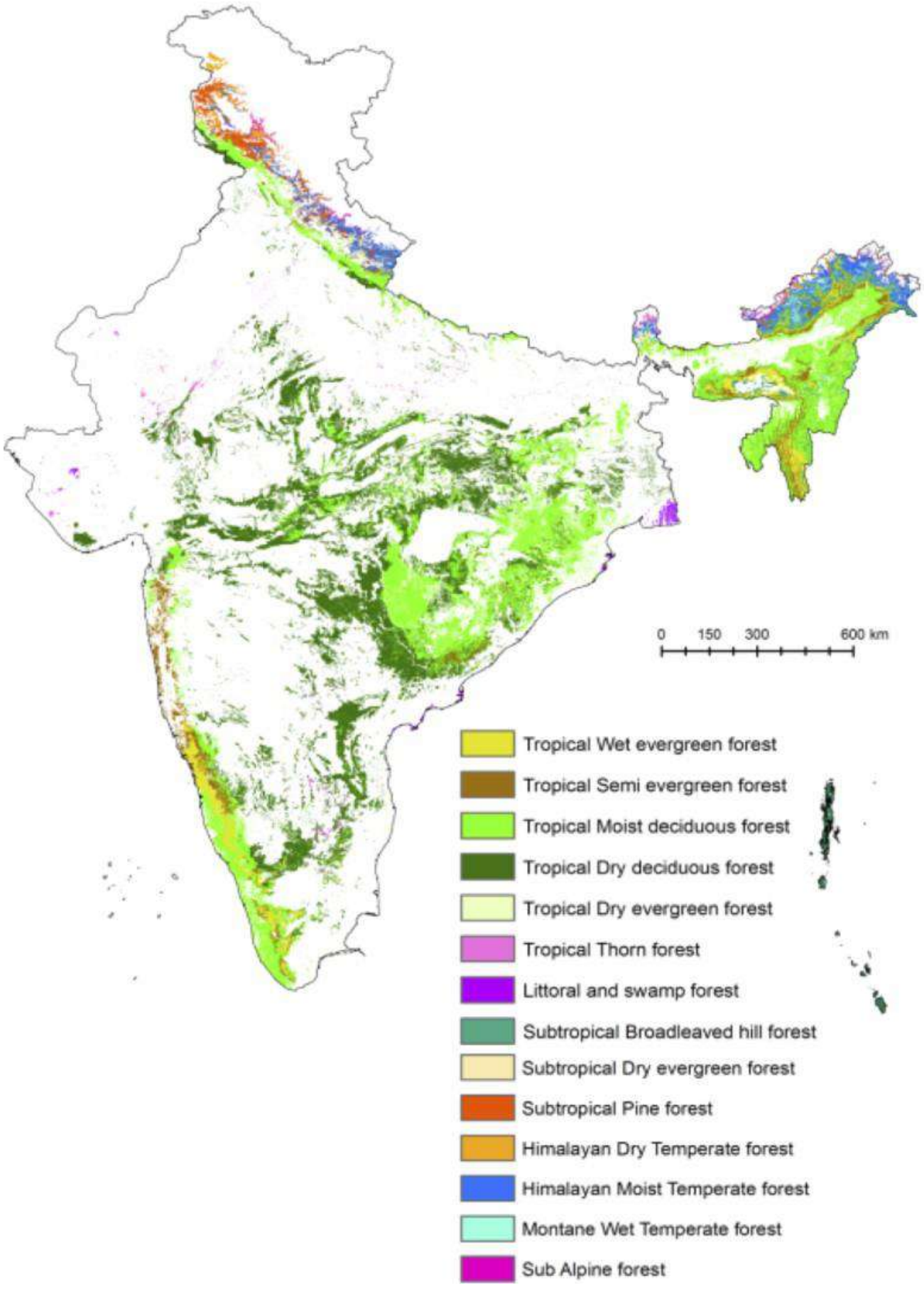


("NROER - File - India: Summer Monsoon Winds")

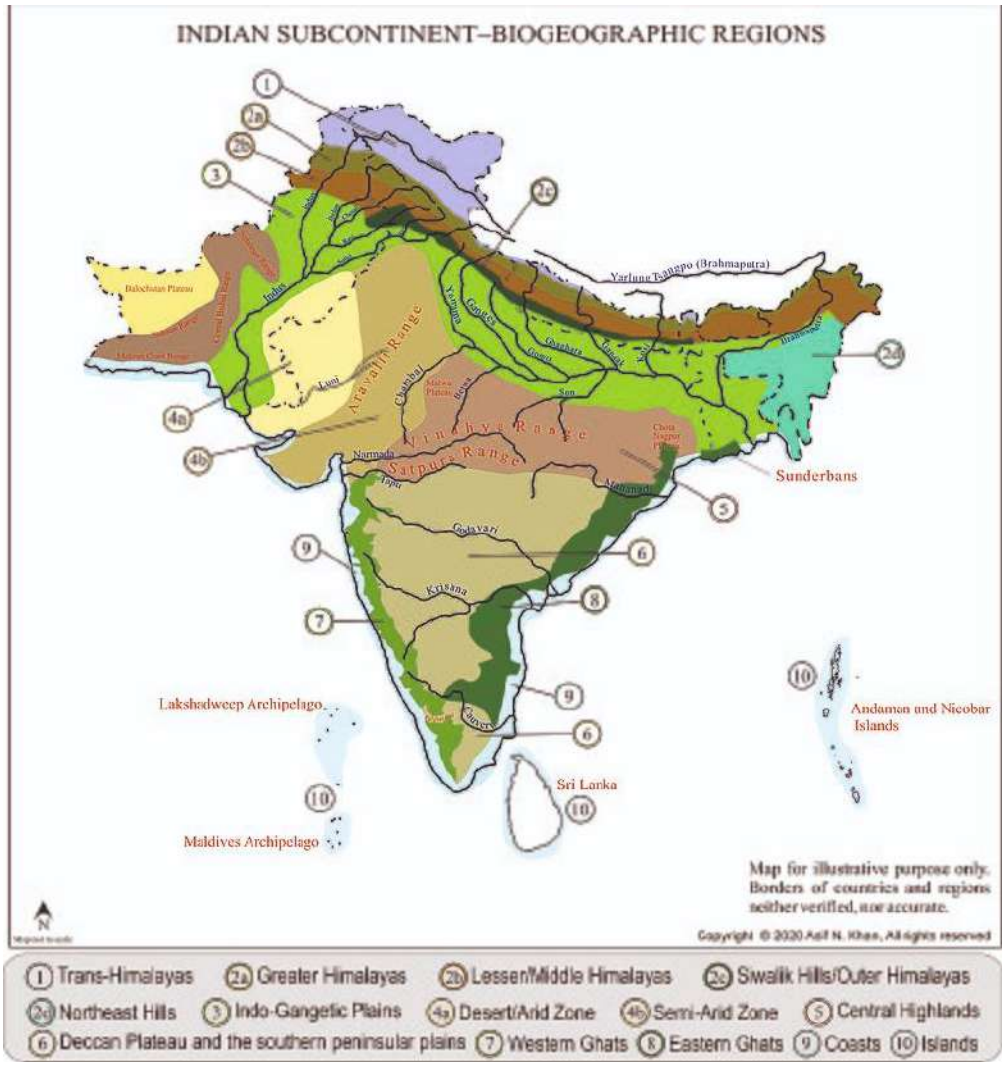


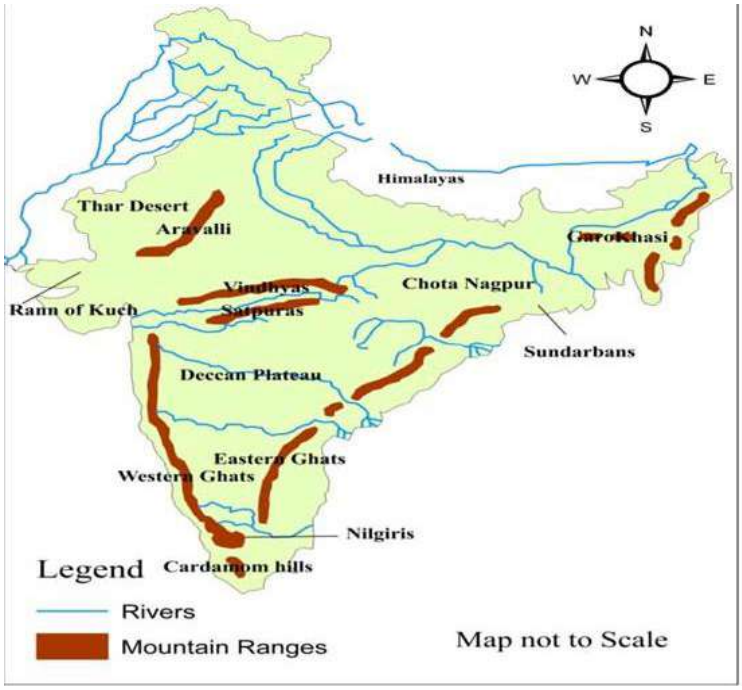
("Maps - - Diercke International Atlas") – Winter Monsoon

About 19% of land area is covered with forests (only 10% of this is dense – i.e 1.9% of land area – dense implying > 40% of forest area covered in canopy).



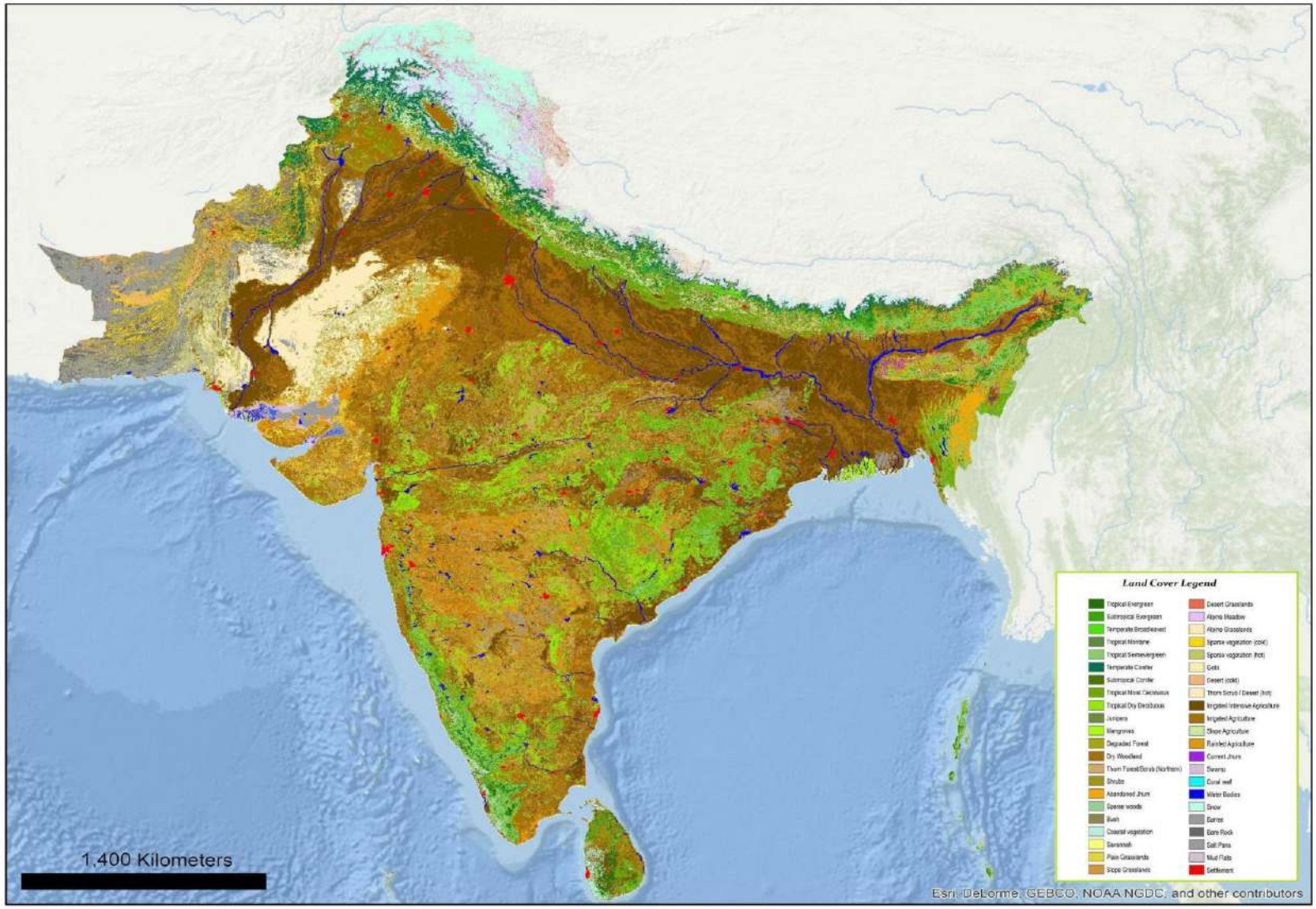
("Forest Cover - ISRO")



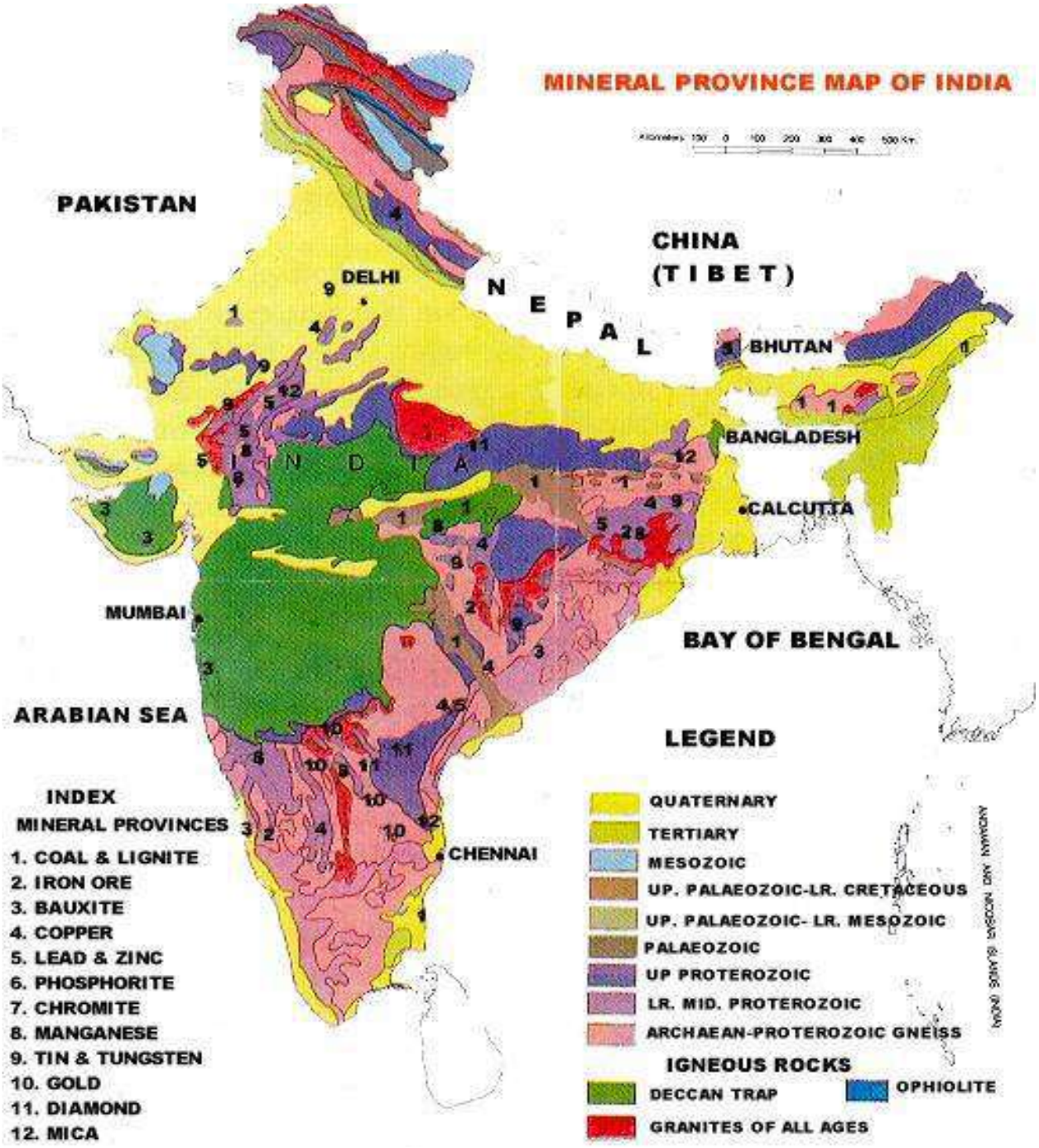


(Sivaraman and Arunachalam)

South Asia Land Cover



Projection: Mercator Scale: 1:20,000,000 Land Cover data from: http://bioval.jrc.ec.europa.eu/ Map Credit: Chris Stephens

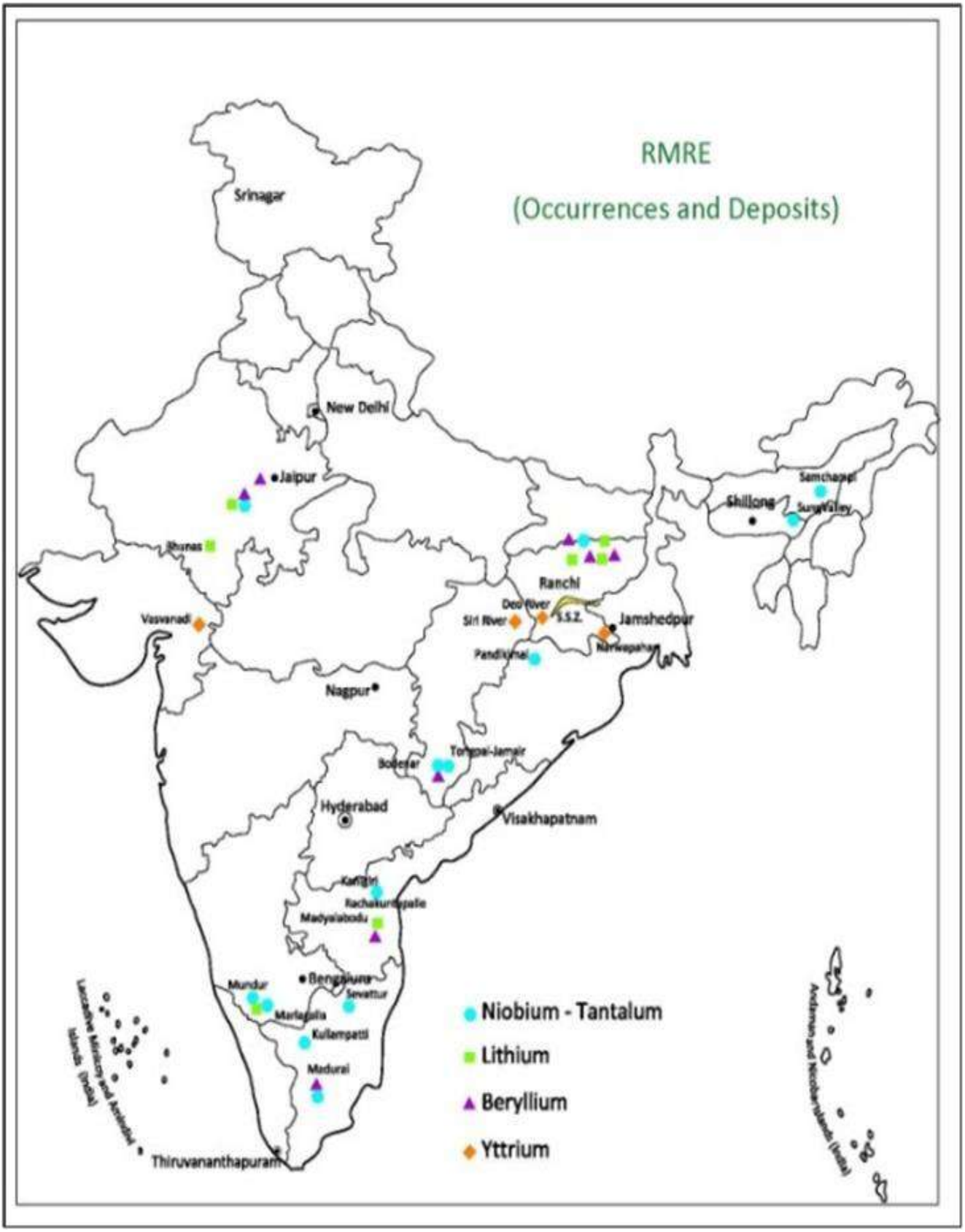


The mineral deposits of India - (Geological Survey of India (GSI)) 2013

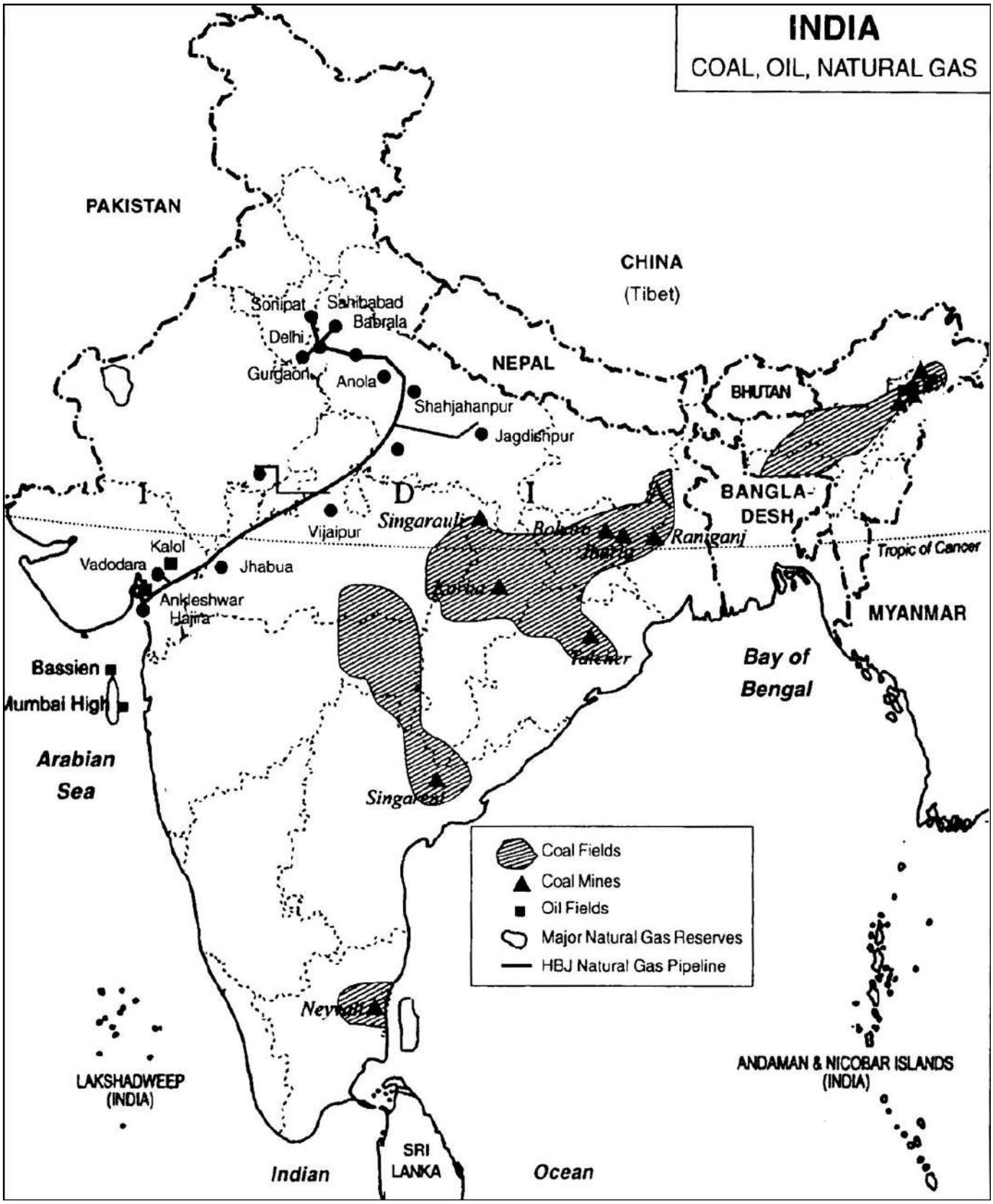
The estimated value of minerals mined in India is about 1.1 lakh crore rupees per annum.

The crude oil production in India (both public and private combined) is about 35 million metric tonnes per annum (onshore: offshore ratio is 1:2) and natural gas production is about 1 lakh metric tonnes per annum (onshore: offshore ratio 1:4). This serves 25% of her domestic needs and valued at 150,000 crores per annum. The estimated hydrocarbon reserve is about 30 billion tonnes ("About Exploration & Production | Ministry of Petroleum and Natural Gas | Government of India")

Rare Metals (RM) include Niobium (Nb), Tantalum (Ta), Lithium (Li), Beryllium (Be), Cesium (Cs) etc. and Rare Earths (RE) include Lanthanum (La) to Lutetium (Lu) besides Scandium (Sc) and Yttrium (Y). These metals are strategic in nature with wide application in the nuclear and other high-tech industries such as electronics, telecommunication, information technology, space, defense etc.

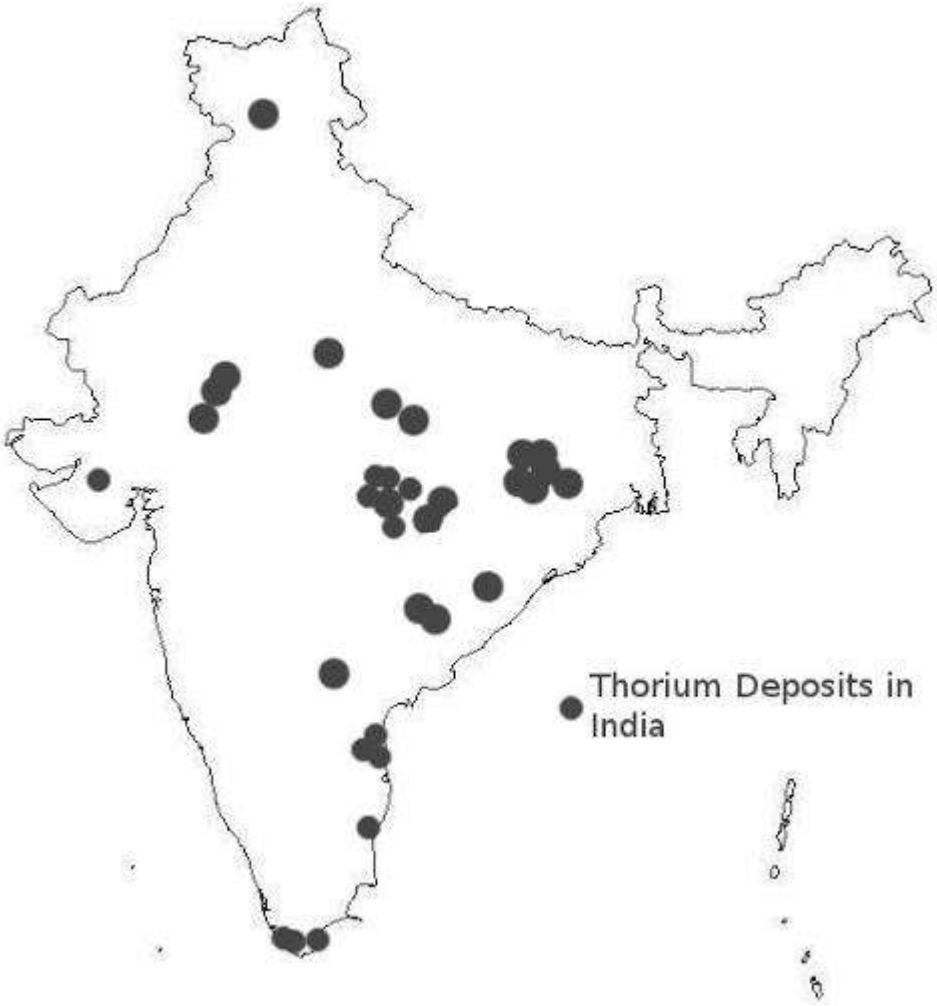


("Rare Metal and Rare Earth Investigation: Atomic Minerals Directorate")

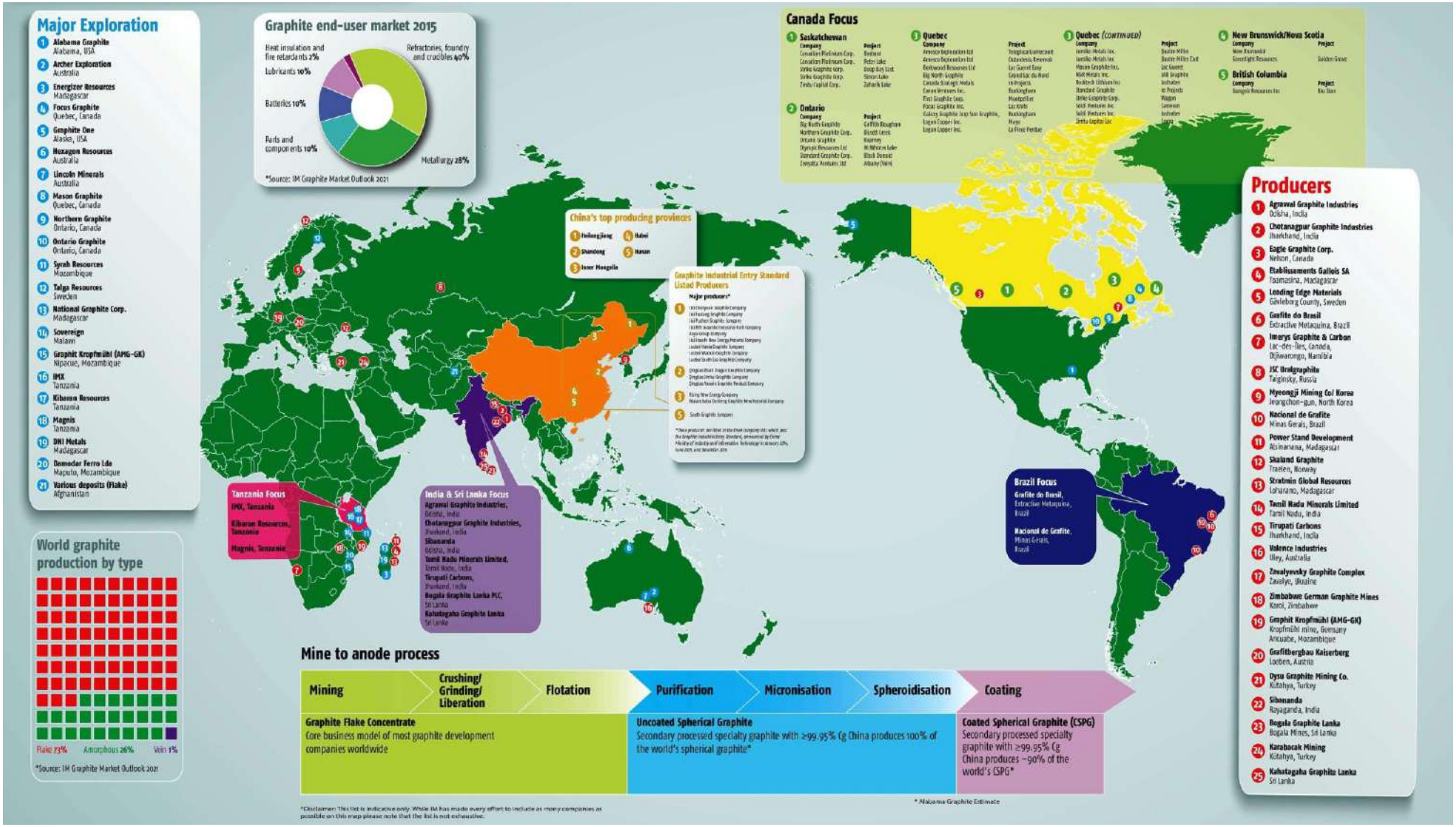


(Zigya) (Dash et al.)

India has large Thorium deposits; essential in the civil use of nuclear energy. Although there is no current working Thorium nuclear reactor in the world, there are ongoing global efforts to achieve this possibility. There are ongoing efforts to plan and develop Thorium nuclear reactors for power generation in India. India has one of the world's highest reserve of thorium deposits ("Thorium - World Nuclear Association").



Graphite is a very good conductor of electric and thermal energy and is used in industrial and metallurgic reactors and foundries. It has a wide range of consumer electronics application. India has high reserves of graphite, Arunachal Pradesh having 1/3 of the total deposits in India. Titanium is a light weight rare earth as strong as steel, helpful in aerospace and automobile engineering. However, most titanium currently produced is used for manufacturing pigments. India has large reserves of titanium.

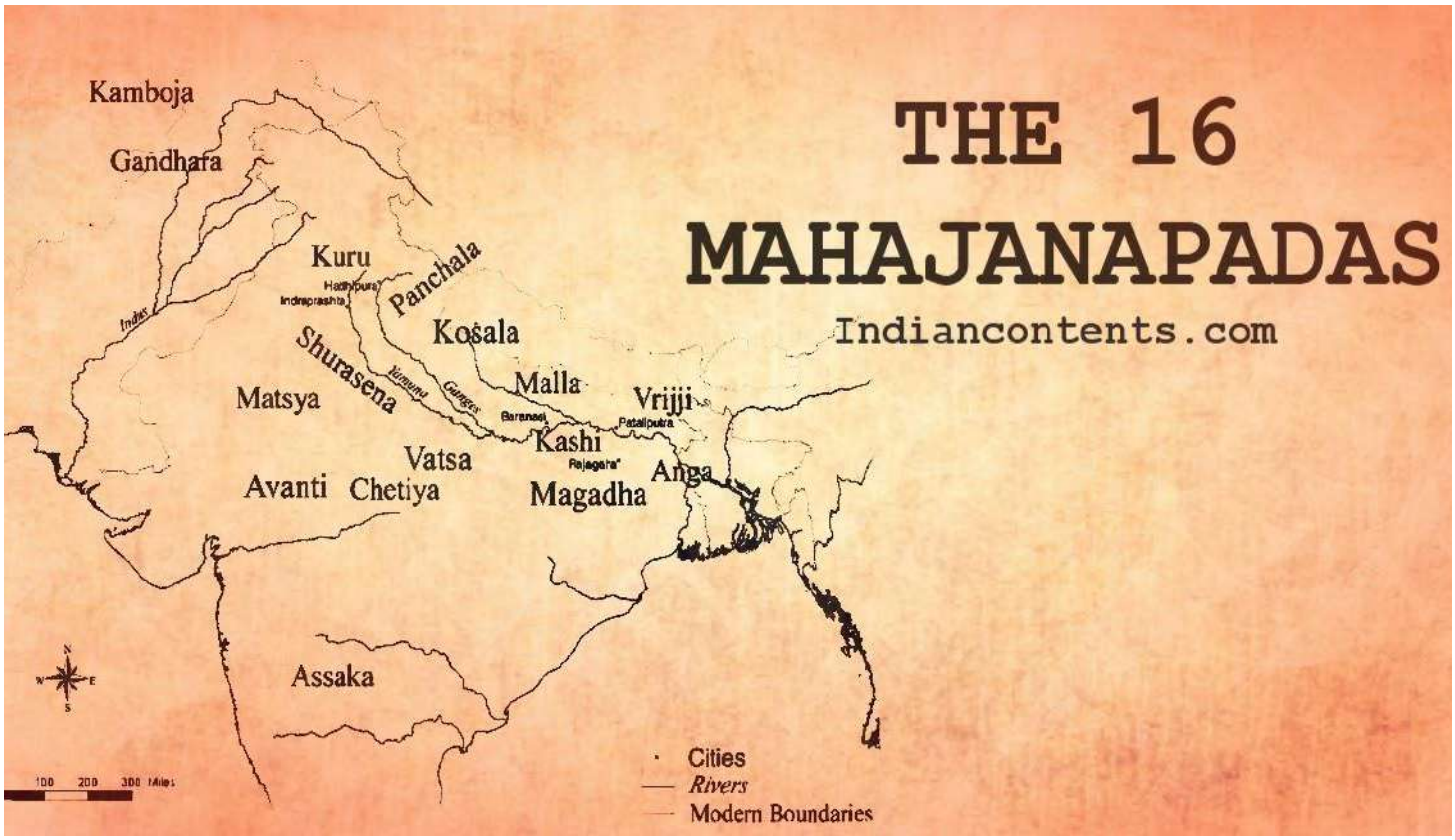


("TMEC | 10 Top Graphite-Mining Countries")

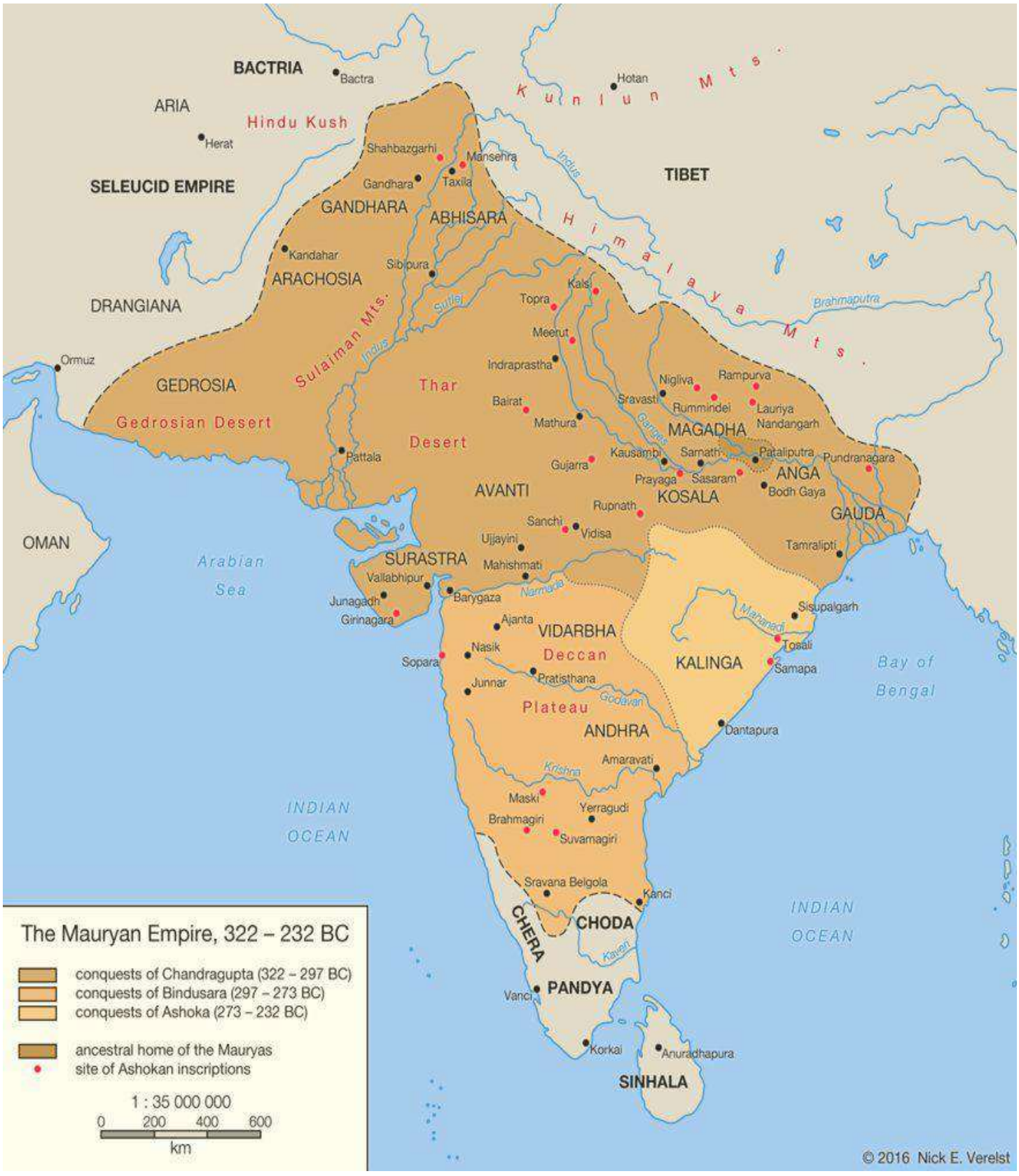
Chapter 2: History

Archaeological studies suggest that Dravidian farmers, steppes farmers and western Asian farmers cohabitated the Indian subcontinent since 5000BC. The urban Indus Valley Civilisation (today's Pakistan) had its peak between 3000 – 2000BC. The Dravidian staple crop was considered as rice and the other Asian migrant farmers had their staple crop as wheat. This is held as one reason for Dravidian aborigines migrating more south, while the central Asian new wave of migration whose staple crop was wheat, stayed in the northern latitudes. However, nearly 75% of the Indian subcontinent gene pool is considered as mixed. Iron metallurgy was advanced with push-pull bellows by 2000BC and carbonisation of iron in crucibles by 300 BC (Wootz steel – this was traded in the middle east as Damascuss steel). The Indo-Aryan warrior migration is held to be true despite the prior synthesis until about 1500 BC when the oral tradition of hymns was codified and a new language of Sanskrit was born (Pillalamarri). The gene pool is broadly ANI (Ancestral North Indian) and ASI (Ancestral South Indian). The ANI gene pool is considered more an admixture than the ASI gene pool. At about 1200 BC, there was more stringent enforcement of caste barriers to intermixing as reflected by the genetic markers of this time. The Vedas, Upanishads and The Geeta were considered written between 1500 BC and 500 BC which became the pillars of Hinduism, as it evolved as a Religion. The discourses and authorships were so wide and deeply contested that a significant part of arts, language and sciences had its roots in this period. This also gave birth to new religions such as Buddhism and Jainism as an offshoot from existing philosophical deliberations.

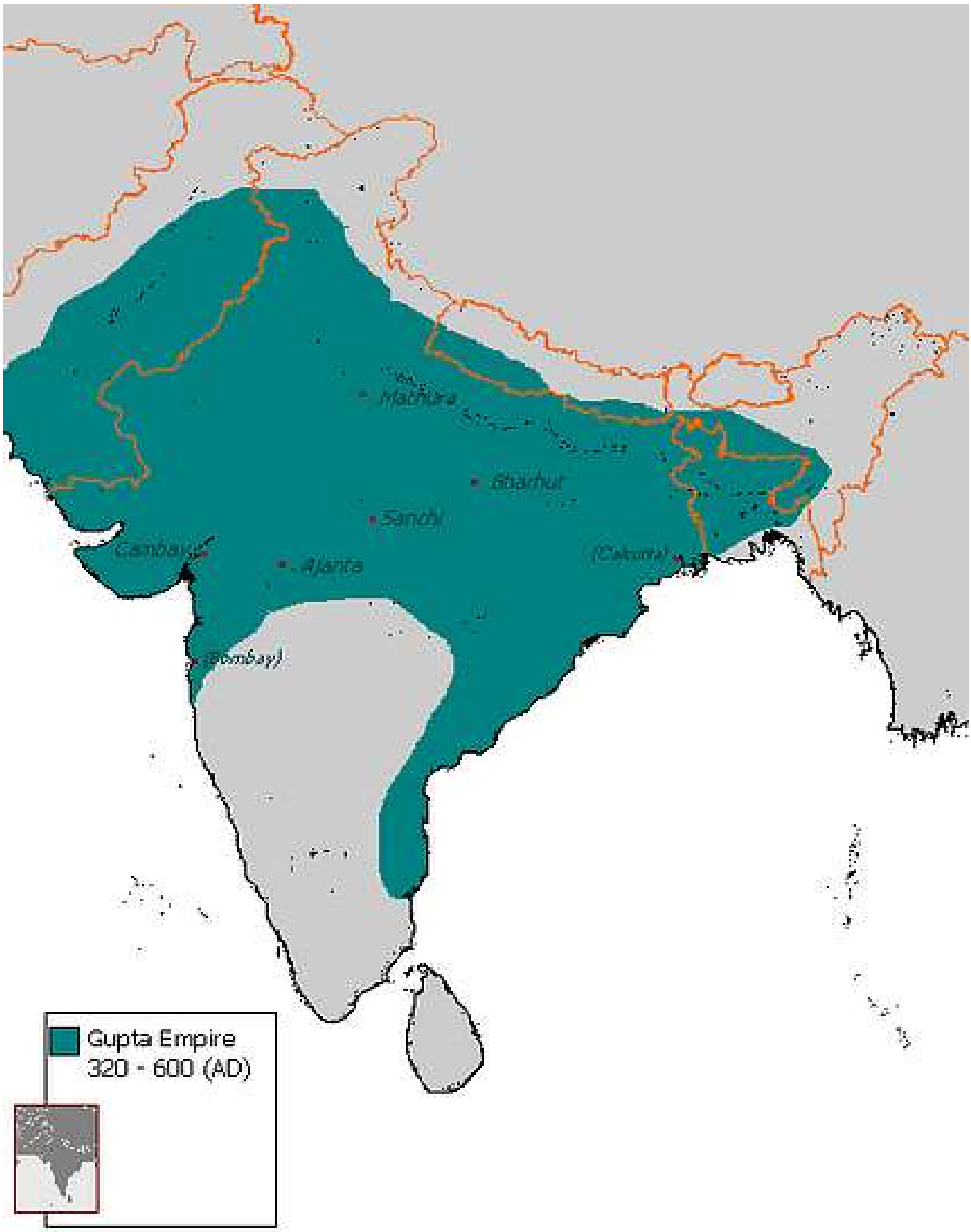
The self-regulated oligarchies or Mahajanapadas around 500 BC established the Hindu Kingdoms of India. The Mauryan Empire about 320 BC saw the greatest expansion to 150% of current land area of India. The Gupta Empire around 400 AD is considered as the Golden Age of India by some historians.



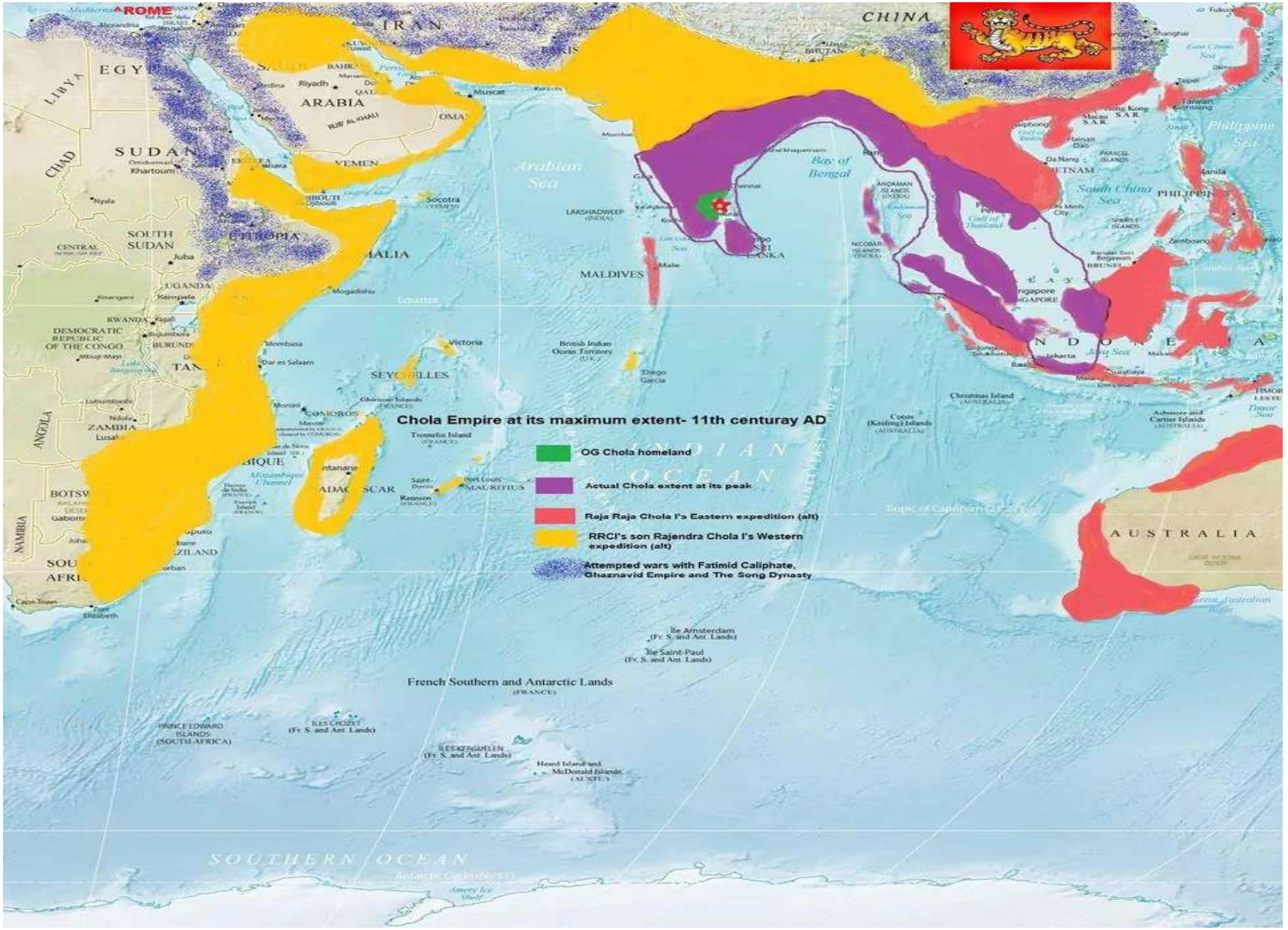
The Islamic Caliphate was well established in central Asia by the medieval period. Arab trade route with India (Gujarat, Kerala, Tamil Nadu and West Bengal) had established the earliest mosques in India. The expansionist attacks started by the 8th Century, but the bravery of several generations of kings in the north western and central India regions kept a check on this agenda. There was territorial conquests within the country between kingdoms but little effort for expansion outside the Indian subcontinent (except North western – Mauryas and Guptas; and south east asia - Cholas).



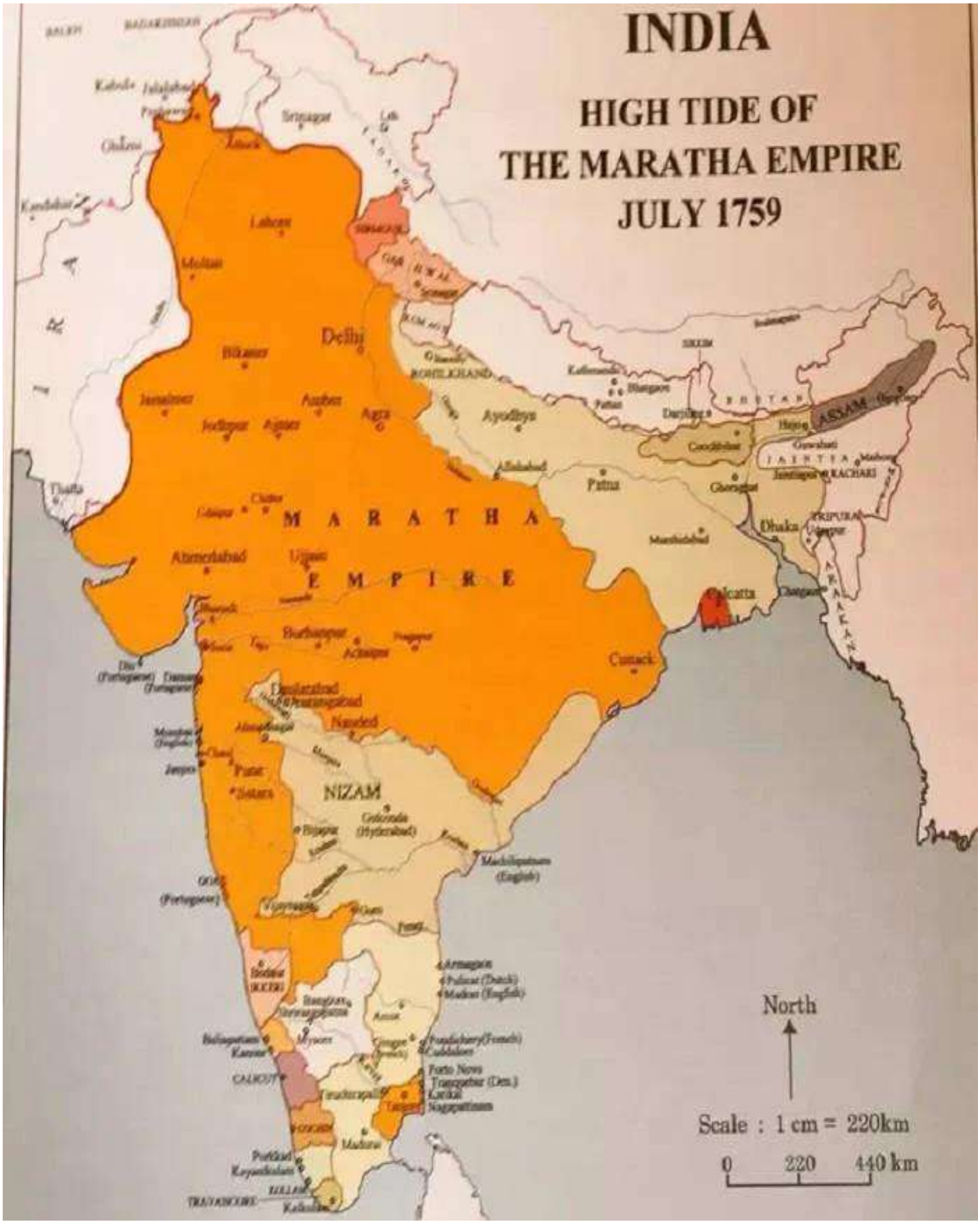
("The Mauryan Empire, 322 - 232 BC by Undevicesimus on DeviantArt | Ancient India Map, Indian History Facts, India World Map")


Mathura
Bharhut
Sanchi
Ajanta
(Bombay)
(Calcutta)
Gupta Empire
320 - 600 (AD)

(Dola RC)

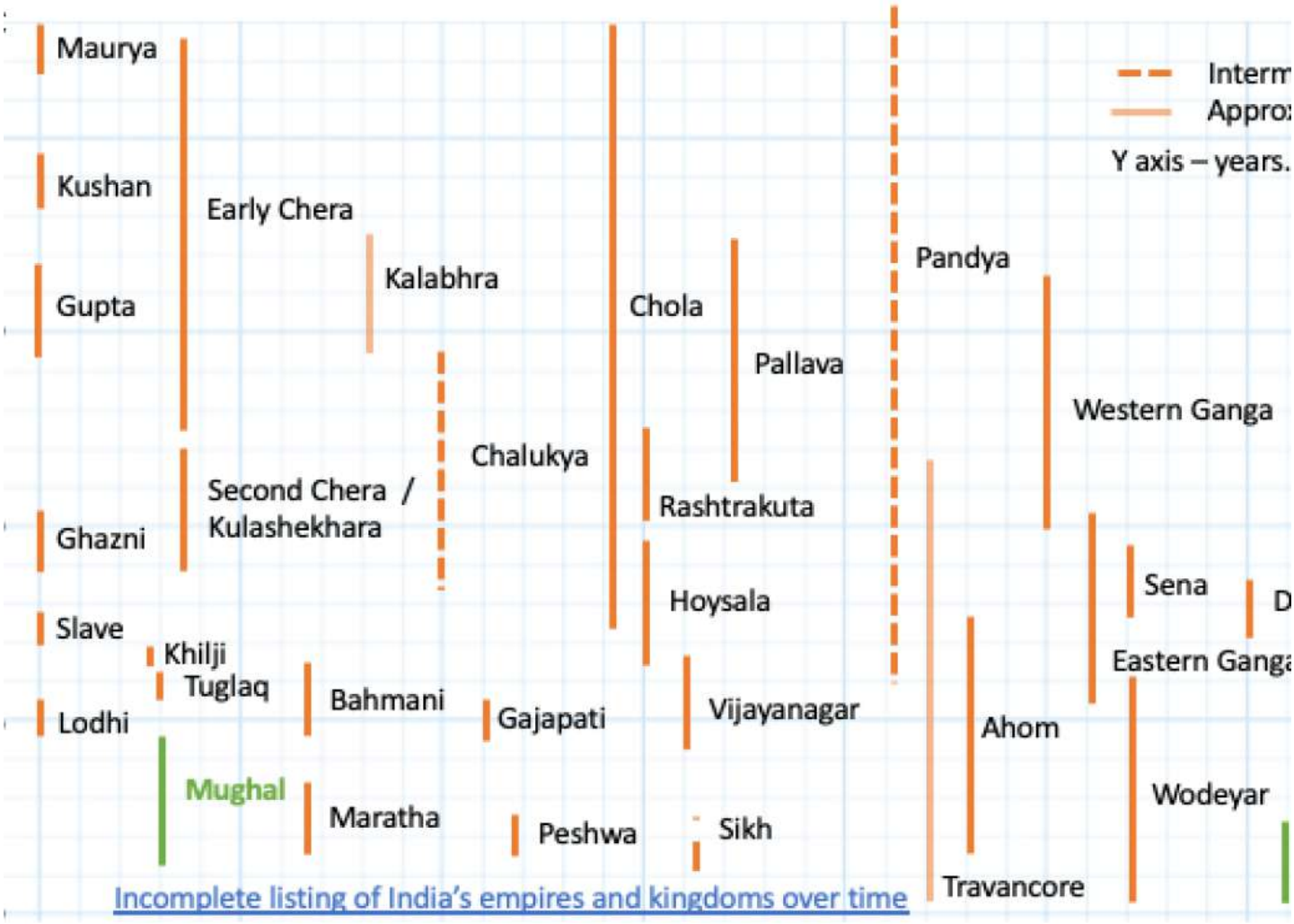


The Chola Empire, one of the Tamil kings, at their greatest extent- 11th century AD : MapPorn (reddit.com



("History of the Maratha Empire (Maratha Confederacy): Rise, Fall & Administration")

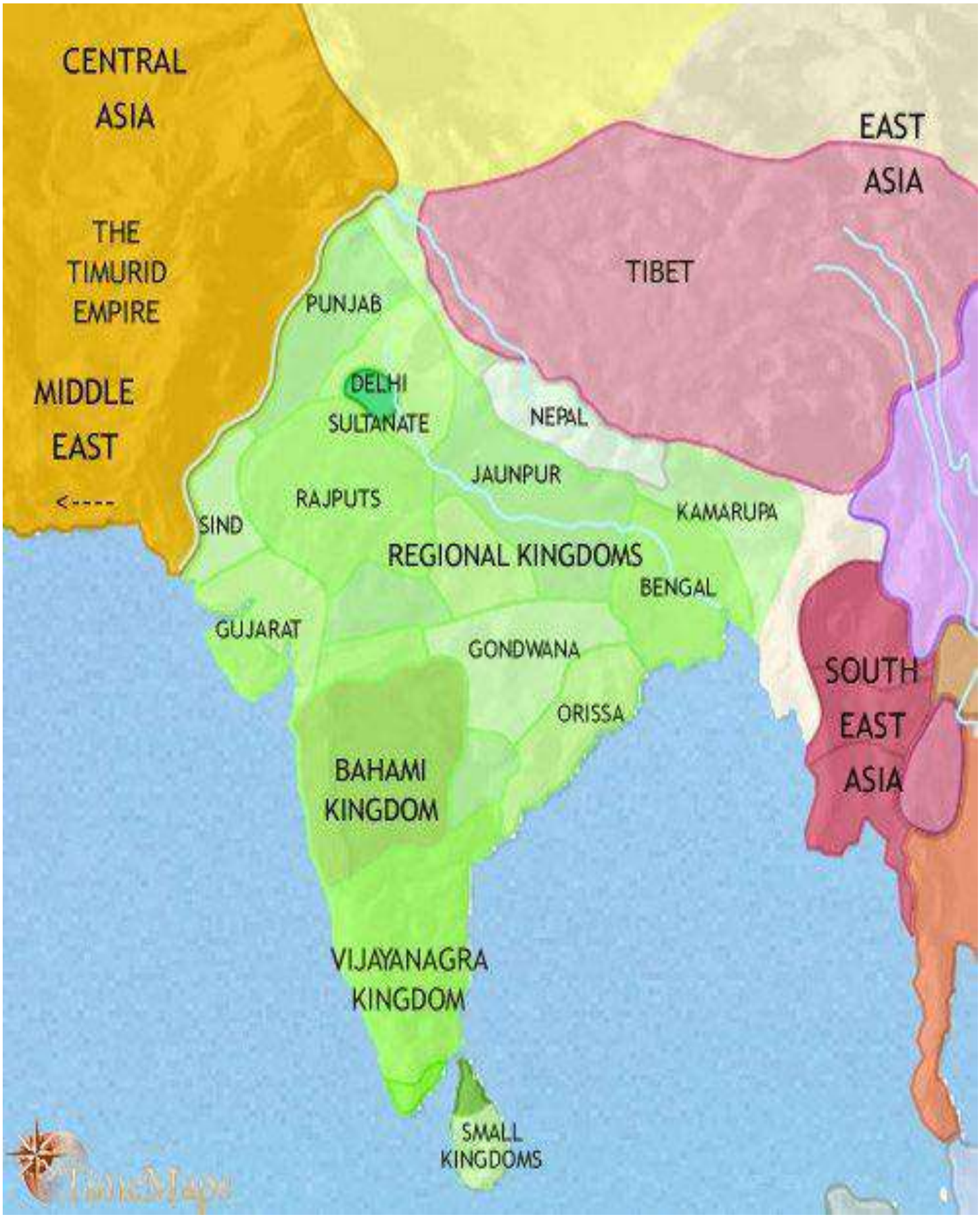
Name Reign	(years)	Comments
Indus valley civilisation	4200	Approximate
Pandya	1800	not continuous
Chola	1580	
Travancore	1127	Approximate
Early Chera	980	
Chero Dynasty	660	Approximate
Western Ganga (Karnataka)	650	
Pallava	622	
Chalukya	613	Intermittent
Ahom	598	
Wodeyar	548	
Eastern Ganga (Orissa)	454	
Pala	400	Approximate
Mughal	331	
Hoysala	317	
Second Chera (Kulashekhara)	302	
Somavamshi (Orissa)	300	Approximate
Kalabhra	250	Approximate
Rashtrakuta	247	
Vijayanagar	229	
Gupta	220	
British rule	190	
Bahmani	180	
Maratha	169	
Sena	160	
Ghazni	154	
Deva	142	
Sikh Empire	139	Not continuous
Kushan	136	
Maurya Dynasty	136	
Peshwa	110	
Gajapathi	107	
Lodhi	105	
Tuglaq	94	
Slave	84	
Khilji	30	



(kumar)

The history of Invasion by the northwestern frontiers is a history of the interplay between the Caliphates (Shiite Muslim Kingdoms) and Mongols that went on to form several fringe dynasties. These formed separate dynasties and invaded India from the Khyber and Bolan pass. Infact, the Sultanates warded off Mongol invasion into the Indian subcontinent.

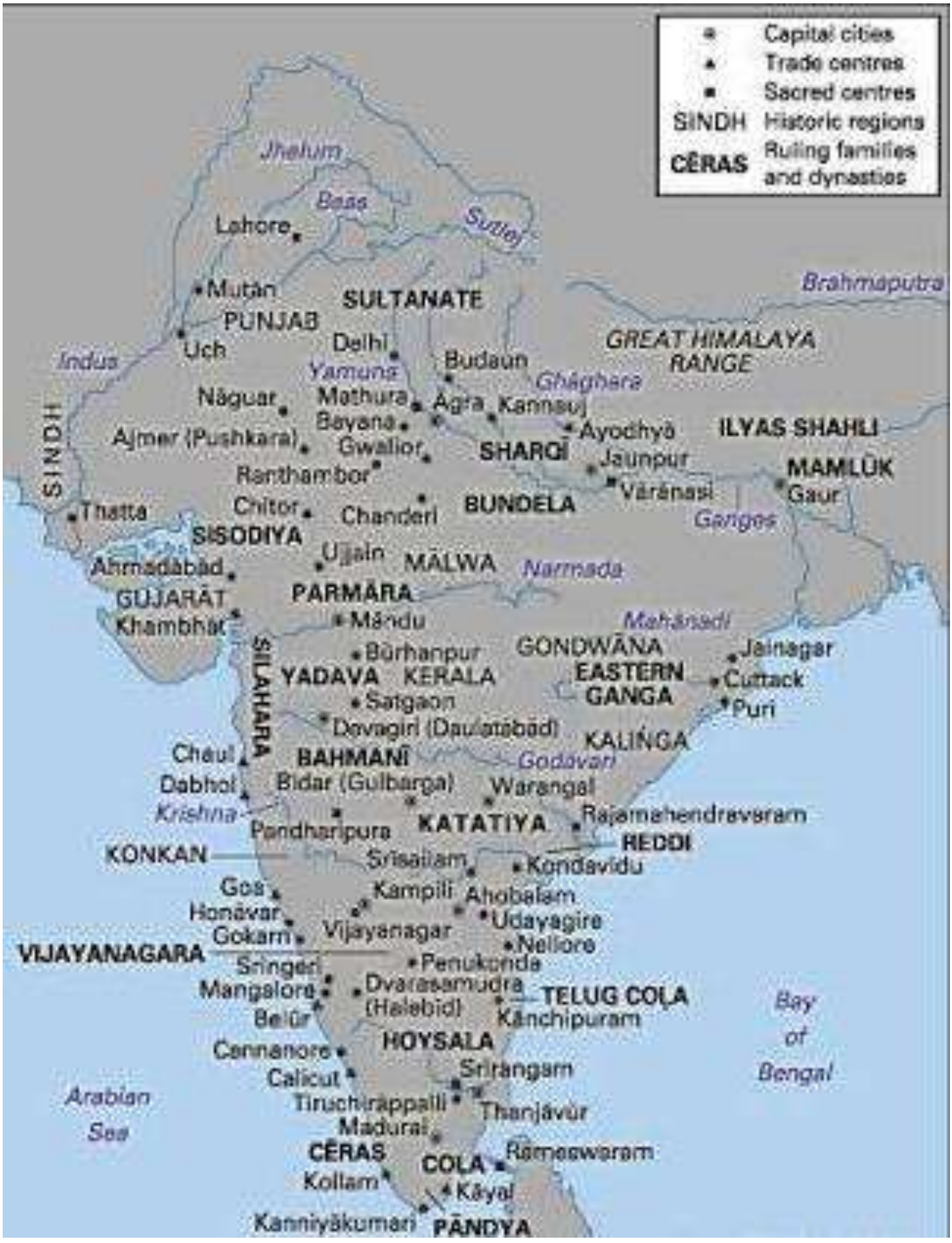
There were few occasions of Hindu Kingdoms joining together to repulse external attacks. The Ghorids from central Afghanistan had started the guerrilla raids of invasion of Northern India from the Khyber-pass by about 1000 AD. Several Hindu Kings from Newar (Rajasthan), Delhi, Uttar Pradesh, Gujarat and Madhya Pradesh fought several battles with the invaders and mostly won or repulsed attacks but they were incessant and repetitive. The last Hindu King to reign India was Prithviraj Chauhan (from Gujarat to Delhi) around 1200AD when in the second battle of Tarain, Mohammad of Ghori returned to conquer the divided Rajputs under Prithviraj Chauhan. The Delhi Sultanate was founded in the early 12th century AD.



Similar attacks from the Bolan pass near Gujarat saw the founding of the Mewar and Gujarat Sultanates. The Rajput Hindus in isolation and sometimes jointly, waged wars against the Sultanates and kept it from forming an Empire. It took a century before the Muslim Empire was set up in Northern India under Alauddin Khilji about 1300 AD.

Babur of the Timurid Dynasty (Mongols – Sunni Muslims from central Asia) defeated the Rajputs and the Delhi Sultanate to set up the Mughal Empire in the first battle of Panipat in 1526.

At its peak, India was the world's largest economy under Emperor Aurgangazeb in the late 17th century. The Muslim rule persisted in India in some form until the accession of the princely state of the Nizam of Hyderabad in September 1948 under Operation Polo by the Indian military. There is significant criticism about slavery, forced conversion, circumcision, destruction of Hindu temples and extermination during the Muslim rule in India. Emperor Akbar of the Mughal Empire is known best for his pacification and placation of the two religious sentiments and ruling courtesy.



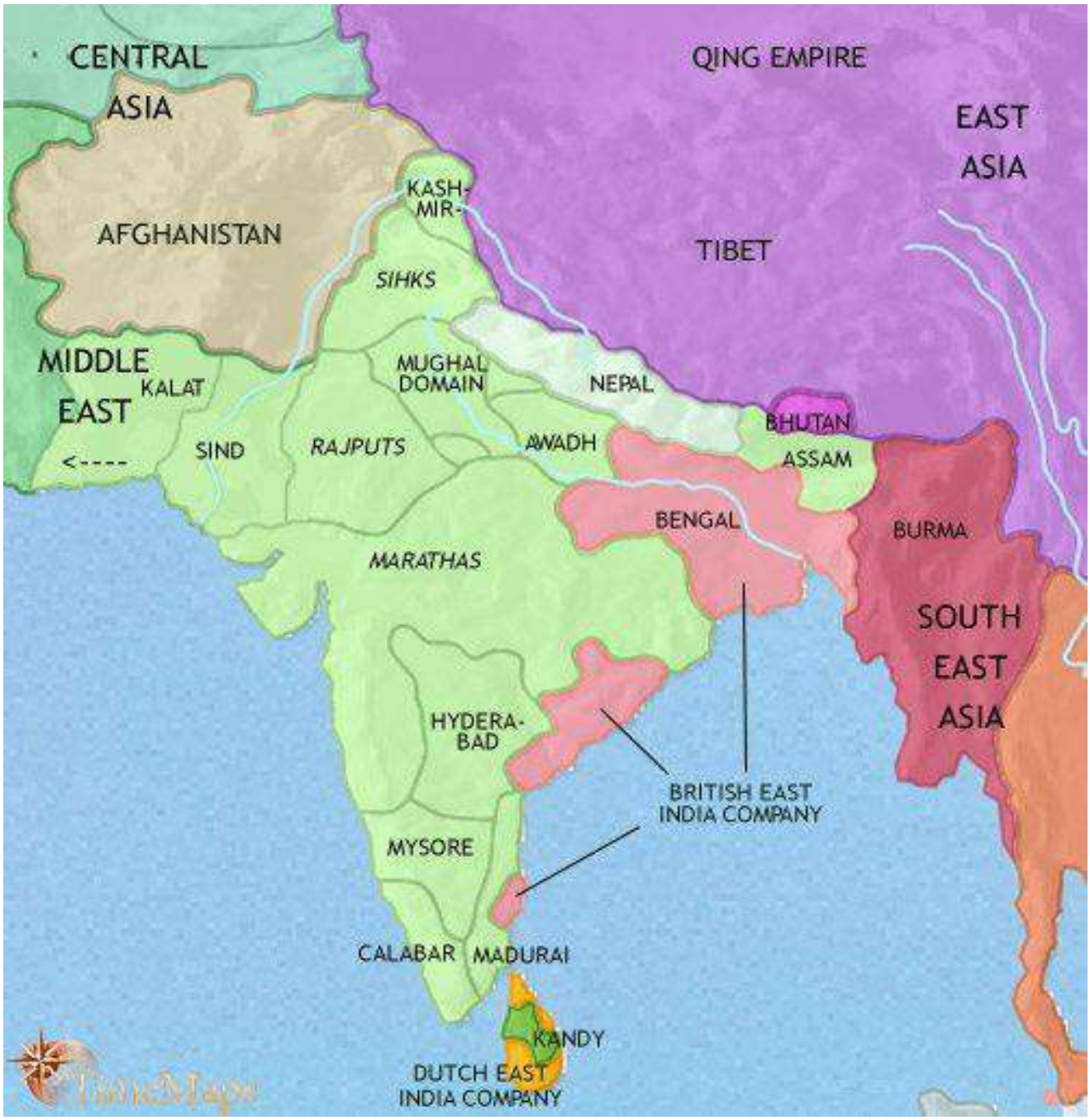
About 1400 AD

CONQUEST OF INDIA FROM THE NORTHWESTERN ROUTE BY THE MUSLIM DYNASTIES IS SUMMARIZED AND GIVEN BELOW ACCORDING TO CHRONOLOGY.

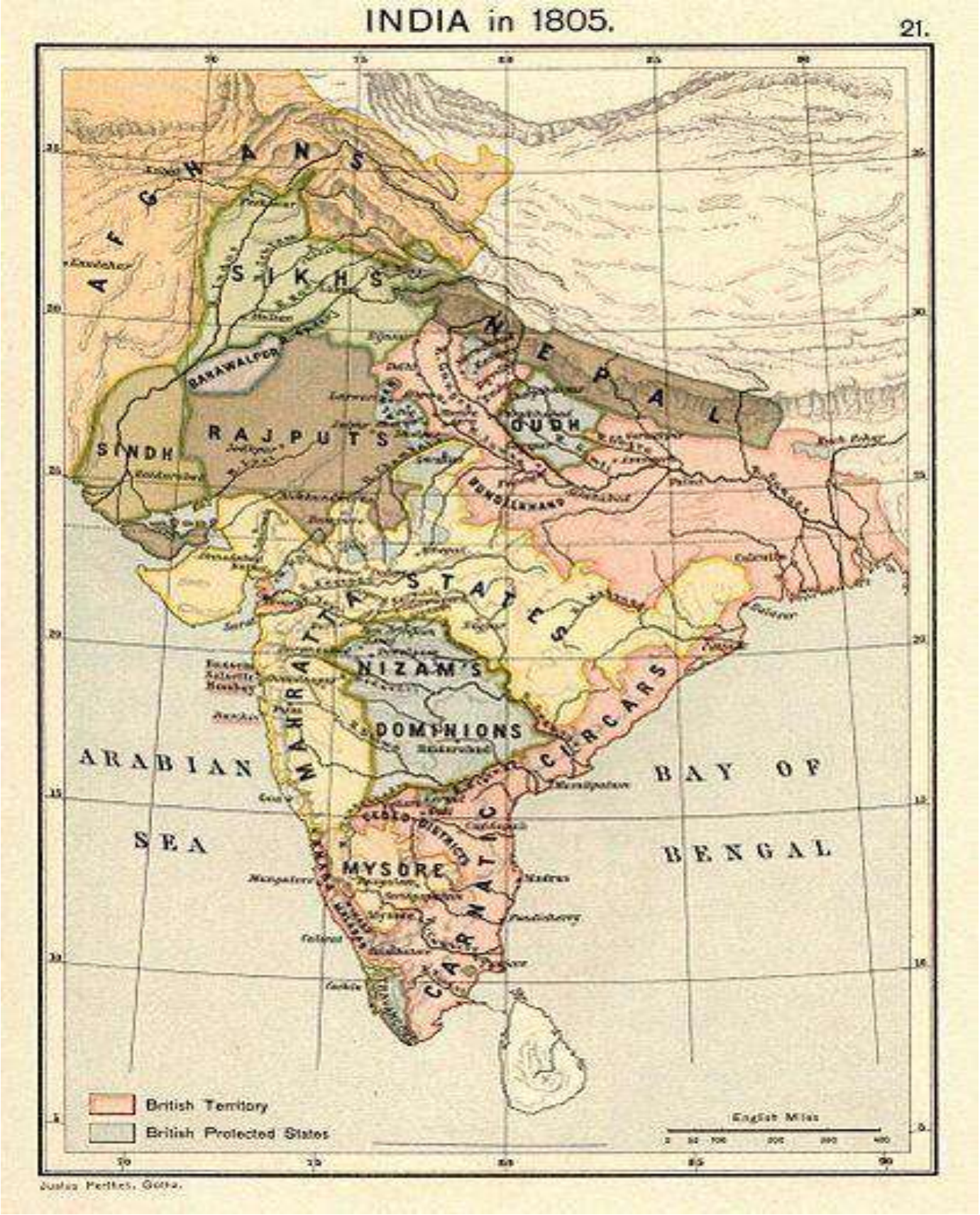
712 A.D.	Arab conquest of Sind.
997- 1030 A.D.	Raids of Mahmud of Ghazni.
1192 A.D.	Muhammad Ghori defeated Prithiviraj Chauhan.
1206 A.D.	Slave dynasty established by qutb-ud-din - Aibak.
1296- 1316 A.D.	Ala-ud-din Khilji's reign.
1325- 51 A.D.	Muhammad bin Tughlak's reign.
1414- 50 A.D.	Rule of Sayyids at Delhi.
1451 A.D.	Accession of Bahlul Lodi
1526 A.D.	First Battle of Panipat. Babur establishes the Mughal Empire.

The trade routes that first opened Muslim (Arab) settlements in India (Kerala, Tamil Nadu, West Bengal and Gujarat) also led to the first colonial settlements in India. However, the oldest Church of Syrian St Thomas Church in Palayoor, Kerala is from 52 AD. Christian Missionaries preceeded Trading companies from the 15th century AD. The trading companies from different European Nations set trading bases and tried to monopolise trading rights. The Dutch in Pulicat (TN, 1605), The Portuguese in Calicut (Kerala, 1498 – the Ottoman Turks control of Constantinople prevented the European sea trade with Asia and hence the navigation of Vasco da Gama to India around the cape of good hope was the opening to Asian colonisation), the British in Gujarat (Surat, 1608) and The French (Surat, 1668). The Mughal Empire and the Maratha empire primarily resisted European colonisation for a few centuries. Chatrapathi Shivaji maharaj is known as the father of the Indian Navy.

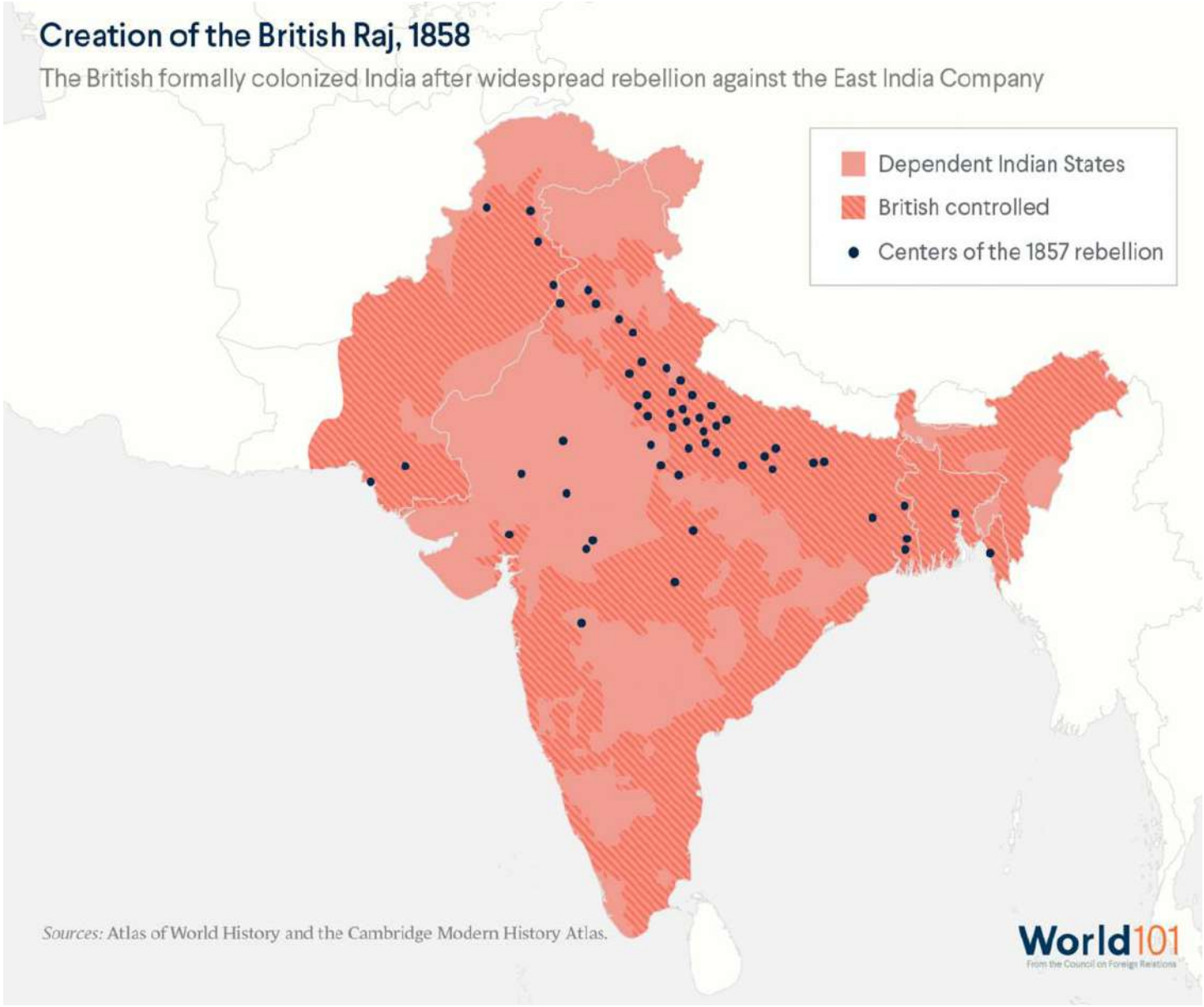
The Portuguese settlement of Goa was freed by the Indian Government in 1961. The French settlement around Pondicherry was gradually ceded between 1954 and 1962. The Dutch had left their trading colony of Pulicat by 1825 and moved on to Kandy (Srilanka).



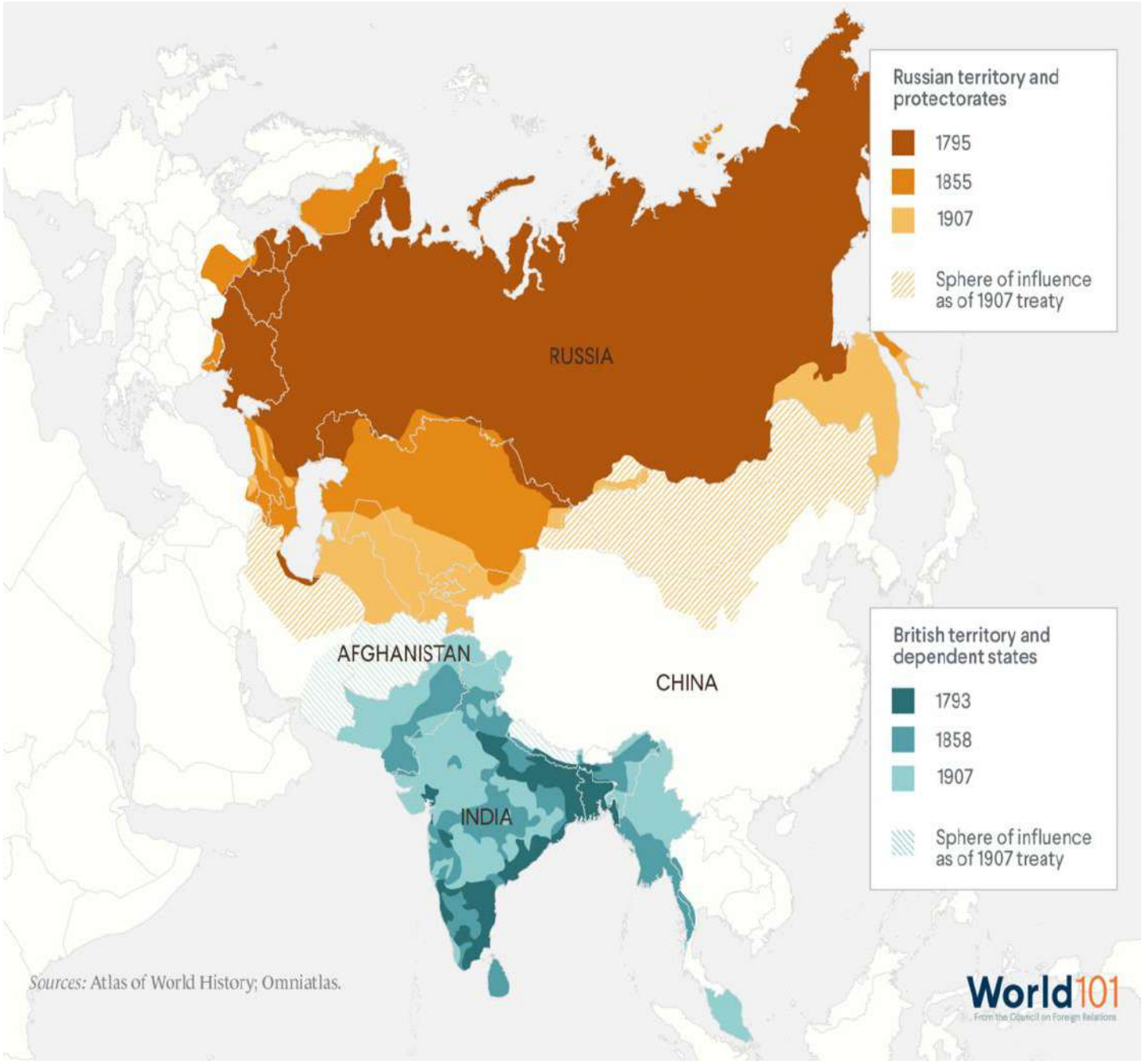
Late 18th century



By 1757 after the defeat of Siraj Ud Daulah (Nawab of Bengal) by Robert Clive in the battle of Plassey, the conflict between the European companies had more or less reached an equilibrium after several battle fronts and negotiated state, with the British East India company having monopoly of trade in India between 1757 – 1858 marked by several direct and indirect battles between the foreign companies. It came under the direct rule of the Queen of Britain after the Indian rebellion (Sepoy Mutiny) of 1857 and the crown ruled from 1858 until 1947 with territory conquered by the East India Company now handed over to the Crown.



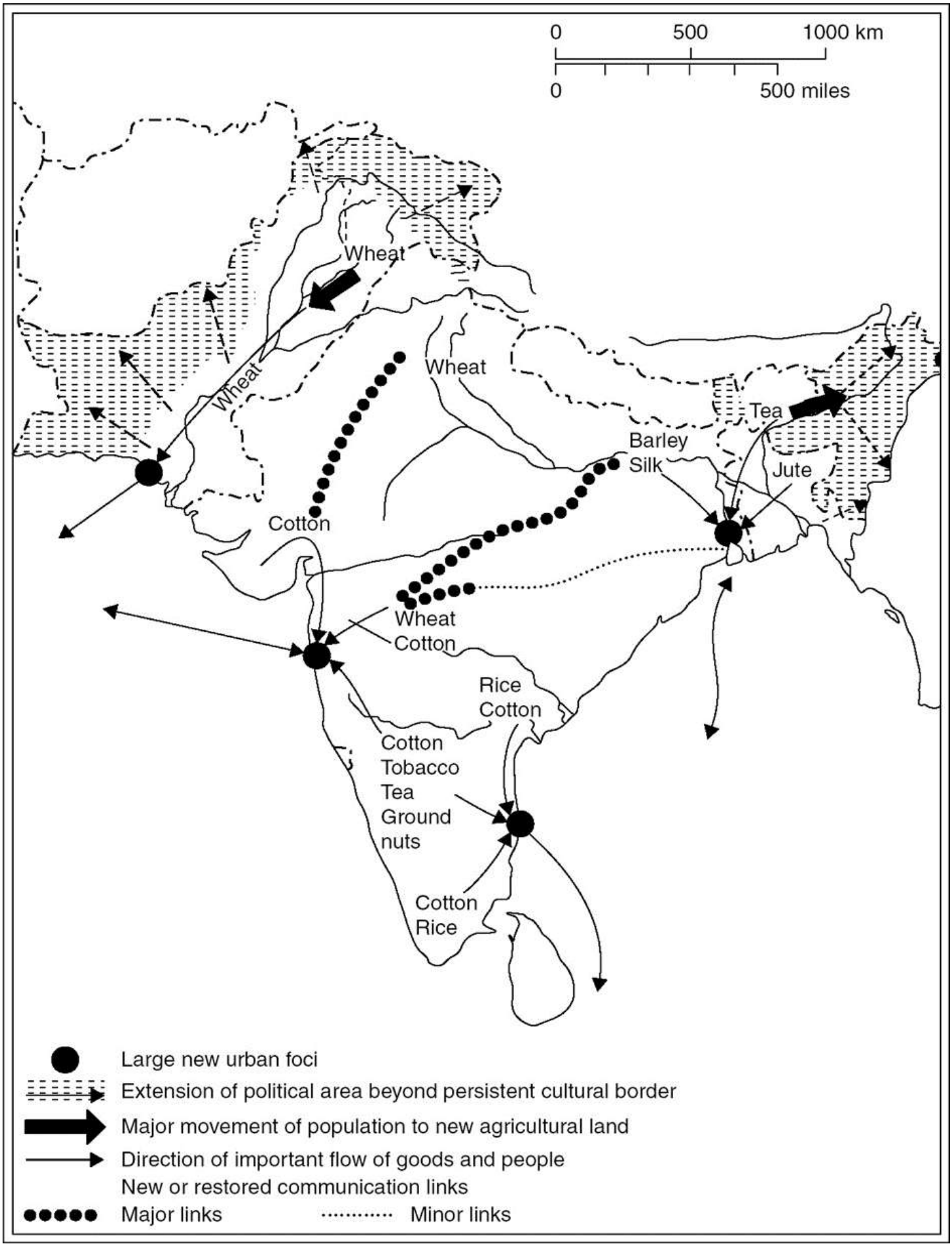
("South and Central Asia | Modern History")



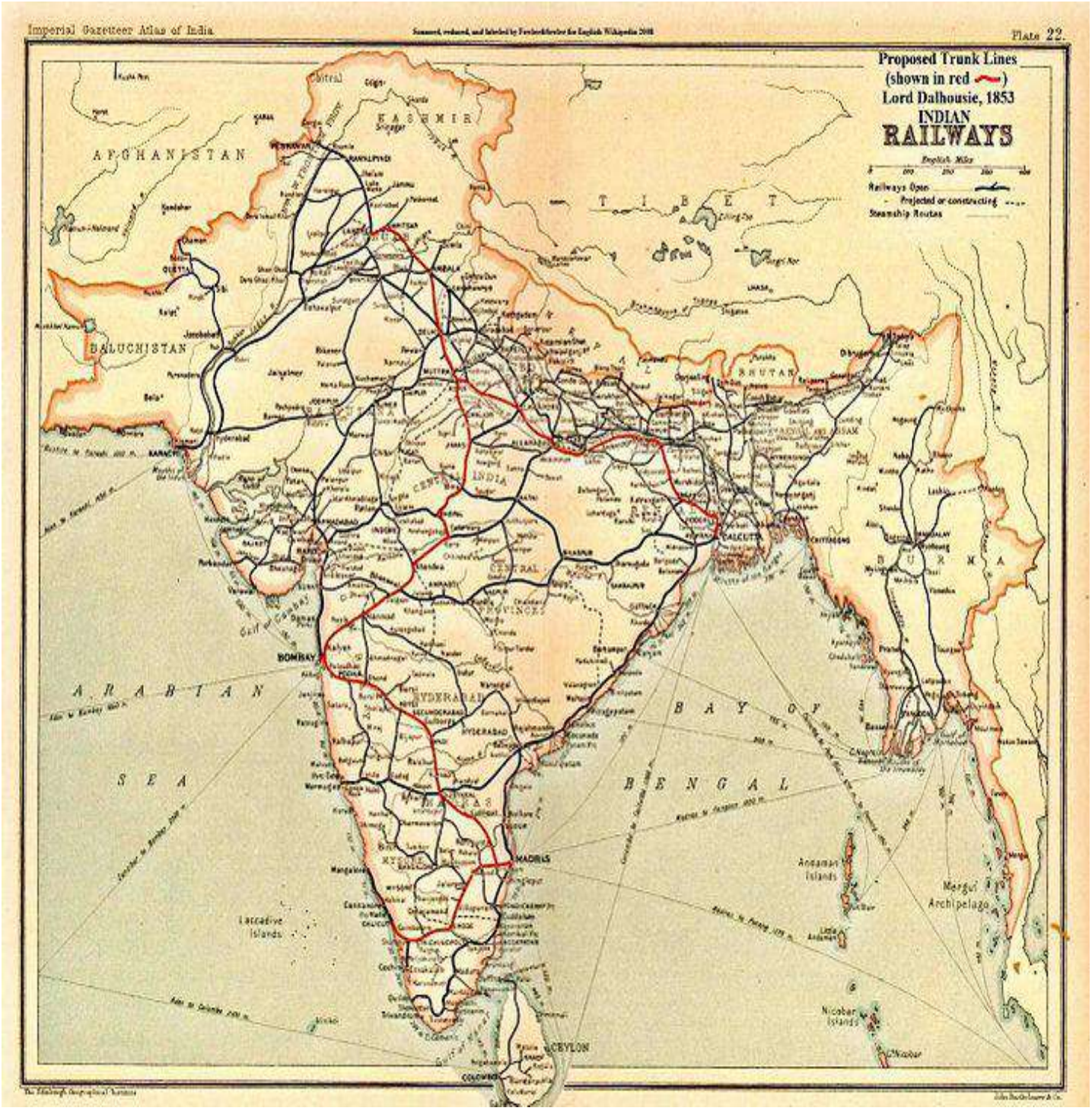
("South and Central Asia | Modern History")

Indians contributed 1.3 million soldiers to world war I (~6% died) and 2.5 million soldiers to world war II (3.5% died). The first mine of Raniganj coal field (West Bengal) was set up in 1774, the Subordinate Medical System was formed by the mid-18th century in the principal British presidencies where Indians were trained in Allopathy that was a developing field in Europe.

Colonies usually produced agricultural and textile ingredients for the colonisers in addition to precious metals. Base metal mining was restricted to the administration and the base mining industries in the colonised land was mostly stopped as these metals could be used for warfare materials. Whatever produce was decided by the coloniser, those earnings were taxed for administration.

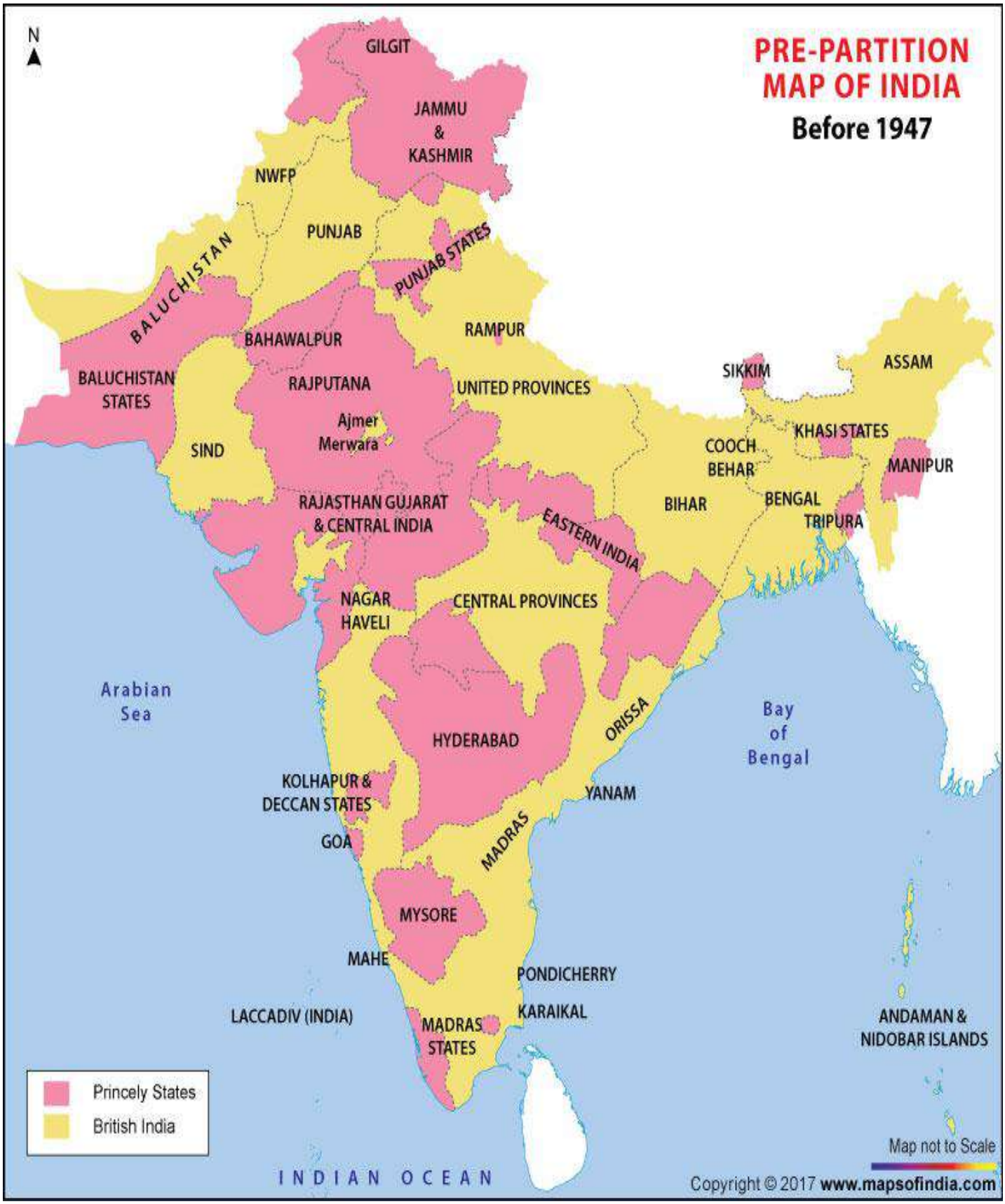


("Agriculture, 1860–1950:")

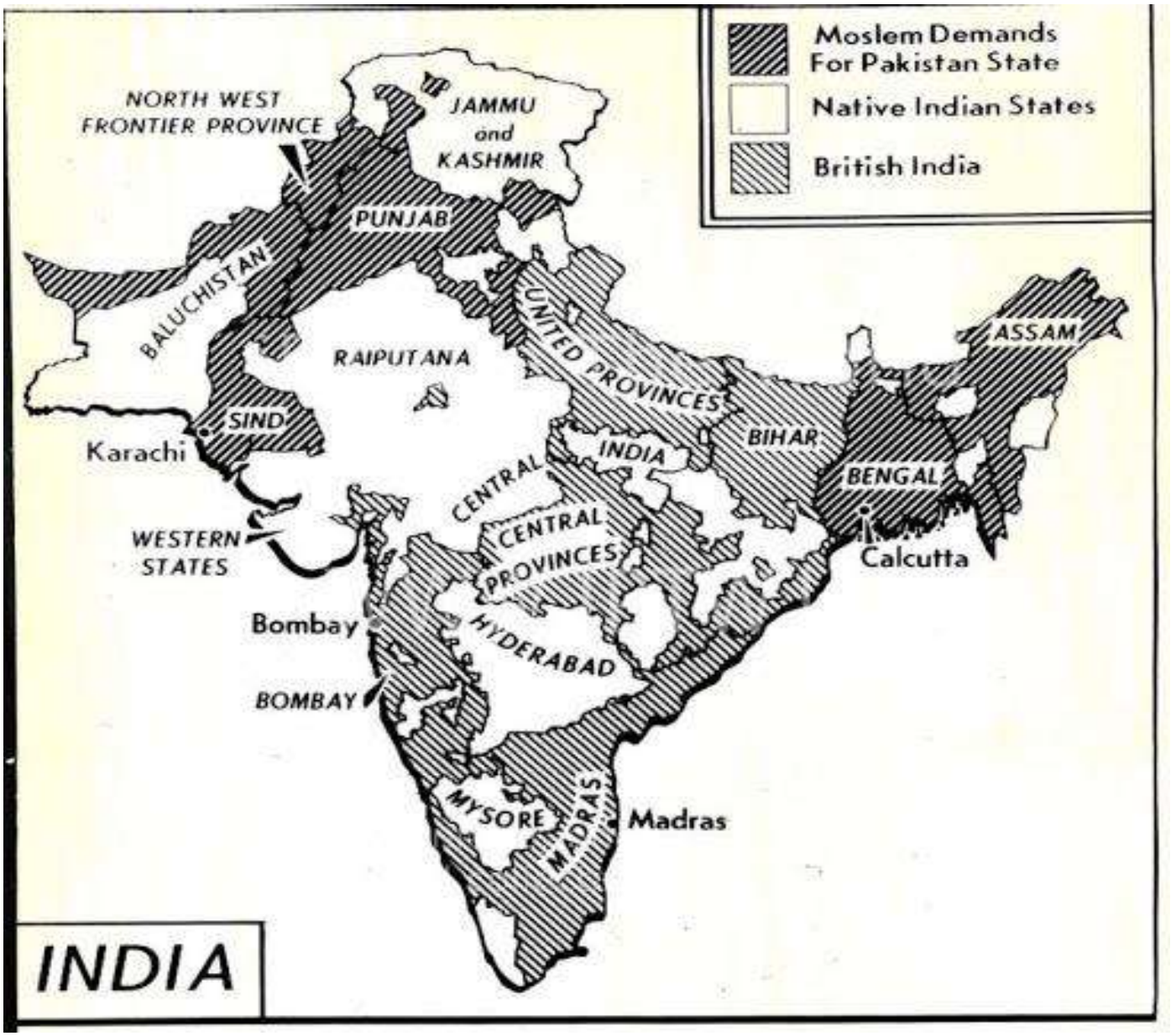


The first industrial line to transport granite for building roads was built in Madras in 1837. The first passenger Railway line between Bombay and Thane (34 kms) was started in 1853. The veins of the agricultural and mineral transport can be seen in this map. After a slow start, the construction of railway network envisaged by Lord Dalhousie was sped up after the 1857 Rebellion.

The first telephone lines were set up in 1882 (6 years after its invention) by the Oriental telephone company in Calcutta, Mumbai, Chennai and Ahmedabad (CSL STYLE ERROR: reference with no printed form). The first hydroelectric power stations were built at the turn of the 20th century in Darjeeling and Sivanasamudram. Some gold mines started operation in Kolar Gold Fields under John and Taylor company in 1880 and was electrified in 1902 (gold reserves in Kolar were harnessed since the 2nd century AD. KGF went on to be one of the deepest mines in the world at ~ 3.2 kms). The streets of Calcutta and Bangalore were the earliest to be lit. The first domestic flight from Karachi to Delhi was flown in 1912 (*Chronology of Events of Indian Civil Aviation Sector | Association of Private Airport Operators*). Indian School of Mines was founded in Dhanbad in 1926.



India with several princely states {584] and the British Raj in the mid-20th century before Independence



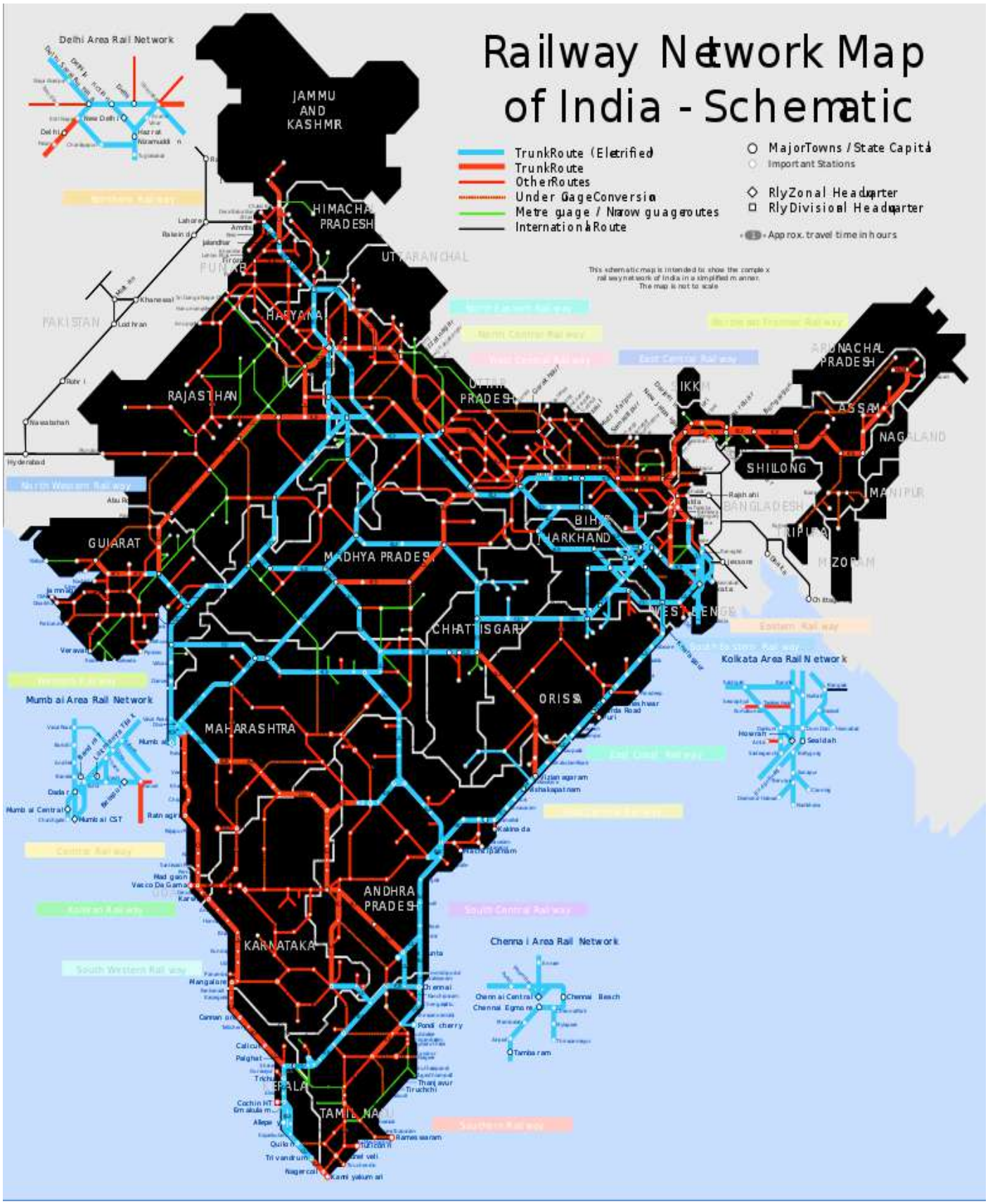
About 1,50,000 Britishers living in India ruled over its 300 million population. The British protected states (princely states with negotiated taxation for protection) grew in numbers. About 1 – 4 lakh Indian soldiers formed the primeval Indian Army (Office). Lord Charles Cornwallis established the Imperial Civil Services in 1858 that formed the major administrative wing ruling over India. This was considered an important aspect of the geopolitical issues of its times as a check to Russian Imperialism and to administer the colony. They were initially mostly British, but by 1940, 50% were Indians. The Indian Freedom struggle occurred in episodes between 1857 until independence. The non-violent wing of the Congress, Muslim league and supporters of Mahatma Gandhi and the less organised small group violent rebellions of several fighters and organised Netaji Subhash Chandra Bose's Indian National Army rebellion were the contributors of freedom struggle movements. The growing Russian influence in Afghanistan, the transatlantic wars of World war I & II along with local civil unrest gradually led to the end of colonialism with its consequence of Independence t the ruled countries. Its historic narrative still remains as the British Commonwealth Group of Nations. The 1857 rebellion itself has an enormous range of death estimate from a few thousands to 10 million spread over ten years. Most of the Indian party or civil rebellion leaders were often imprisoned and repeatedly transferred between locations to keep their locations a secret from the population. This was certainly the case during World War II.

It is estimated that the partition of India on religious grounds led to a maximum estimate of 2 million deaths and 14 million displaced. Sardar Vallabhai Patel, the first Deputy Prime Minister of India saw the unification of India by bringing into the Indian territory, 550 princely states. There was an agreed $125,000 per annum allowance to relinquish royal

charges from the princely states. Ms Indira Gandhi during her tenure as Prime Minister withdrew this allocation. The European model of Geopolitics was similar and royalty assets were replaced by popular garden tours and estate housings or hotels. The same trend followed in India. The Royals were alleged to have sided with the British during the Indian Freedom struggle. India and Pakistan have fought 3 wars in redefining their boundaries and terrorism and counter-terrorism actions are an aftermath. China has fought one war with India for similar purpose. Less than 50% of J&K remains in Indian region due to its disputes with neighbouring China and Pakistan. These boundary disputes are still not resolved. Bangladesh was formed by the Awami League declaring its independence from Pakistan in 1971, this had led to the 2nd Indo-Pak war.

The INC (Indian National Congress) was formed in 1885. The All-India Muslim League was established in 1906. Akhil Bharat Hindu Mahasabha separated from the INC and established itself as a political party in 1933. There is no central record of Freedom Fighters and their names are not engraved on India Gate but in a centralised process, 1.7 lakh pension beneficiaries have been identified; 23,000 of whom belong to the INA movement of Freedom struggle. This leads to a disbursing of ~ 650 crore rupees in pension funds each year to the families of the Freedom Fighters. A memorial is being considered.

Chapter 3: Infrastructure, Development and Conservation



("Rail Transport in India")

The road length has increased from 1 lakh to 60 lakh kms (65% of goods and 90% of commuter transport) and Railways have added from 50,000 route kms to 1.25 lakh kms track length. The Indian Railways envisages to be carbon neutral by 2030 ("Timeline: 165 Years of History on Indian Railways") and fully electrified by 2024 (now ~ 60%).

The first metro started in Calcutta in 1984 and now 21 other cities have metro trains with Delhi's metro ranked in the World's largest ten networks.

There are 464 airstrips in India of which 137 are managed by the Airports Authority of India (Domestic and international airports) of which 34 are international airports.

Indian Institute of Science was founded in 1909 in Bangalore. BCCI was formed in 1928. Indian Statistical Institute in Calcutta was founded in 1931. Tata Institute of Social Sciences was founded in 1936 and TIFR in 1945 in Mumbai. The first IIT was founded in 1951 in Kharagpur and there are now 23 such institutions. BARC was founded in 1954. AIIMS was founded in 1956. IIM was formed first in Ahmedabad and Calcutta in 1961 and there are now 20 such institutions. TERLS Rocket launching station was built in 1963, ISRO was formed in 1969 and is now a pioneering space institute in the

world. There are ~ 165 National institutes in India, mostly set up during Nehru's Five-Year Plans. The last five-year-plan ended in 2017 and NITI Aayog under the BJP Government came in its place in 2015.

List of institutes Funded by Central Government in 2020 (Singh)

Institute	Location
All India Institute of Medical Sciences (AIIMS)	• New Delhi • Bhopal • Bhubaneswar • Jodhpur • Patna • Raipur • Rishikesh • Bilaspur
All India Institute of Speech and Hearing (AIISH)	• Mysore
Aryabhatta Research Institute of Observational Sciences (ARIES)	• Nainital
Birbal Sahni Institute of Palaeobotany	• Lucknow
Bose Institute	• Kolkata
Central Drug Research Institute	• Lucknow
Centre for the Study of Developing Societies (CSDS)	• Delhi
Central Electronics Engineering Research Institute	• Pilani
Central Food Technological Research Institute	• Mysore
Central Glass and Ceramic Research Institute (CGCRI)	• Kolkata
Central Institute for Cotton Research	• Nagpur
Central Institute of Agricultural Engineering	• Bhopal
Central Institute of Brackish Water Aquaculture	• Chennai
Central Institute of Educational Technology	• New Delhi
Central Institute of Fisheries Education	• Mumbai
Central Institute of Fisheries, Nautical and Engineering Training (CIFNET)	• Cochin

Institute	Location
Central Institute of Fresh Water Aquaculture	• Bhubaneswar
Central Institute of Indian Languages	• Mysore
Central Institute of Plastics Engineering and Technology	• Chennai
Central Institute of Psychiatry	• Ranchi
Central Institute of Medicinal and Aromatic Plants	• Lucknow
Central Institute of Road Transport (CIRT)	• Pune
Central Leather Research Institute	• Adyar • Chennai
Central Institute of Technology, Kokrajhar (CIT)	• Kokrajhar
Central Mine Planning and Design Institute Limited	• Ranchi
Central Research Institute for Dryland Agriculture	• Hyderabad
Central Sheep and Wool Research Institute	• Avikanagar
Central Soil Salinity Research Institute	• New Delhi
Centre for Cultural Resources and Training (CCRT)	• New Delhi
Centre for Development Studies	• Thiruvanathapuram
Centre for Excellence in Basic Sciences	• Mumbai
College of Defence Management	• Secunderabad
ESIC Medical College, Gulbarga	• Gulbarga
Film and Television Institute of India	• Pune
Foreign Service Institute	• New Delhi
Harcourt Butler Technological Institute	• Kanpur
Harish Chandra Research Institute (HRI)	• Allahabad
Indian Agricultural Research Institute (IARI)	• New Delhi

Institute	Location
Indian Association for the Cultivation of Science (IACS)	• Kolkata
Indian Diamond Institute	• Surat
Indian Institute of Architects	• Mumbai
Indian Institute of Astrophysics	• Bangalore
Indian Institute of Chemical Biology (IICB)	• Kolkata
Indian Institute of Chemical Technology	• Hyderabad
Indian Institute of Coal Management	• Ranchi
Indian Institute of Ecology and Environment	• New Delhi
Indian Institute of Engineering Science and Technology (IIEST)	• Shibpur
Indian Institute of Foreign Trade (IIFT)	• New Delhi • Kolkata
Indian Institute of Forest Management (IIFM)	• Bhopal
Indian Institute of Information Technology (IIIT)	• Gwalior • Allahabad • Dharwad • Jabalpur • Kanchipuram • Kottayam • Kurnool • Guwahati • Bhubaneswar • Nagpur • Bhopal
Indian Institute of Management	• Amritsar • Ahmedabad • Bangalore • Calcutta • Lucknow • Kozhikode • Indore • Shillong • Kashipur • Raipur • Ranchi • Rohtak • Trichy • Udaipur • Visakhapatnam

Institute	Location
	• Sambalpur • Nagpur
Indian Institute of Information Technology and Management	• Gwalior
Indian Institute of Mass Communication (IIMC)	• Aizawl • Amravati • Dhenkanal • Jammu • Kottayam • New Delhi
Indian Institute of Petroleum	• Dehradun
Indian Institute of Petroleum and Energy	• Visakhapatnam
Indian Institute of Plantation Management	• Bangalore
Indian Institute of Pulses Research	• Kanpur
Indian Institute of Remote Sensing (IIRS)	• Dehradun
Indian Institute of Science (IISc)	• Bangalore
Indian Institute of Science Education and Research (IISER)	• Kolkata • Pune • Mohali • Bhopal • Thiruvanathapuram • Tirupati, Berhampur
Indian Institute of Social Welfare and Business Management	• Kolkata
Indian Institute of Soil Science	• Bhopal
Indian Institute of Space Science and Technology (IIST)	• Thiruvanathapuram
Indian Institute of Spices Research	• Calicut
Indian Institute of Technology (IIT)	• Kharagpur • Kanpur • Bombay • Chennai • Delhi • (ISM) Dhanbad • Dharwad • Guwahati • Bhubaneswar • Roorkee • Ropar

Institute	Location
	• Hyderabad • Gandhinagar • Jodhpur • Patna • Mandi • Indore • Tirupati • (BHU) Varanasi • Tirupati • Palakkad • Goa • Bhilai • Jammu
Indian Institute of Tourism and Travel Management	• Gwalior • Nellore • Bhubaneswar • Noida • Goa • Bodh Gaya (Camp) • Shillong (Camp)
Indian Institute of Tropical Meteorology	• Pune
Indian Institute of Natural Resins and Gums (Indian Lac Research Institute)	• Ranchi
Indian National Centre for Ocean Information Services	• Hyderabad
Indian Maritime University	• Chennai • Mumbai • Kolkota • Kochi • Visakhapatnam
Indian Statistical Institute	• Bangalore • Chennai • Kolkata • Delhi
Indian Veterinary Research Institute	• Bareilly
Indira Gandhi Institute of Development Research	• Mumbai
Indira Gandhi Centre for Atomic Research (IGCAR)	• Kalpakkam
Indira Gandhi National Forest Academy (IGNFA)	• Dehradun
Institute for Plasma Research (IPR)	• Gandhinagar

Institute	Location
Institute for Studies in Industrial Development	• New Delhi
Institute of Defence Studies and Analyses	• New Delhi
Institute of Economic Growth	• New Delhi
Institute of Food Security	• Gurgaon
Institute of Genomics and Integrative Biology (IGIB)	• New Delhi
Institute of Hotel Management (IHM)	• Delhi • Mumbai • Kolkata • Chennai • Bhubaneshwar • Goa • Jaipur • Shillong • Shimla • Guwahati
Institute of Mathematical Sciences (IMSc)	• Chennai
Institute of Physics	• Bhubaneswar
Institute of Rural Management	• Anand
Institute of Secretariat Training and Management	• New Delhi
Institute for Studies in Industrial Development	• New Delhi
International Institute for Population Sciences	• Mumbai
Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)	• Bangalore
King Institute of Preventive Medicine and Research	• Chennai
Lakshmibai National University of Physical Education (LNIPE)	• Gwalior
Maulana Abul Kalam Azad Institute of Asian Studies	• Kolkata
Morarji Desai National Institute of Yoga	• New Delhi

Institute	Location
National Academy of Agricultural Research Management	• Rajendranagar
National Academy of Agricultural Sciences	• New Delhi
National Academy of Construction	• Hyderabad
National Academy of Customs Excise and Narcotics (NACEN)	• Kolkata • Hindupur
National Academy of Defence Production	• Nagpur
National Botanical Research Institute (NBRI)	• Lucknow
National Brain Research Centre (NBRC)	• Manesar
National Civil Defence College	• Nagpur
National Dairy Research Institute	• Karnal (Haryana)
National Defence College of India	• Delhi
National Environmental Engineering Research Institute	• Nagpur
National Institute for Micro, Small and Medium Enterprises	• Hyderabad
National Institute of Agricultural Extension Management	• Hyderabad
National Institute of Agricultural Marketing	• Jaipur
National Institute of Animal Welfare	• Faridabad
National Institute of Construction Management and Research	• Mumbai
National Institute of Design	• Ahmedabad • Bangalore • Hyderabad • Kurukshetra • Jorhat • Bhopal • Vijayawada
National Institute of Disaster Management	• New Delhi
National Institute of Electronics & Information Technology (NIELIT)	• Ajmer • Agartala • Aizwal • Aurangabad • Calicut

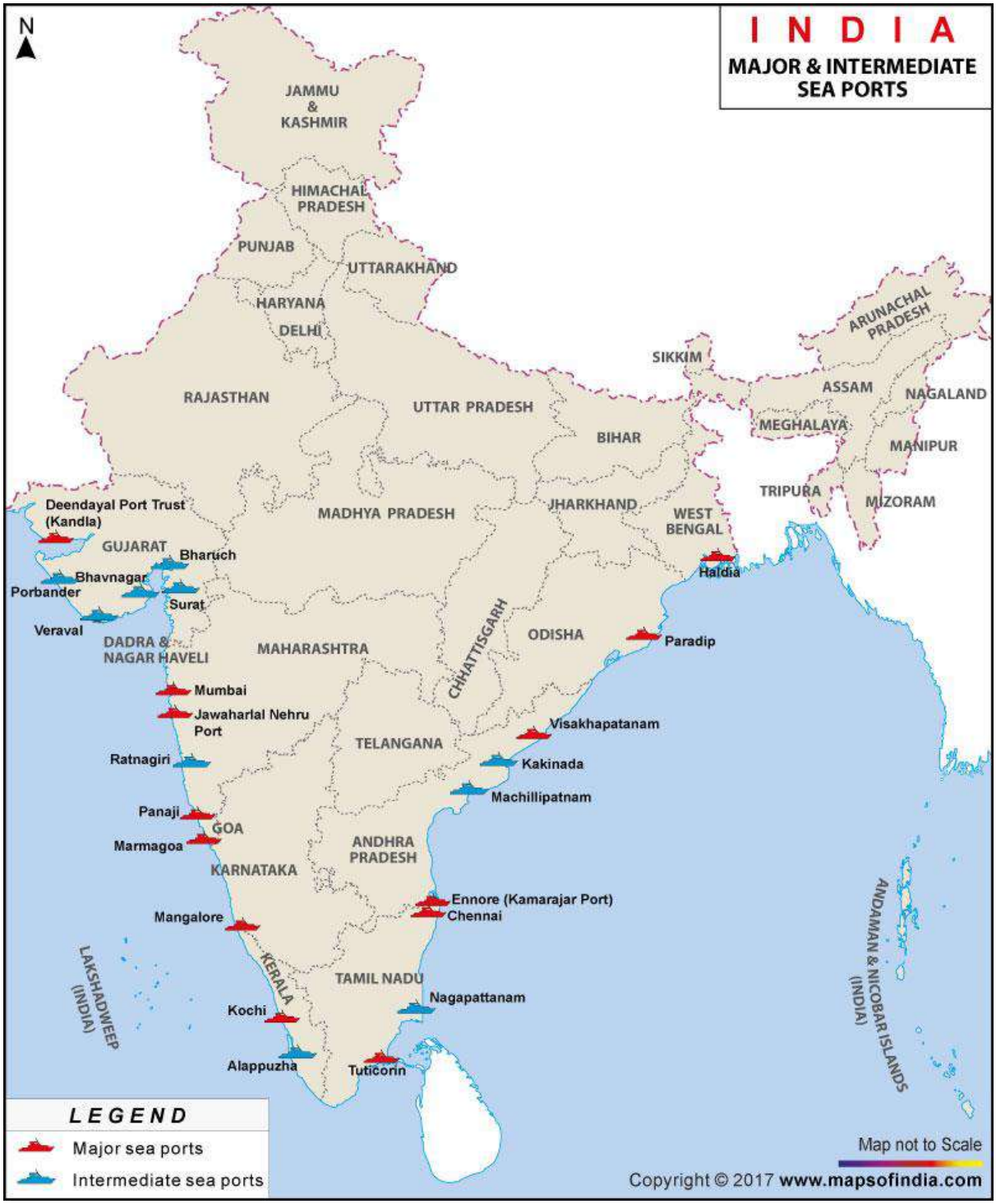
Institute	Location
	• Chennai • Chandigarh • Delhi • Gorakhpur • Gangtok • Guwahati • Imphal • Itanagar • Jammu • Kohima • Kolkata • Leh • Lucknow • Patna • Ranchi • Shillong • Srinagar • Tezpur
National Institute of Fashion Technology	• Bangalore • Bhopal • Bhubaneswar • Chennai • Gandhinagar • Hyderabad • Jodhpur • Kangra • Kannur • Kolkata • Mumbai • Patna • Raebareli • Shillong
National Institute of Foundry and Forge Technology (NIFFT)	• Ranchi
National Institute of Homoeopathy	• Kolkata
National Institute of Hydrology	• Belgaum • Roorkee
National Institute of Industrial Engineering (NITIE)	• Mumbai
National Institute of Interdisciplinary Science and Technology (NIIST)	• Thiruvanathapuram
National Institute of Malaria Research	• Delhi • Haridwar • Guwahati • Nadiad

Institute	Location
	• Raipur • Ranchi • Rourkela • Goa • Bangaluru • Chennai
National Institute of Mental Health and Neurosciences (NIMHANS)	• Bangalore
National Institute of Nutrition	• Hyderabad
National Institute of Open Schooling	• Noida
National Institute of Oceanography (NIO)	• Goa • Kochi • Mumbai • Visakhapatnam
National Institute of Ocean Technology	• Chennai • Nellore
National Institute of Public Finance and Policy	
National Institute of Pharmaceutical Education and Research	• Mohali • Ahmedabad • Raebareli • Hyderabad • Guwahati • Hajipur • Kolkata
National Institute of Rural Development	• Hyderabad
National Institute of Science Communication and Information Resources (NISCAIR)	• New Delhi
National Institute of Science Communication and Information Resources	• Delhi
National Institute of Science Education and Research (NISER)	• Bhubaneswar
National Institute of Securities Markets (NISM)	• Navi Mumbai
National Institute Of Technical Teachers Training and Research	• Bhopal • Chandigarh • Chennai • Kolkata

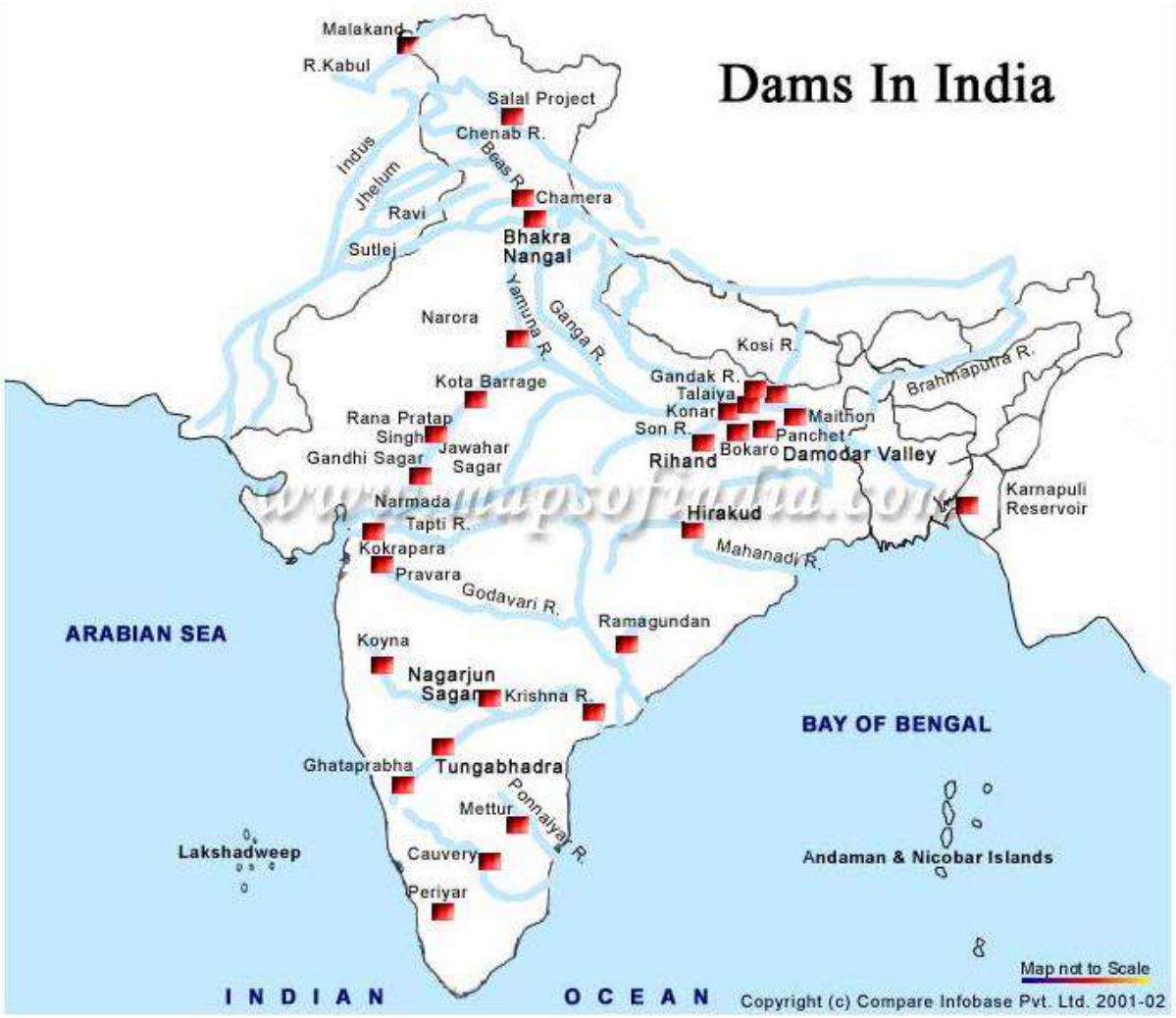
Institute	Location
National Institute of Technology	• Agartala • Aizawl • Allahabad • Bhopal • Dimapur Nagaland • Durgapur • Goa • Hamirpur • Imphal • Jaipur • Jalandhar • Jamshedpur • Karaikal • Calicut • Kurukshetra • Nagpur • New Delhi • Patna • Raipur • Sikkim • Rourkela • Shillong • Silchar • Srinagar • Surat • Surathkal • Trichy • Tadepalligudem • Warangal • Yupia
National Institute of Urban Affairs	• New Delhi
National Institute of Water Sports	• Goa
National Museum Institute of the History of Art, Conservation and Museology (NMIHACM)	• New Delhi
National Power Training Institute	• Faridabad
National Sugar Institute	• Kanpur
National Tuberculosis Institute	• Bangalore
National Institute of Homoeopathy (NIH)	• Kolkata
Netaji Subhas National Institute of Sports (NSNIS)	• Patiala
North Eastern Regional Institute of Science and Technology (NERIST)	• Itanagar

Institute	Location
Physical Research Laboratory (PRL)	• Ahmedabad
PEC University of Technology (PEC)	• Chandigarh
Raman Research Institute (RRI)	• Bangalore
Rajiv Gandhi Institute of Petroleum Technology	• Rae Bareli
Saha Institute of Nuclear Physics	• Kolkata
Sanjay Gandhi Postgraduate Institute of Medical Sciences	• Lucknow
Sant Longowal Institute of Engineering and Technology (SLIET)	• Sangrur
Satyajit Ray Film and Television Institute	• Kolkata
S.N. Bose National Centre for Basic Sciences (SNBNCBS)	• Kolkata
School of Planning and Architecture	• Vijayawada • Bhopal • Delhi
Sher-i-Kashmir Institute of Medical Sciences	• Srinagar
State Institute of Public Administration and Rural Development	• Agartala
Tata Institute of Fundamental Research (TIFR)	• Mumbai • Hyderabad
Tata Institute of Social Sciences	• Mumbai • Hyderabad • Guwahati • Tuljapur
Rajiv Gandhi National Institute of Intellectual Property Management	• Nagpur
V. V. Giri National Labour Institute	• New Delhi
Variable Energy Cyclotron Center	• Kolkata

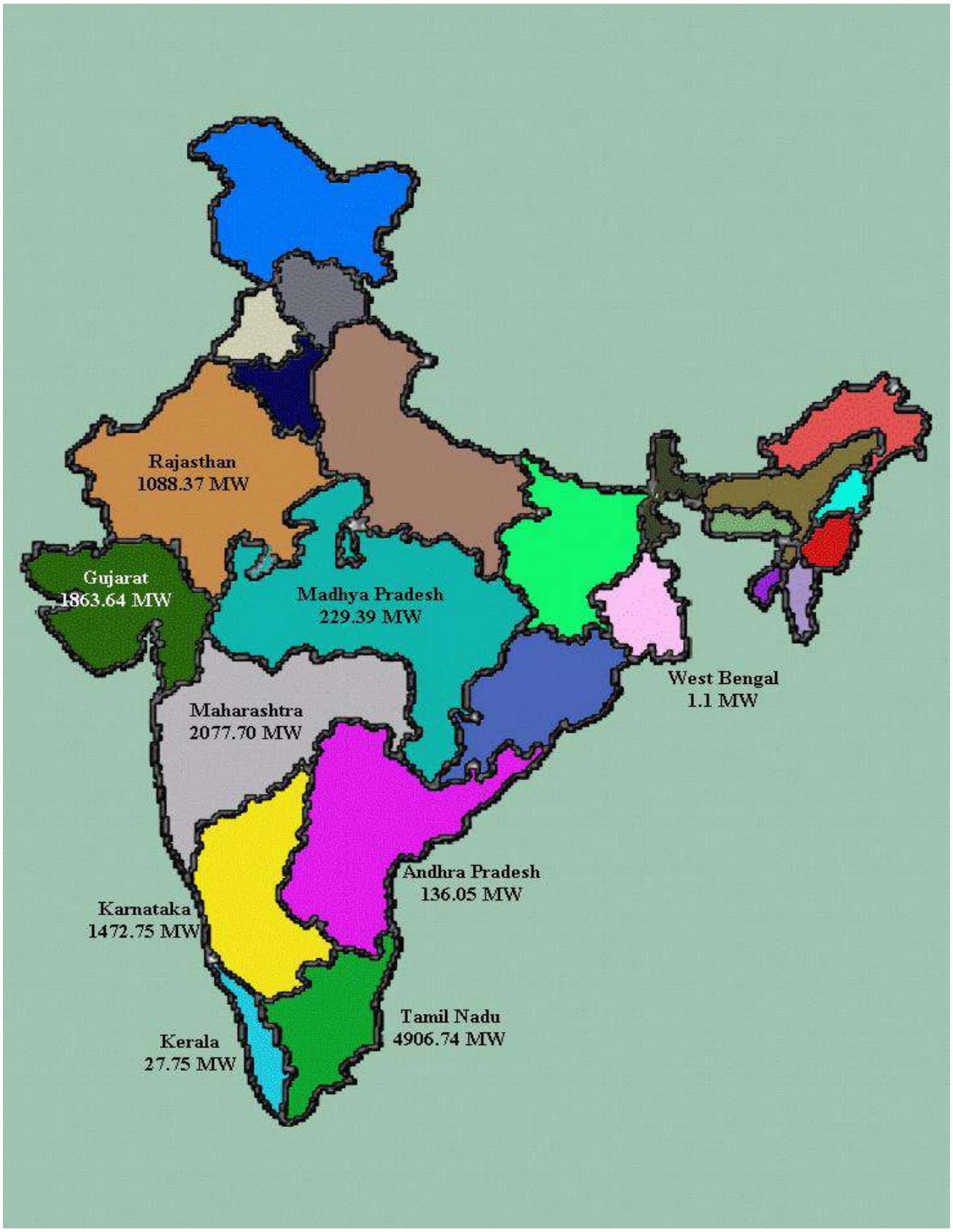
There are 13 major sea ports in India.



There are ~ 5,200 dams in India under the Central Water Commission (the oldest is from 2nd century AD near Tiruchirappalli). This produces 1/3 of electric power India needs.

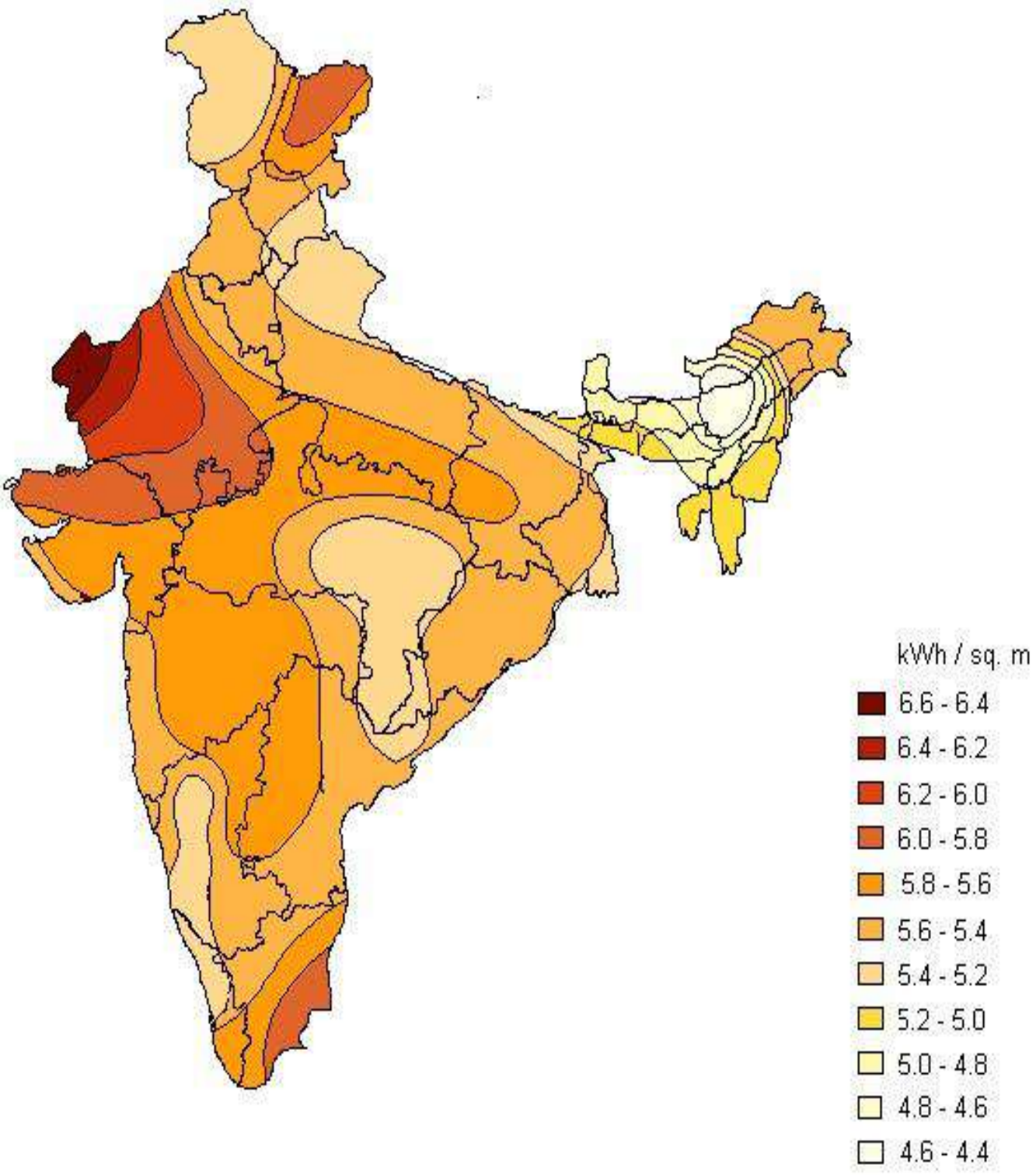


India uses coal for most of its electricity generation as thermal power.

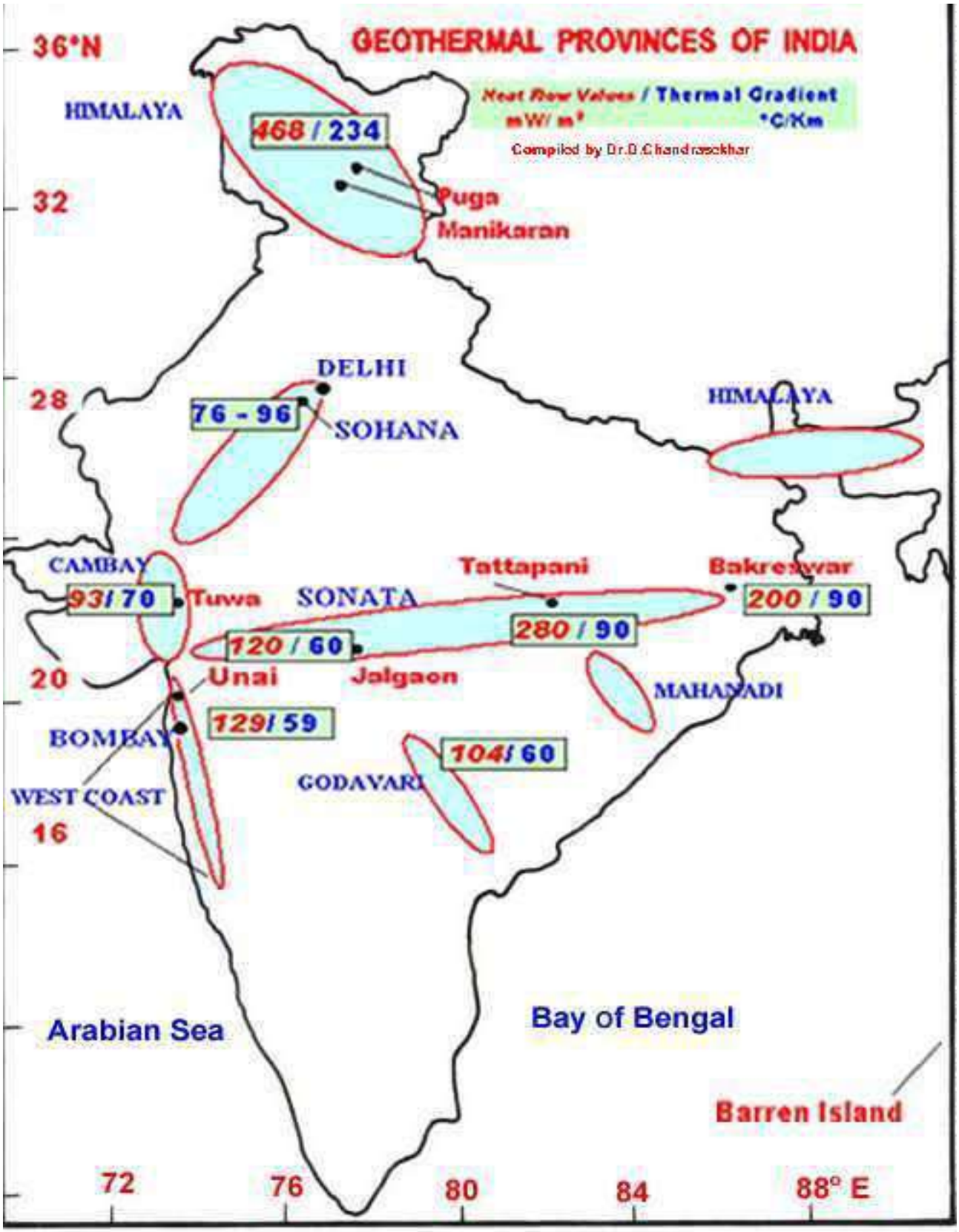


Wind Power by state production and utilisation

The first nuclear power plant was built in Tarapur (Thane, Maharastra) in 1964 and there are now 7 power plants.

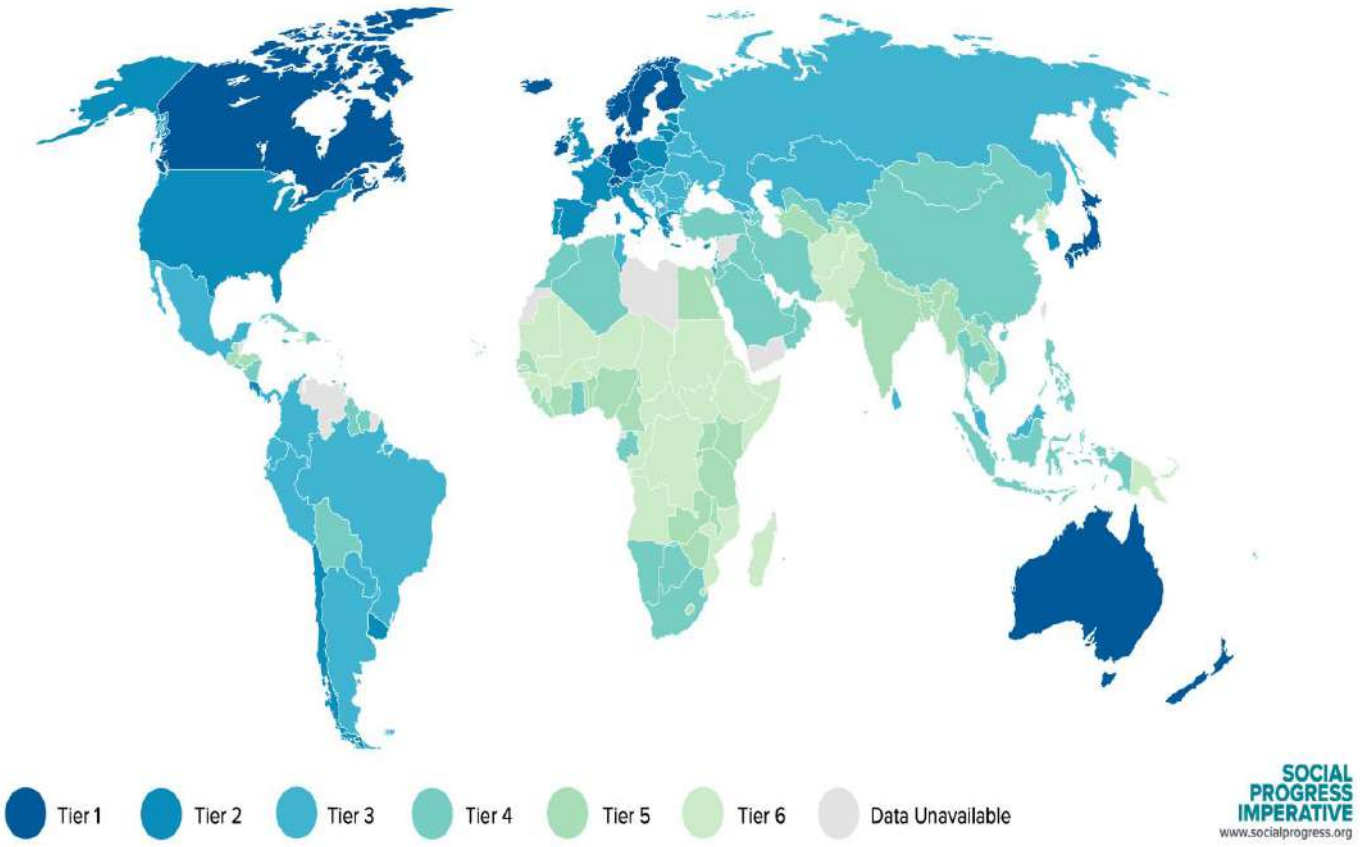


Photovoltaic potential – map of India

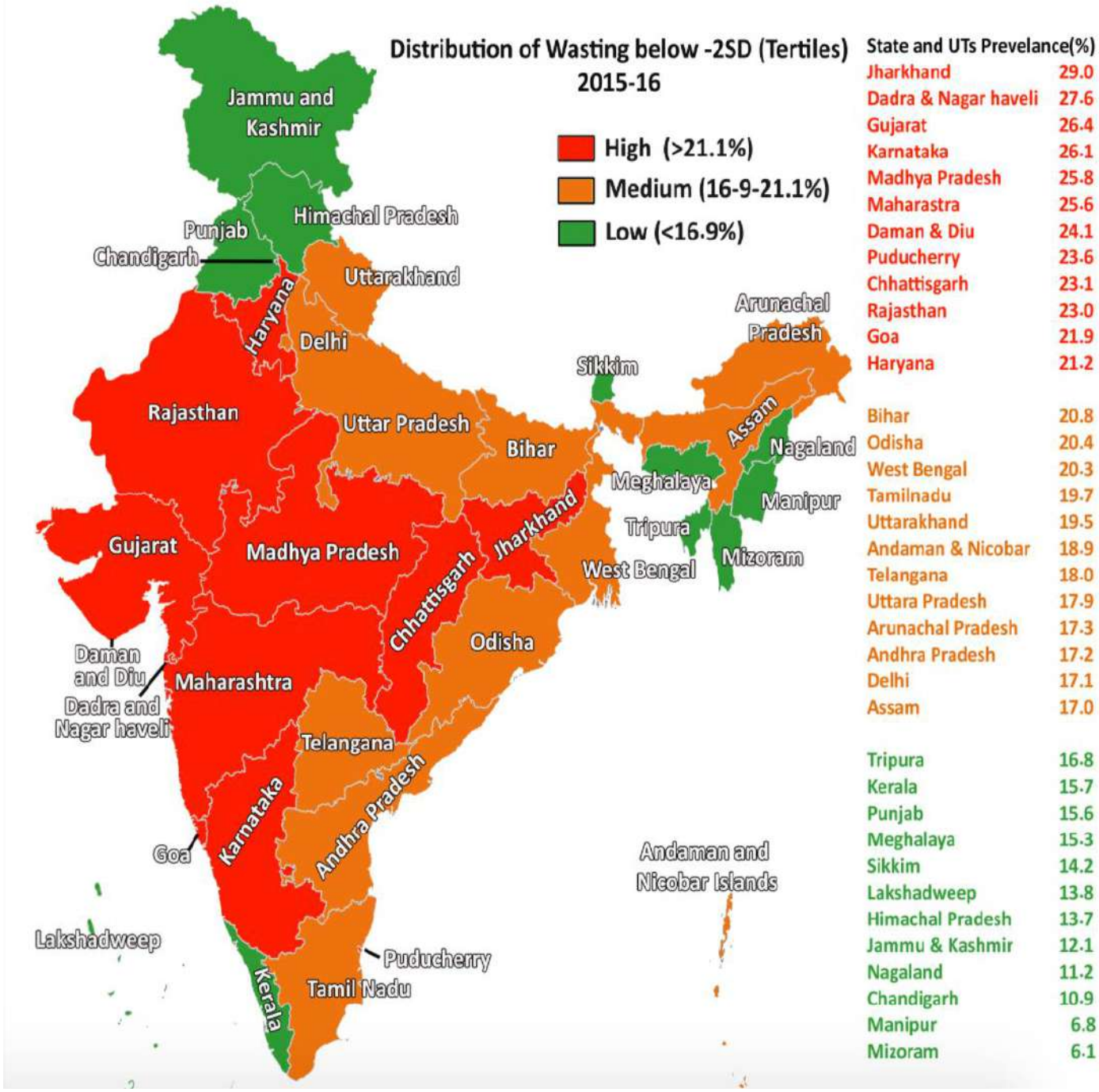


Geothermal provinces of India

Its GDP share of the world increased from 3% to 7% (nominal rank 6th and purchasing power parity is 3rd in the world), holds the 11th richest rank of the Forbes 100 global and is celebrated as the World's largest Democracy. However, equity and social development needs some focus.



(Wikipedia Contributors)

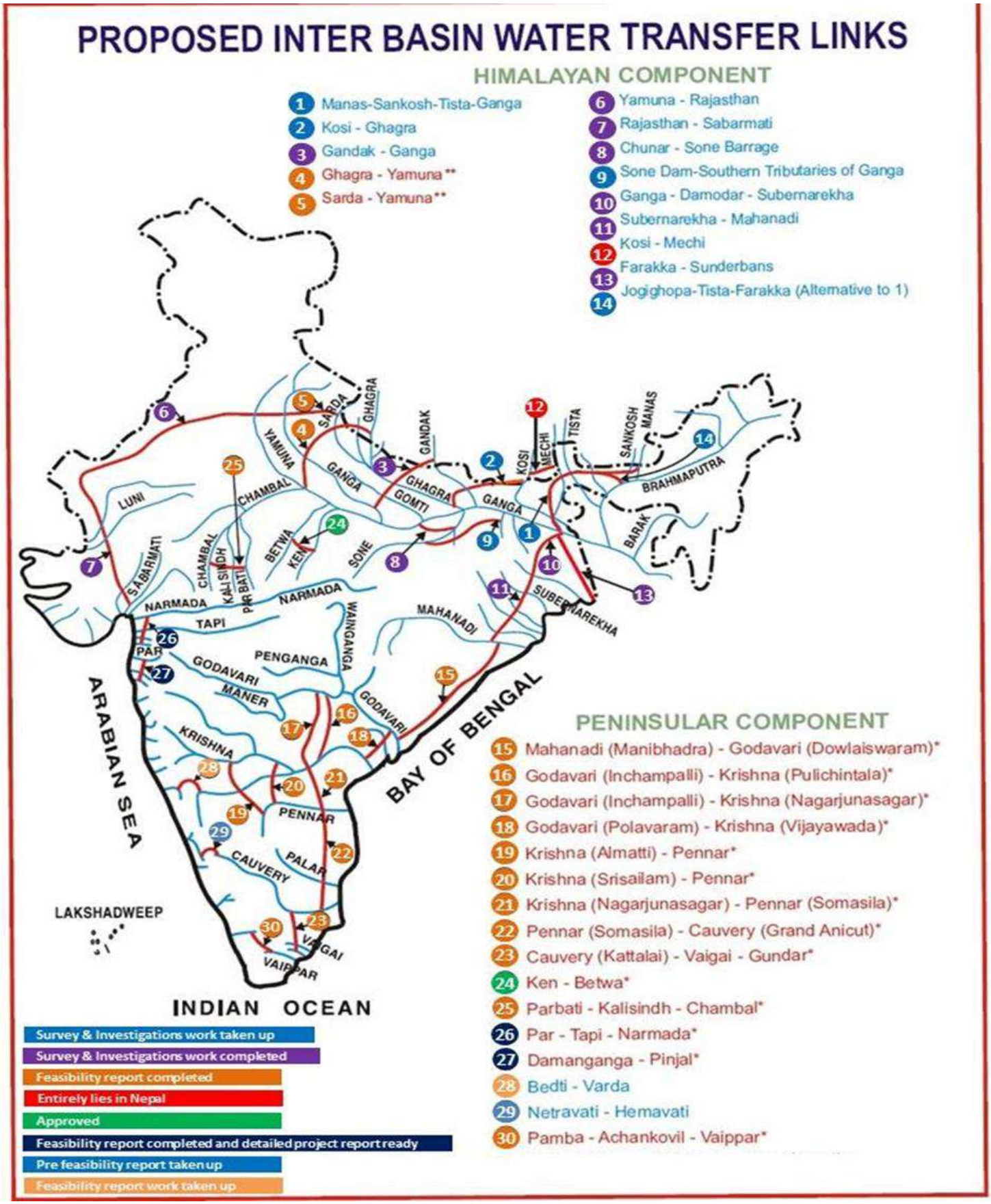


Nutrition map of India ("Country's First 'Nutrition Atlas' Comes Online")

It has 101 National Parks,

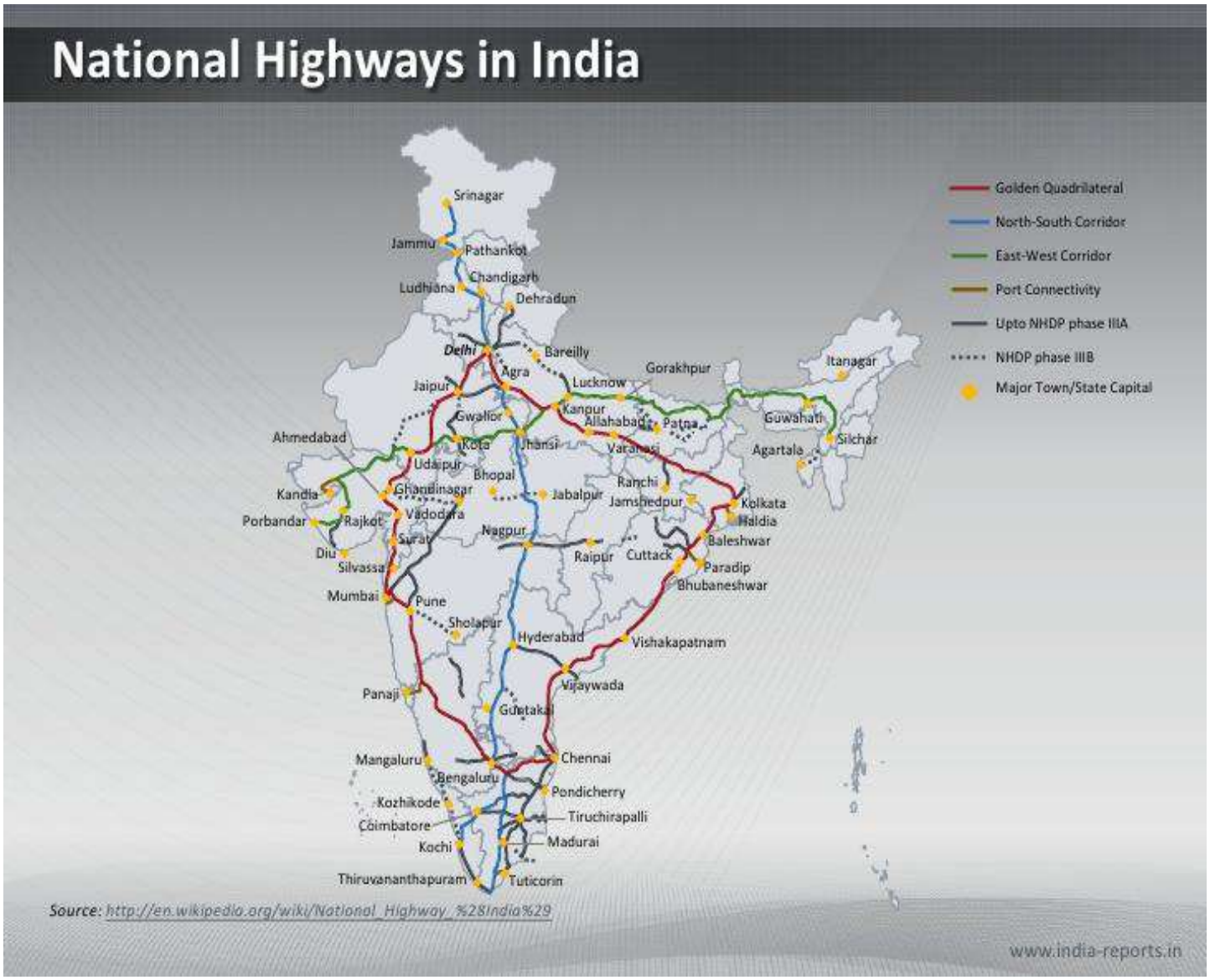
38 UNESCO World Heritage Sites

("World Heritage Sites in India")



("National River Linking Project: Dream or Disaster? | India Water Portal")

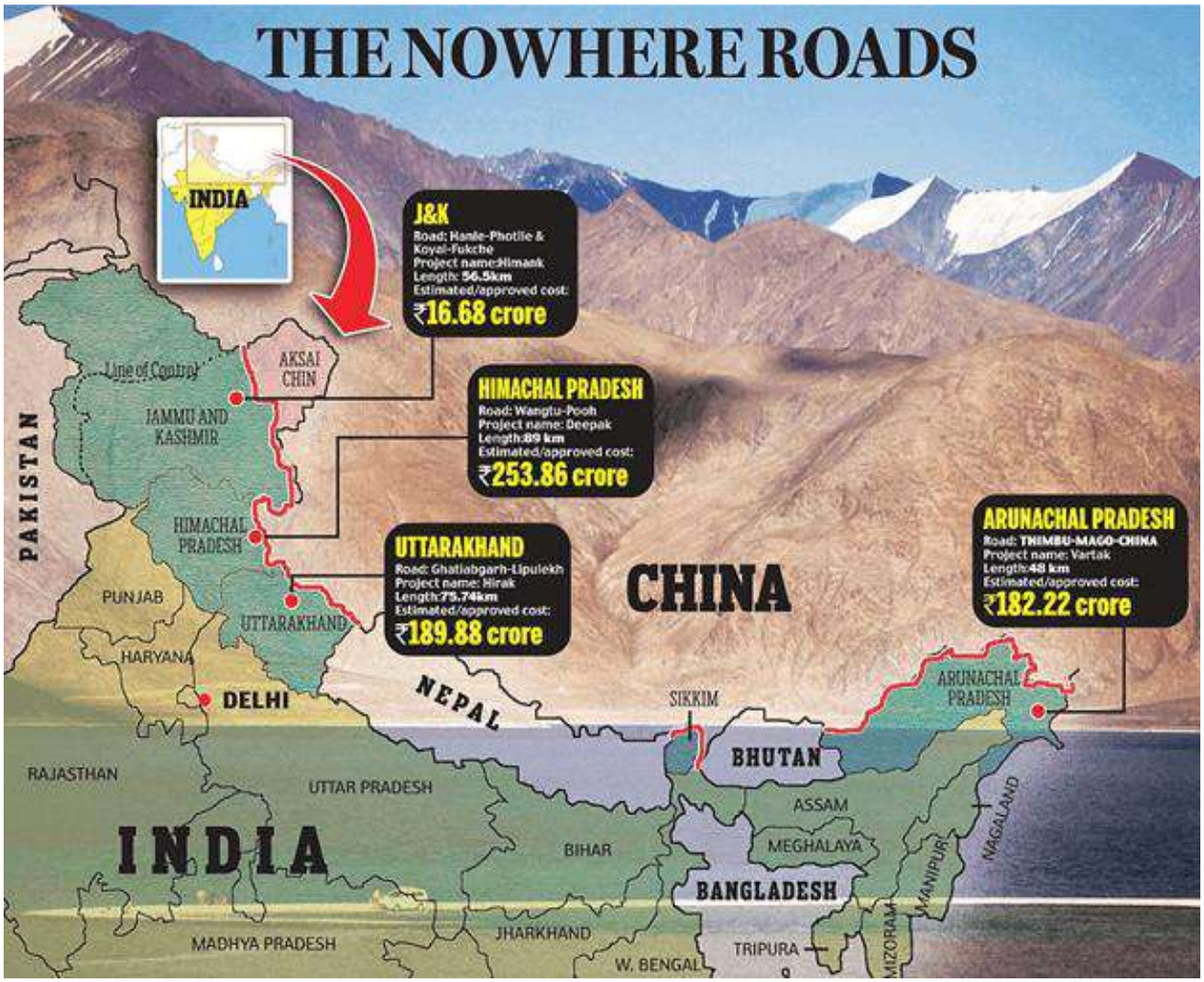
The interconnecting of rivers was mooted as a Nation development plan first in the 1970's but has yet to gain implementation momentum.



(Mehta and Rajan)

The Golden Quadrilateral connects all four metropolitan cities of India by road ~ 6000kms with 4 – 6 lanes.

Border Roads Organisation founded in 1960 has a vision to connect Northern and North Eastern remote and high-altitude areas of ~ 60,000kms of road length and also maintains and builds several bridges and tunnels. The China corridor is overseen by ICBR division with 2/3 of ~3,200kms road length.



(www.ETGovernment.com)

India in its phase I of 'Smart City' Development (four pillars of comprehensive development-institutional, physical, social and economic infrastructure) has identified 20 cities to be developed into this profile. These would be the cities of the future in India ("Smart City Features :: SMART CITIES MISSION, Government of India").

URBANA SMART CITY MAP OF INDIA

SMART SOLUTIONS

SMART CITY SELECTION PROCESS

STRATEGY

FINANCING SMART CITIES

Sources

- GoI Funds & Matching contribution by State/ULBs
- State/ ULB's own resources (like user fee charges, beneficiary charges, impact fees, debt, etc.)
- Innovative finance mechanisms such as municipal bonds , Pooled Finance Mechanisms, Tax Increment Financing (TIF)
- Other Central Government Schemes (Swachh Bharat Mission, AMRUT, HRIDAY)
- Borrowings from Financial Institutions (Bilateral & Multilateral Institutions)
- National Investment & Infrastructure Funds (NIIF)
- Public Private Partnerships (PPPs)

Distribution of Funds

- 93% for Project
- 5% Administration & office Expenses for State/ULBs
- 2% Administration & office Expenses for MoUD

Condition of Funds Release by Government of India

- Timely Submission of Score Card Each Quarter to MoUD
- Satisfactory physical and financial progress
- Milestones achieved as given in Smart City Proposal
- SPV - All conditions met regarding Establishment, Structure, Functions, Operations

SMART CITY FEATURES

- Promoting mixed land use in area-based developments
- Housing and inclusiveness
- Creating walkable localities
- Preserving and developing open spaces
- Promoting a variety of transport options
- Making governance citizen-friendly and cost effective
- Giving an identity to the city
- Applying Smart Solutions to infrastructure and services in area-based development in order to make them better

SPV

Type : Limited Company under Companies Act

Shareholding

The Implementation Of The Mission At The City Level Will Be Done By A Special Purpose Vehicle (SPV) Created For The Purpose.

Funds

Funds provided by Central Government will be in the form of tied grants.
ULB can utilise these for its equity contribution) on following conditions –

- State has made adequate contribution to the SPV out of their own funds
- Approval will be limited to Government of India grants already released
- Should not affect the shareholding conditions

SPV Functions

- Approving, sanctioning executing projects, technical appraisal
- Ensure timely completion of projects
- Oversee Capacity Building Activities
- Incorporate JVs & Subsidiaries to enter into PPP
- Determine & collect User Charges
- Collect taxes, surcharges, etc.

SPV Powers

1. Operational Independence in decision making & Mission Implementation
2. With respect to Smart City Project All Rights & duties of Municipal Council
3. Delegating decision making powers (available to SLEC) to CEO of SPV
4. Delegating powers (available to Urban Development Department) to BoD of SPV
5. Delegating matters to HPSC (requiring approval of State Government)

Board Of Director

Position		Appointed by
Chairman	Divisional Commissioner/ Col lectors/ Municipal Commissioners/ Chief Executive of Urban Development Authority	State Government
Director	Representative of Central Government	MoUD
CEO	With fixed term of 2 years	MoUD
Independent Directors	From Data banks of MCA	
Functional Directors		

CEO Functions

- Oversee Day to day operations
- Enter into agreements on behalf of Company
- HR policy (subject to approval of BoD)
- Hiring/ Removal of Management
- Defining employee & managers – Roles & Responsibilities

URBANA WORLD

A Smart City's Smart Magazine

MISSION MONITORING

National Level

Apex Committee

Head →
- Secretary, MoUD

Members →
- Secretary, Housing & Poverty Alleviation
- Secretary (Expenditure)
- Joint Secretary, Finance, MoUD
- Director, MHA
- Chief Planner, Town & Country Planning
- Select Principal Secretaries of States
- Select CEOs of SPVs
- Mission Director

Responsibilities
- Review Cities List given by states after Stage I
- Review Proposals after Stage 2
- Approve release of funds based on progress in implementation
- Recommend corrections in implementations

State Level

High Powered Steering Committee (HPSC)

Chairman →
- Chief Secretary

Member-Secretary →
- State Mission Director (> Rank of Secretary to State Government)

Members →
- Principal Secretary, Finance
- Principal Secretary, Planning
- Principal Secretary/Director, Town & Country Planning Department, State/UT Governments
- Representative of MoUD
- Select CEO of SPV in the State
- Select Mayors and Municipal Commissioners /Chief Executive of the ULBs, and Heads of the concerned State Line Departments.
- Secretary/Engineer-in-Chief or equivalent, Public Health Engineering Department
- Principal Secretary, Urban Development – Member Secretary

Responsibilities
- Guidance, State Level Platform for Smart City development
- Oversee Stage I Inter-State competition
- Review Smart City Proposal & Send to MoUD

City Level

Smart City Advisory Forum

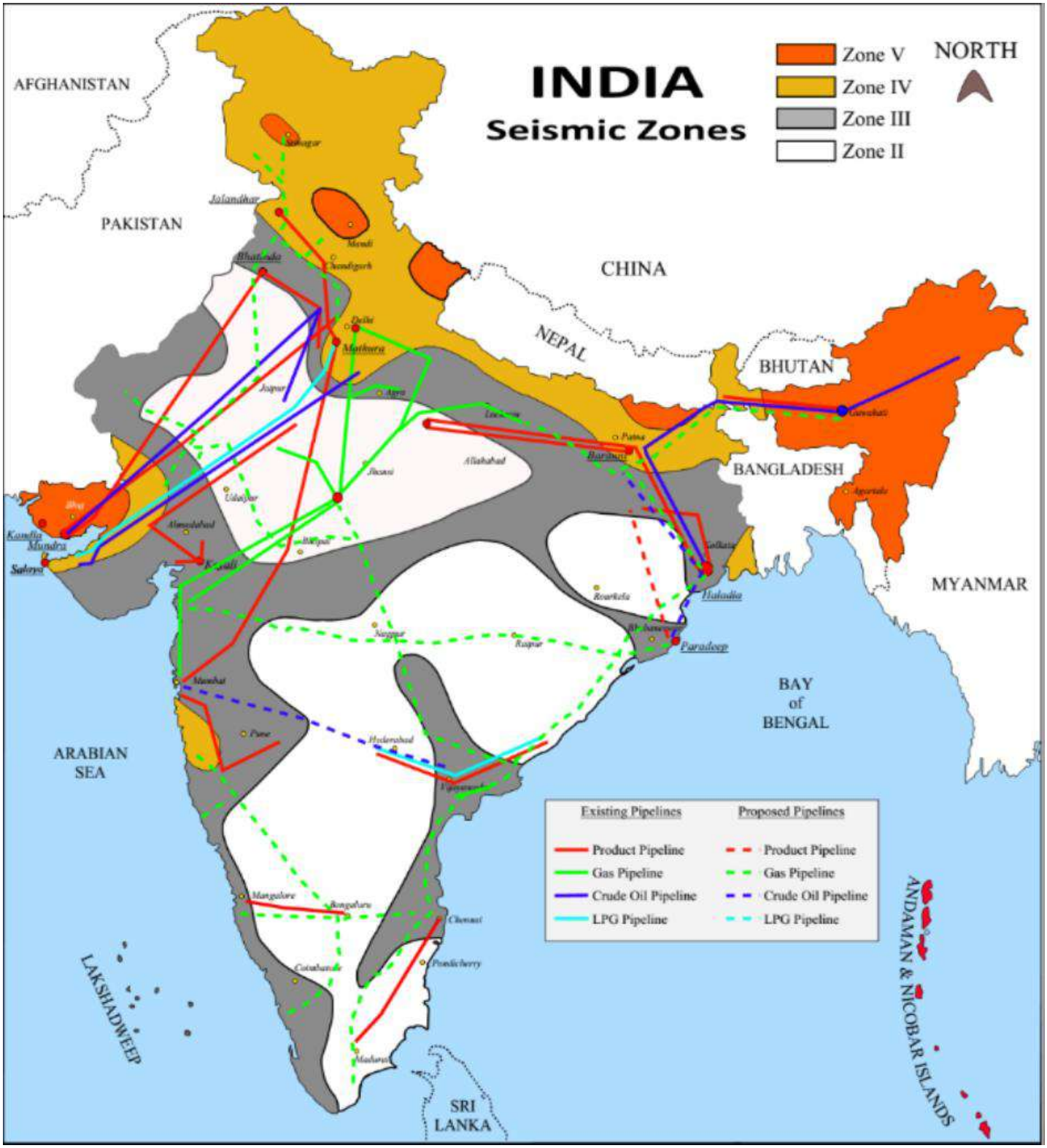
(Proposed for all 100 Smart Cities)

Convenor →
- CEO of SPV

Members →
- Director, Collectors
- Member of Parliament (MP)
- Member of Legislative Assembly (MLA)
- Mayor
- Local Youths
- Technical Expert
- Atleast One Member who is a
  - President/ secretary of registered Residents Welfare Association
  - Member of registered Tax Payers Association / Rate Payers Association
  - President/ Secretary of Slum Level Federation
  - Member of a NGO/ Mahila Mandal/ Chamber of Commerce/ Youth Associations

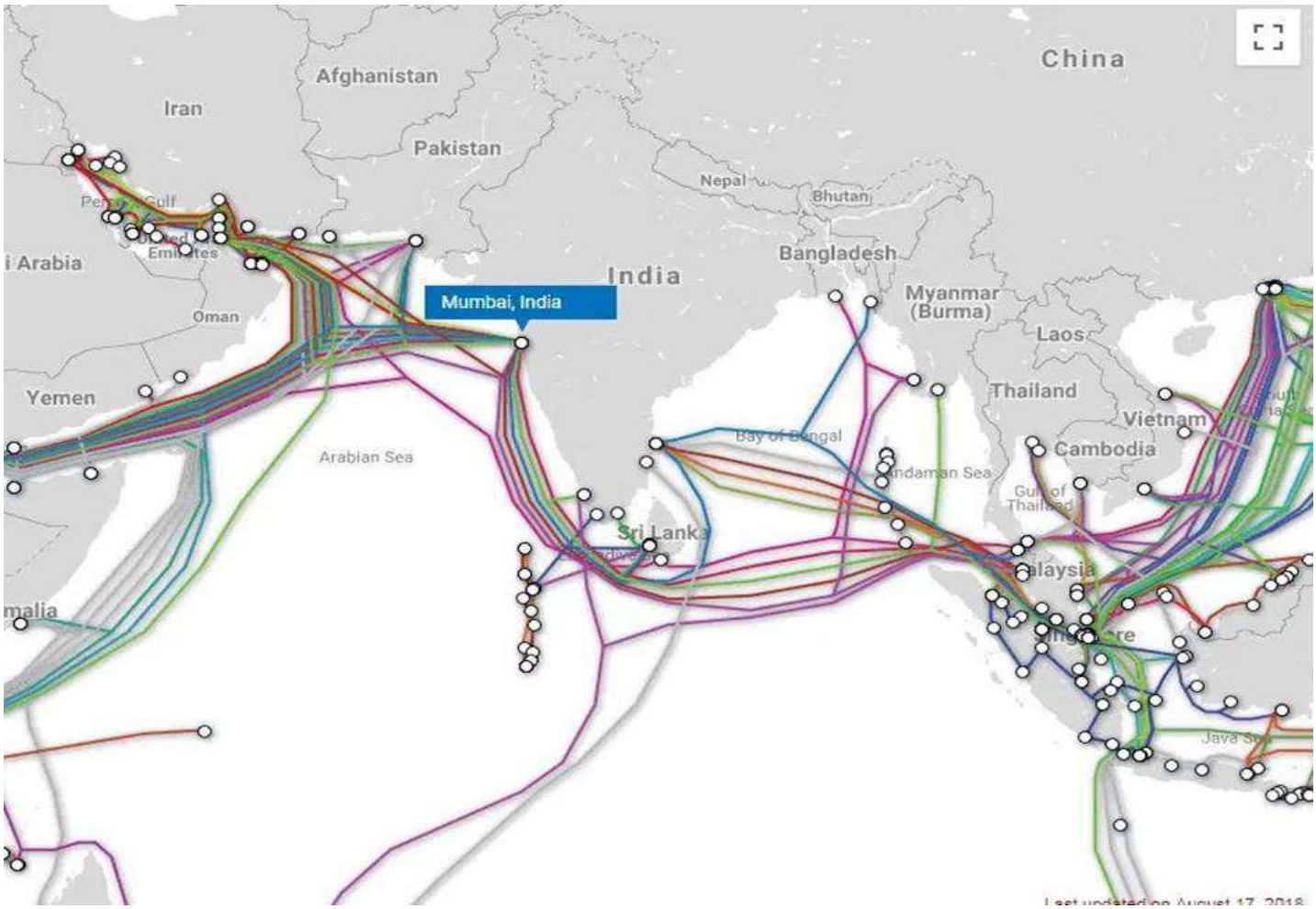
INFOGRAPHICS BY :
ANKIT PANDEY

There are 51 ministries in the Union Government with several Departments under its radar. There have been several national frameworks developed in recent years under individual ministries such as Make in India, Digital India, Swachh Bharat Abhayaan, Niti Aayog etc that cultivates a mindset of National Development and produces policy directions.



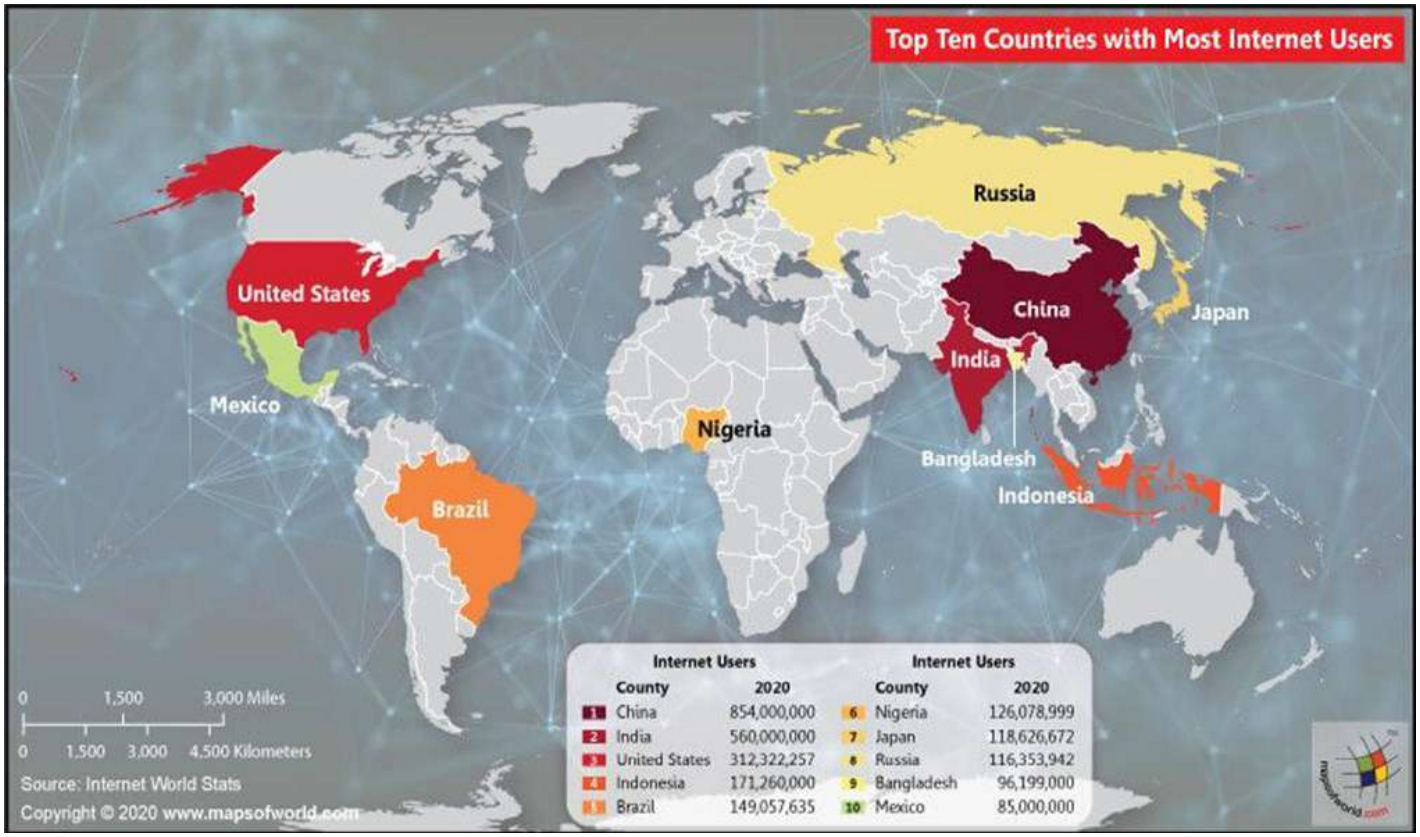
Oil and Natural Gas pipeline map of India

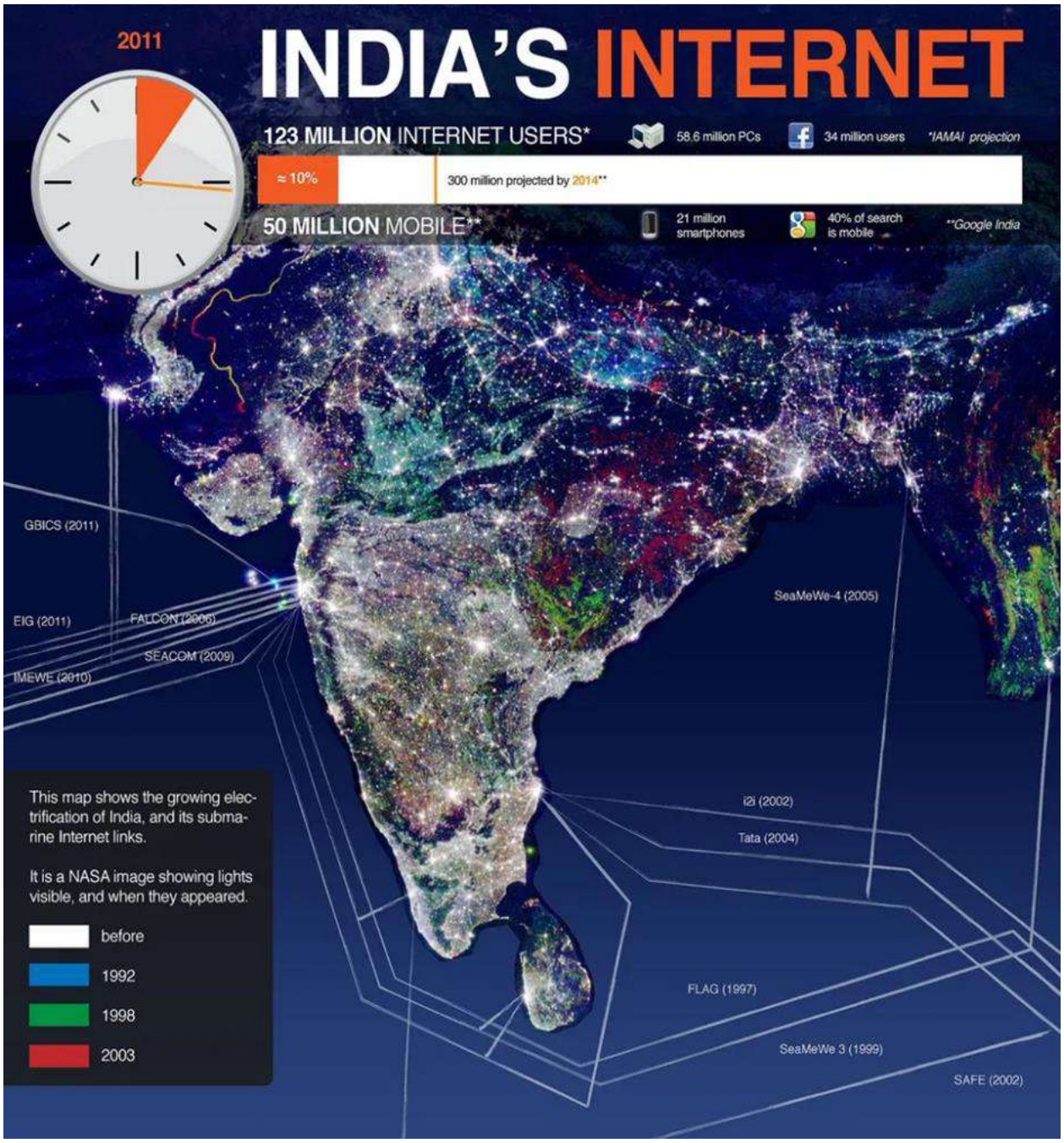
BSE Sensex is based on 30 top-performing and NIFTY Fifty has 50 high performing companies in the share index trade market which together make ~ 4.5 Trillion USD while the annual nominal GDP is 2.6 Trillion USD (Buffet Indicator of ~ 175%).

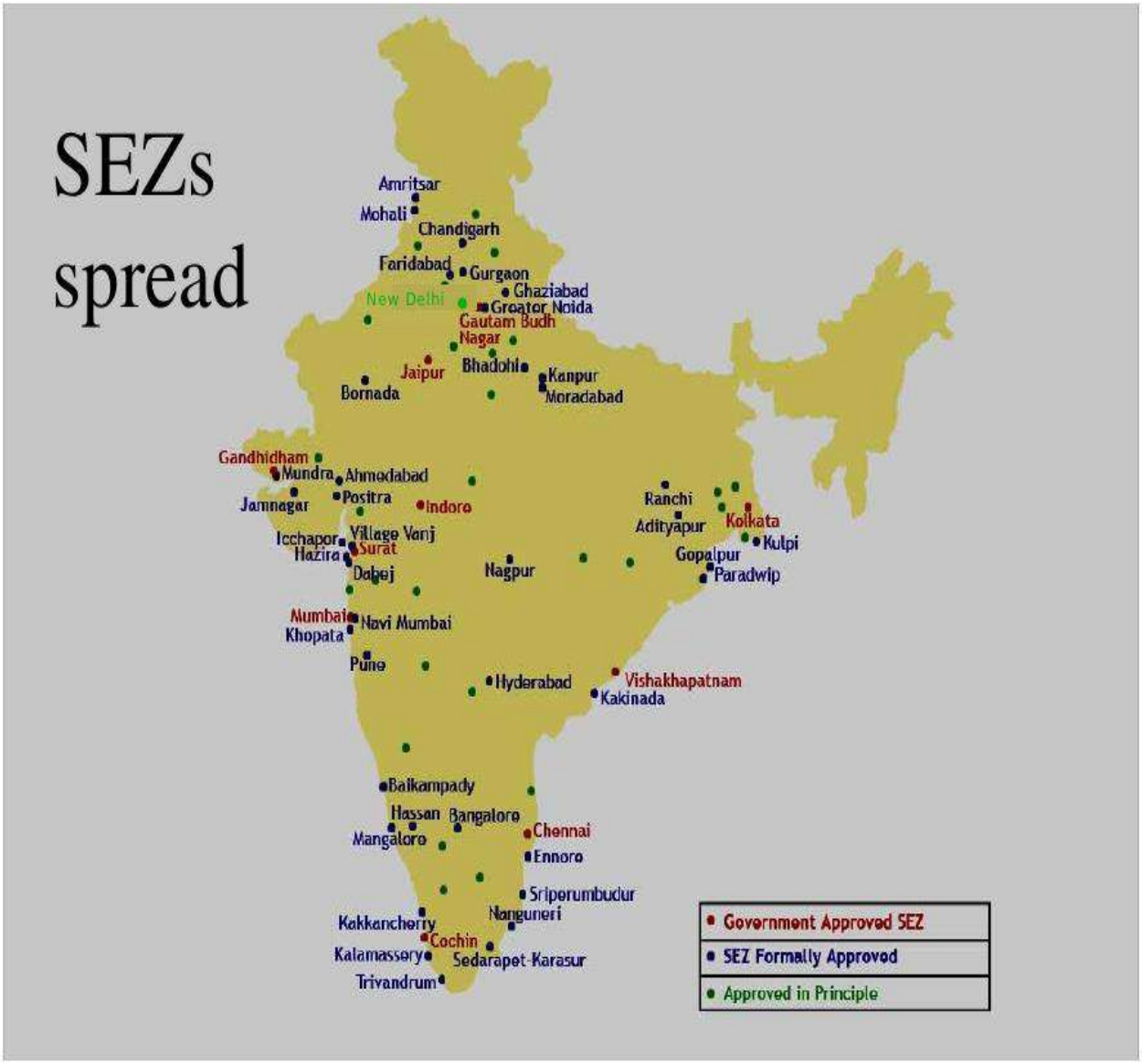


Sub-marine cable communication around India for International telecommunications

There are 0.4 million telecom towers in India. Most of the country can receive 4G signal from any of the top 4 mobile operators in the country. In 2020, it is 560 million internet users (40% of the population).



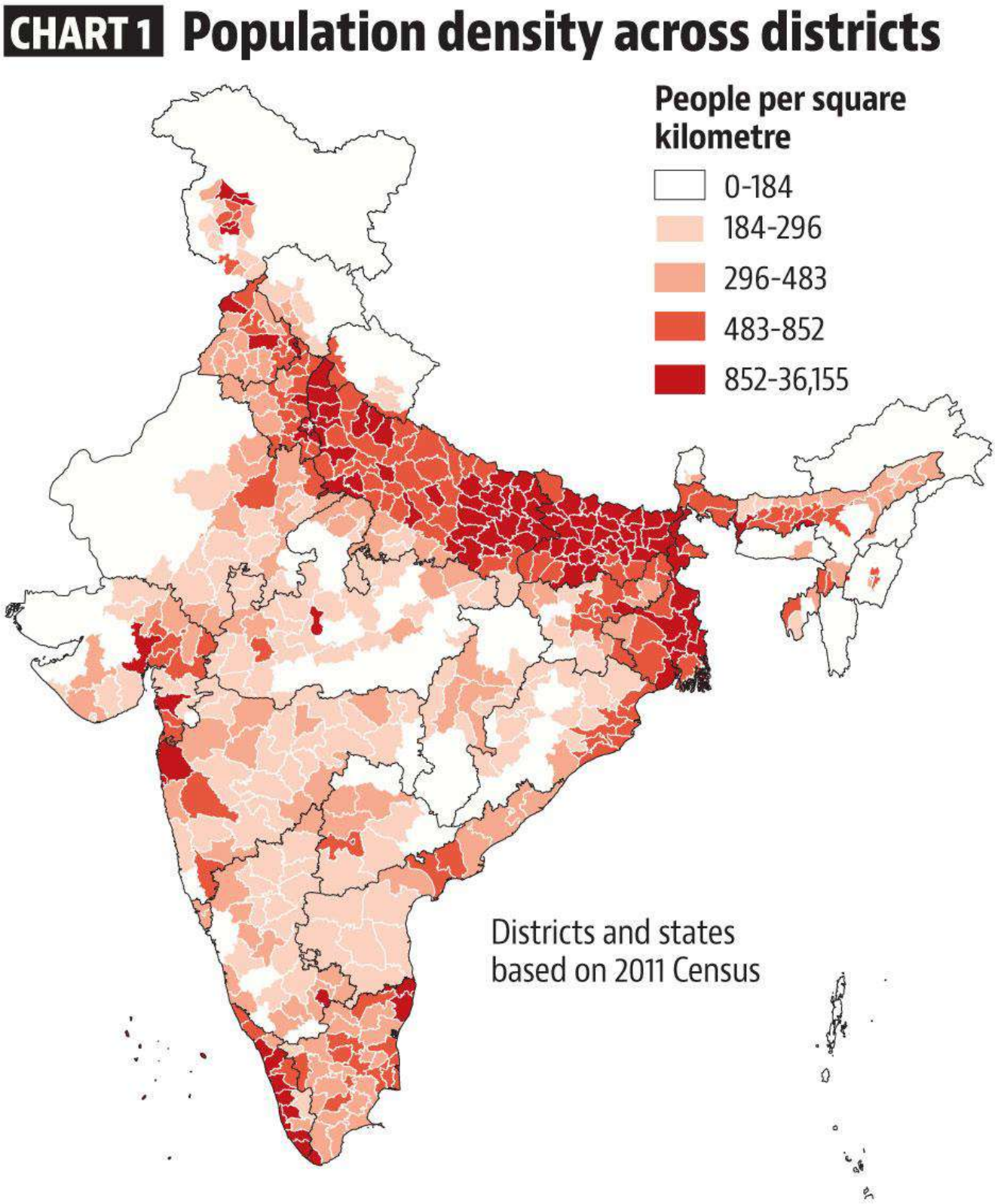

2011
INDIA'S INTERNET
123 MILLION INTERNET USERS*
58.6 million PCs
34 million users
*IAMAI projection
≈ 10%
300 million projected by 2014**
50 MILLION MOBILE**
21 million smartphones
40% of search is mobile
**Google India
GBICS (2011)
EIG (2011)
FALCON (2006)
SEACOM (2009)
IMEWE (2010)
SeaMeWe-4 (2005)
i2i (2002)
Tata (2004)
FLAG (1997)
SeaMeWe 3 (1999)
SAFE (2002)
This map shows the growing electrification of India, and its submarine Internet links.
It is a NASA image showing lights visible, and when they appeared.
before
1992
1998
2003



Special Economic Zones have been created in various parts of the country to facilitate industry and commerce.

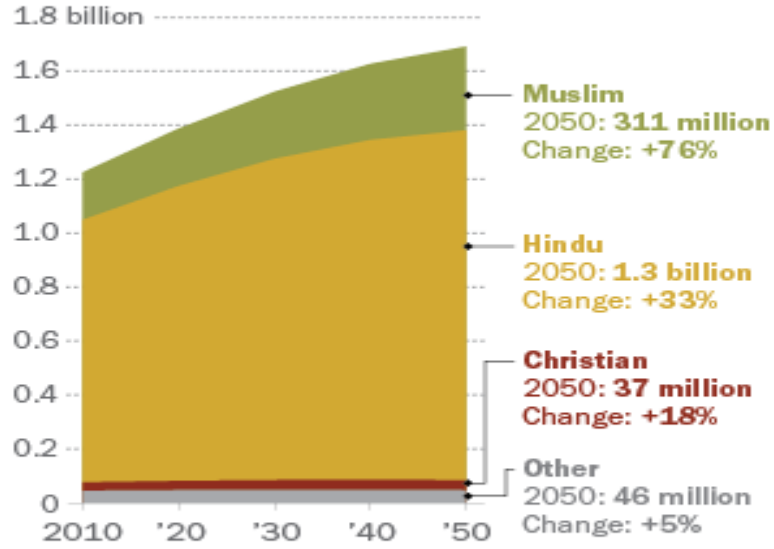
Chapter 4: Demography and livelihood

Indian population has grown ~ 5.5 times since 1947 to current 1.4 billion population and is now the second most populous country in the world; expected to overtake China by 2027. ~ 62% live in rural areas. It has 2 million Hindu temples, 0.3 million mosques, no census of churches available but there are 174 Christian Dioceses in India.



Population Growth of the World's Largest Religions in India

Population projections, 2010-2050



Note: "Other" includes Buddhists, Sikhs, Jains, Jews, adherents of folk religions and those with no religious affiliation.
Source: The Future of World Religions: Population Growth Projections, 2010-2050.

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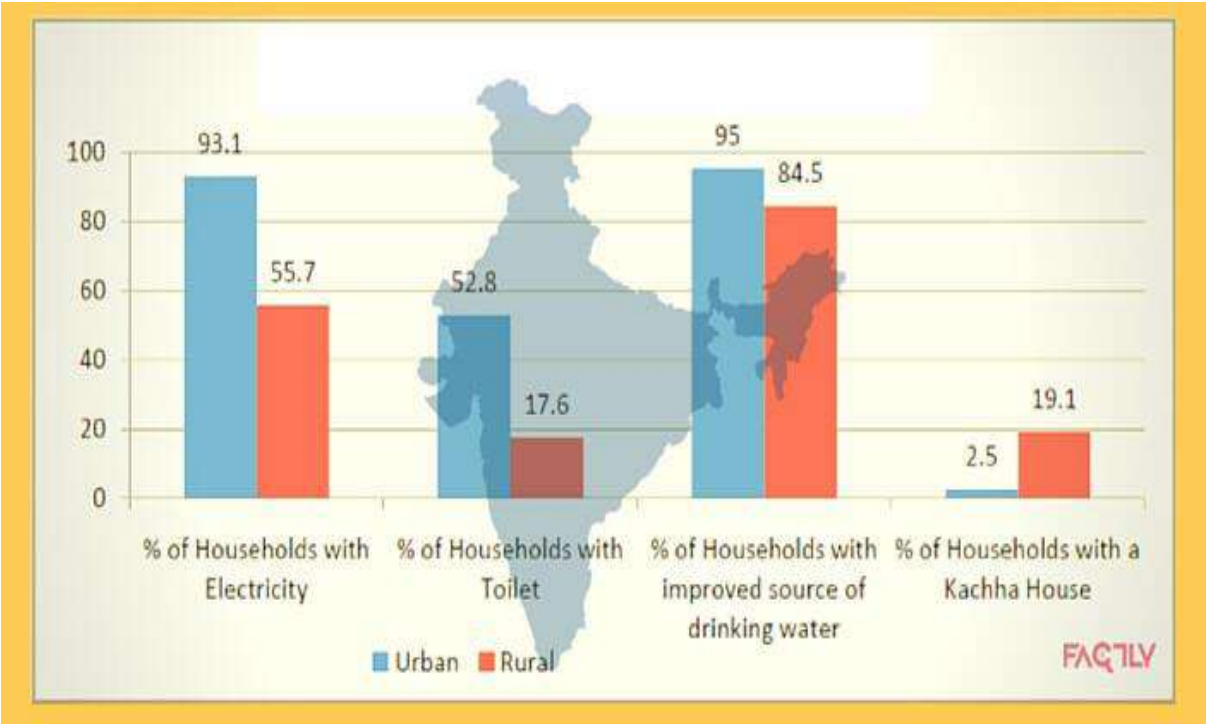
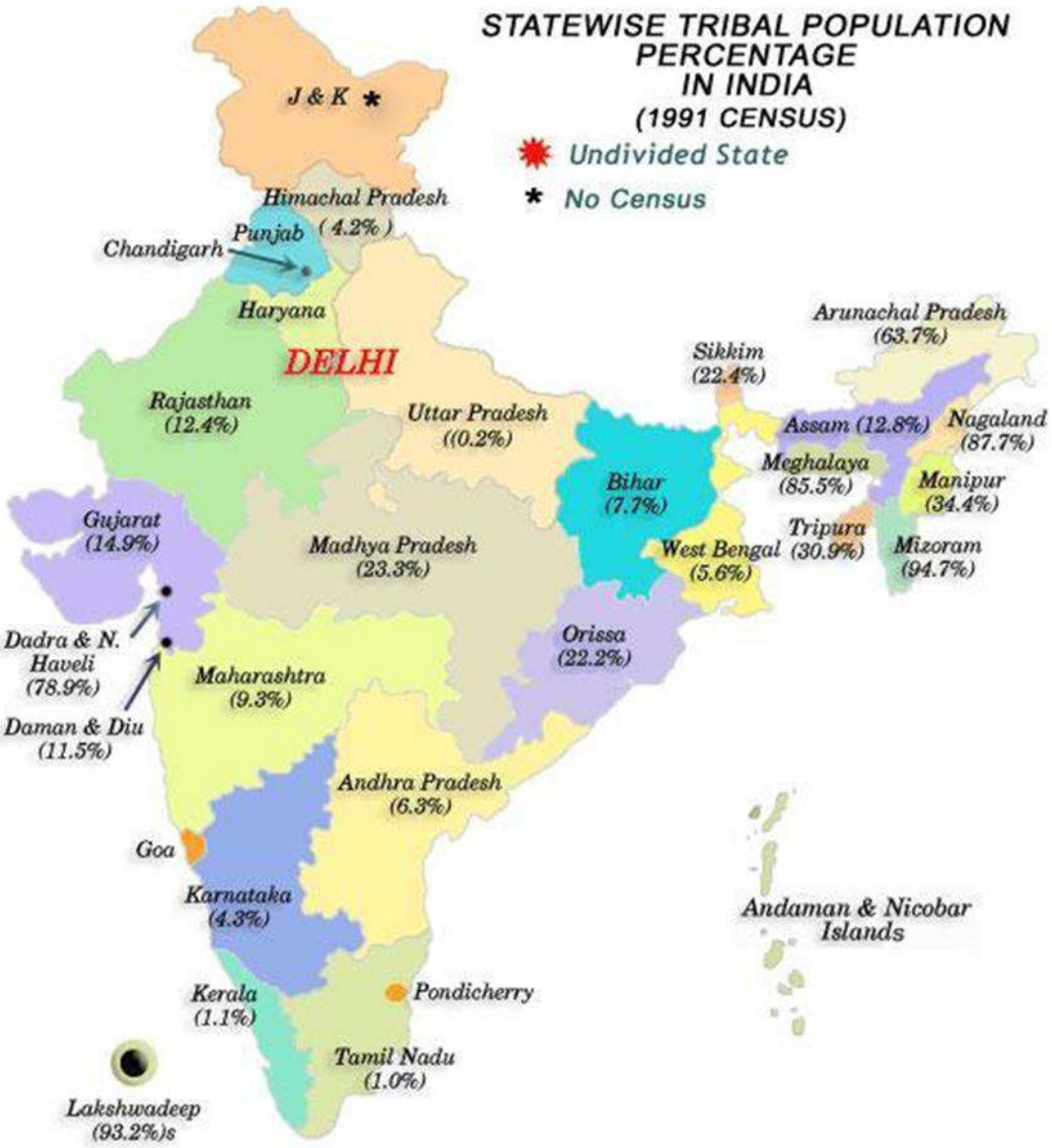
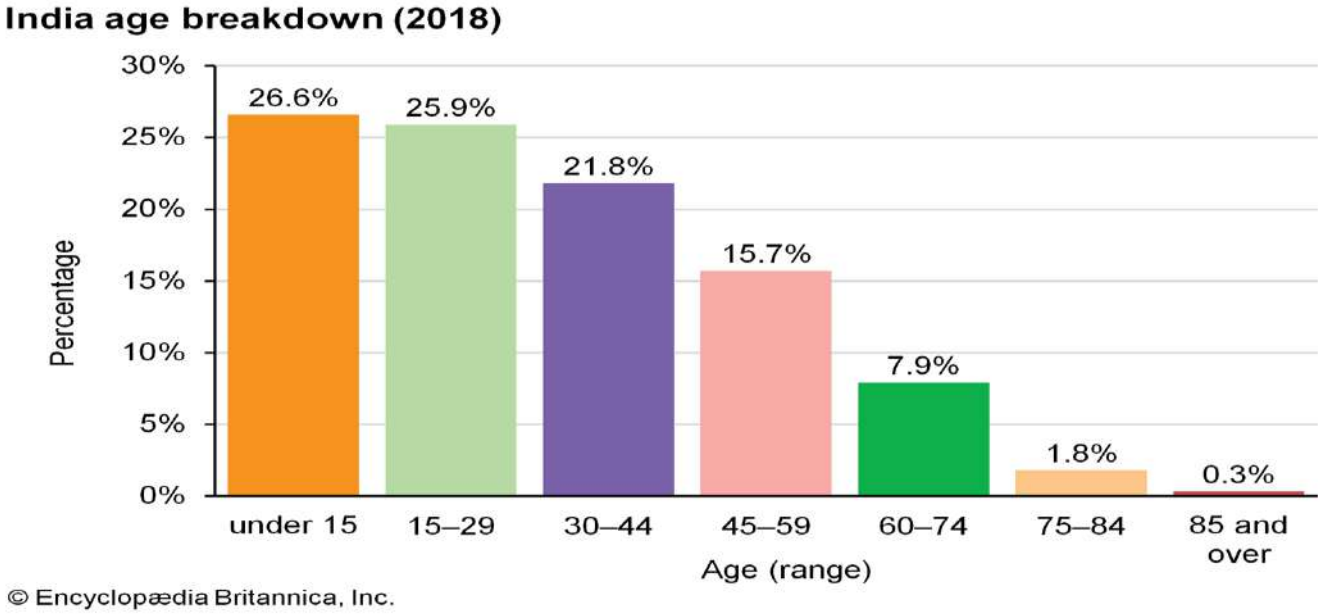
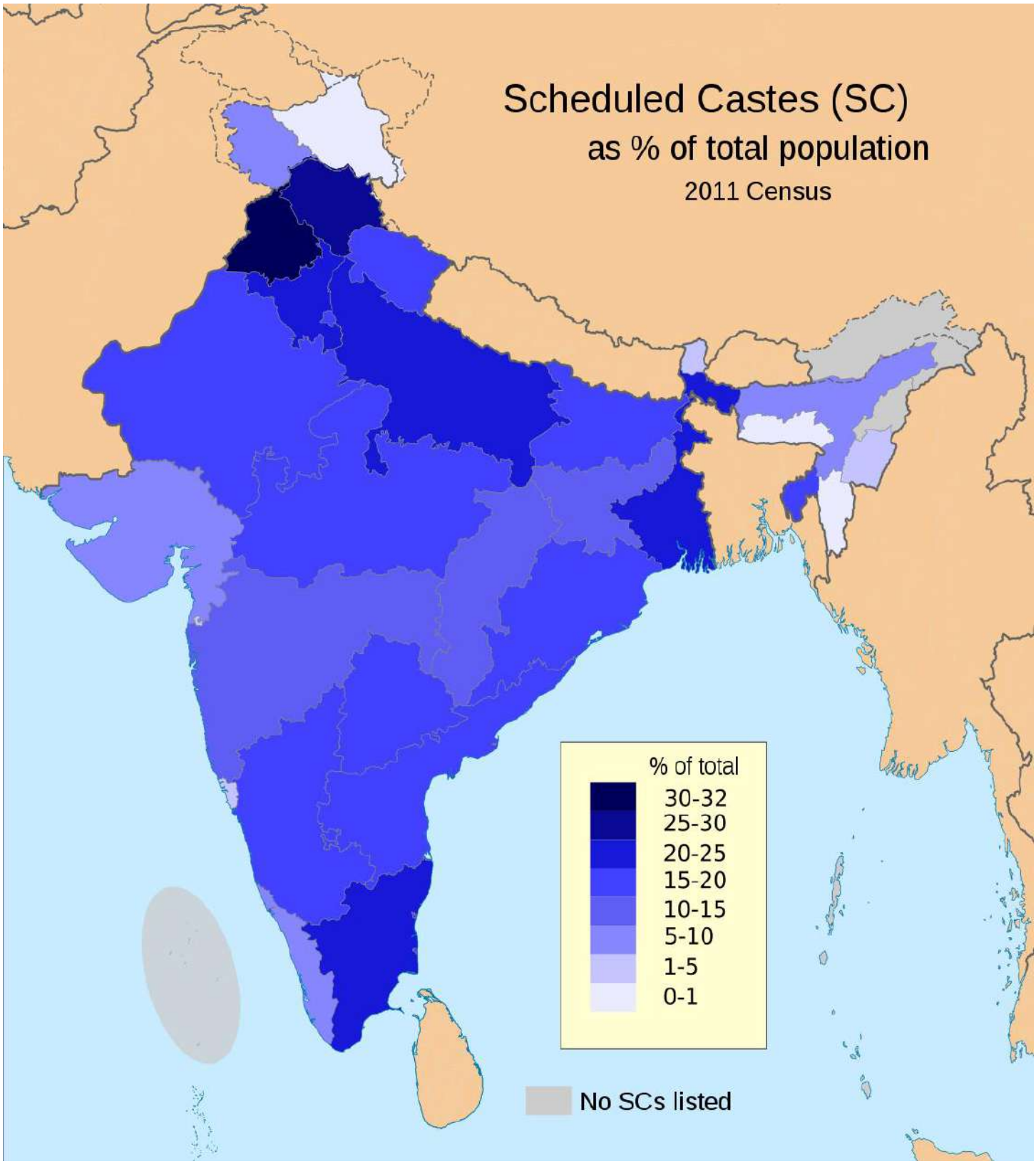
Literacy is 74% (12% in 1947), life expectancy is 70 years (31 years in 1947), BPL rate reduced from 70% to 11%, rural population is ~ 62% (20% urban migration since 1947), population 350 million to current 1.38 billion resident population, 32 million residing in the rest of the world as NRI's or PIO's (20%). There are a reported 3000 castes in India, 6 major religions, ~ 20,000 mother tongues and 21 major spoken languages,



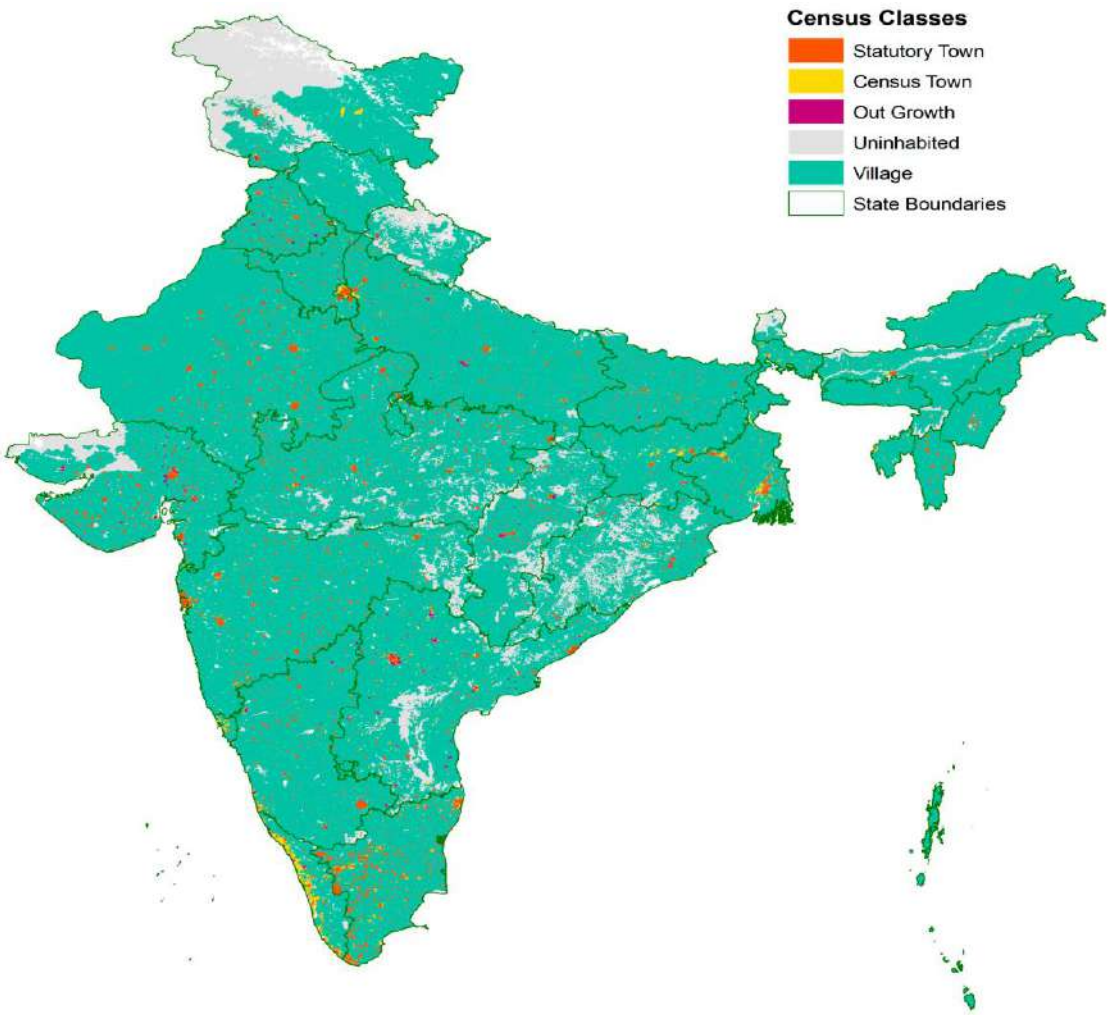


("Census of India: Literacy and Level of Education")

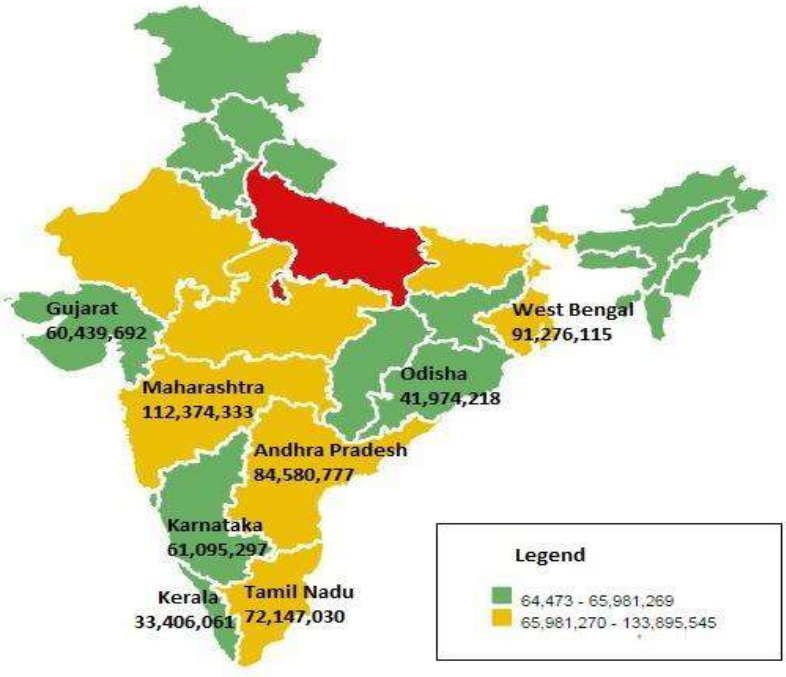




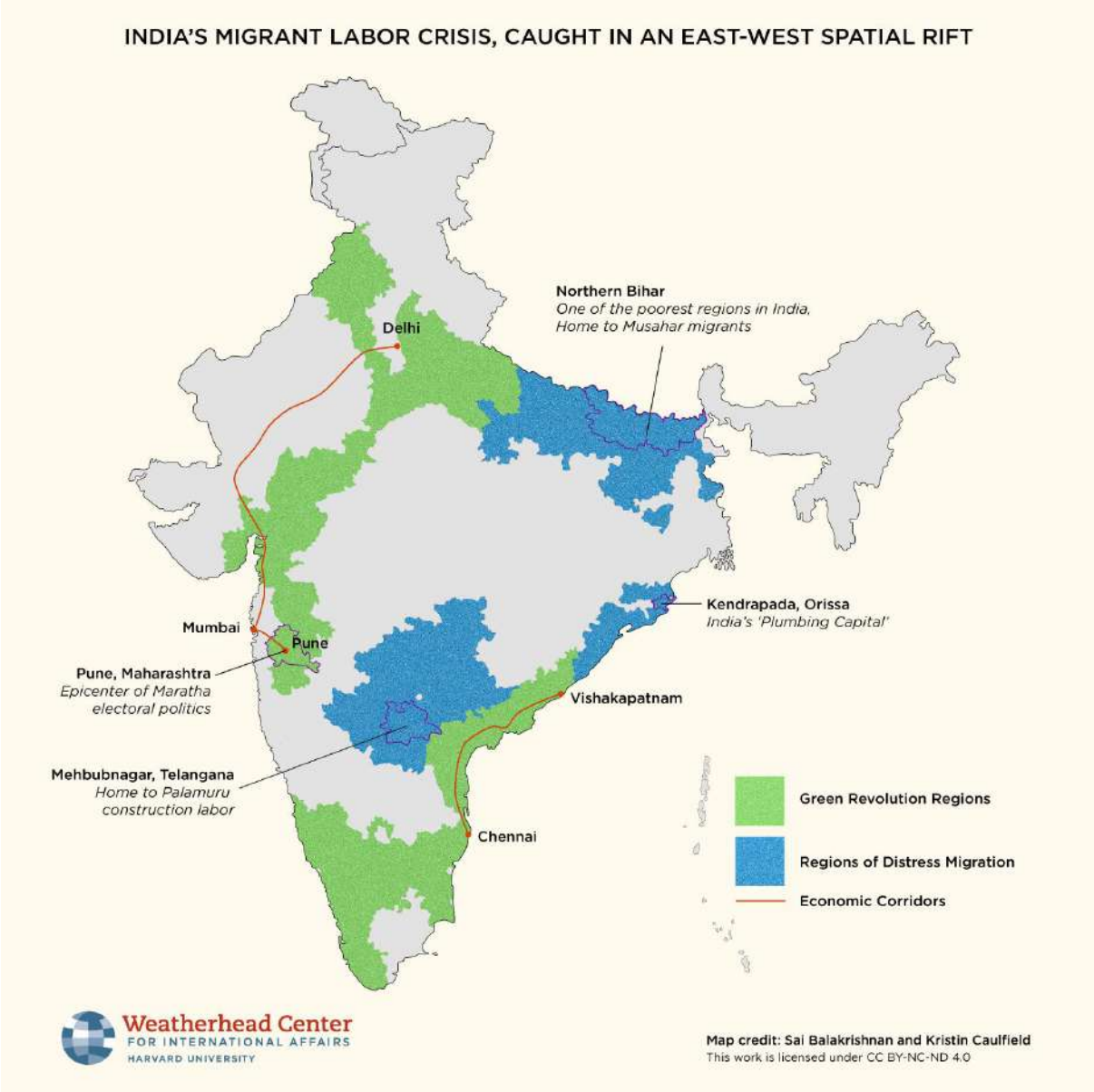
("Scheduled Castes and Scheduled Tribes")



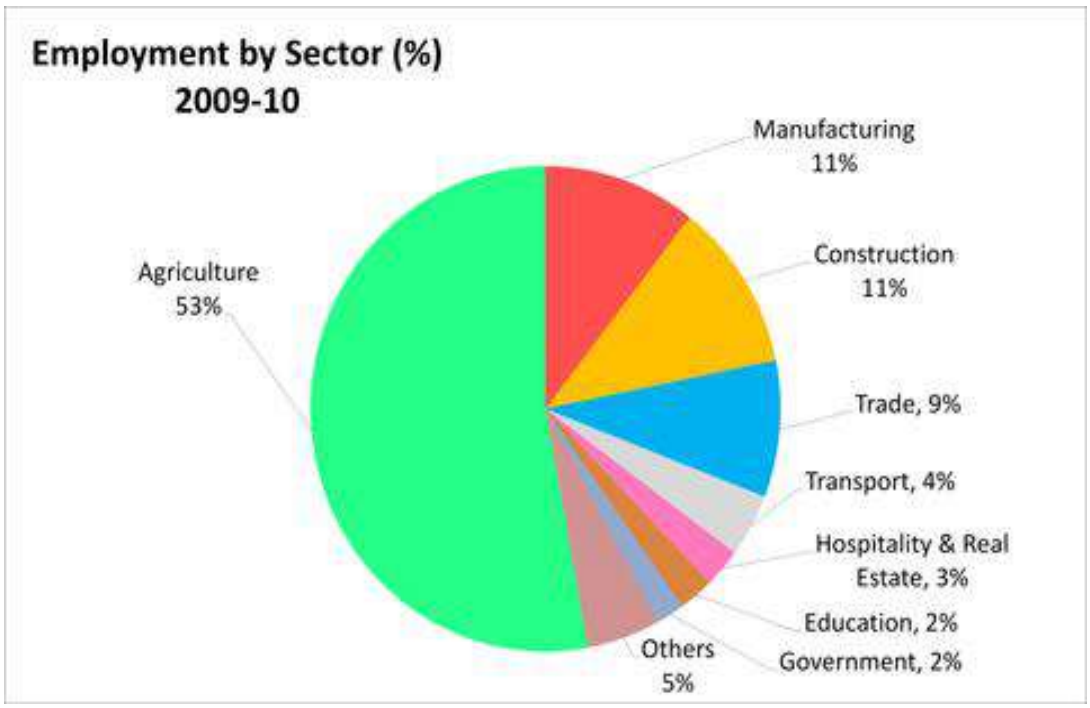
Urbanisation in India (~62%), 2011: (engin)

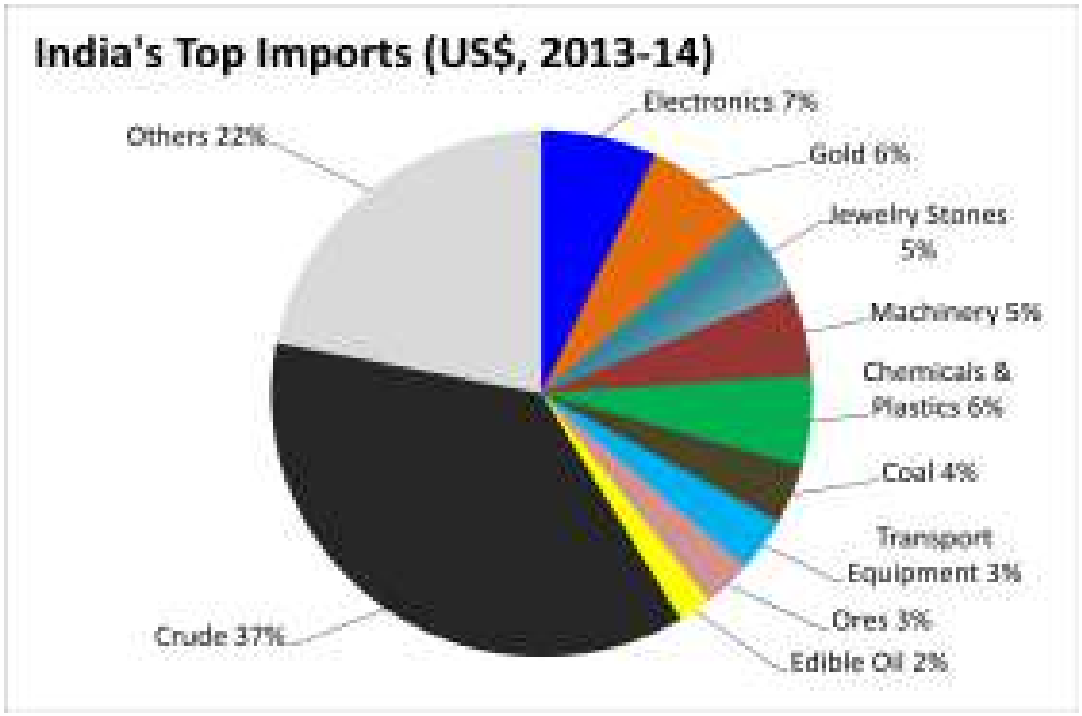


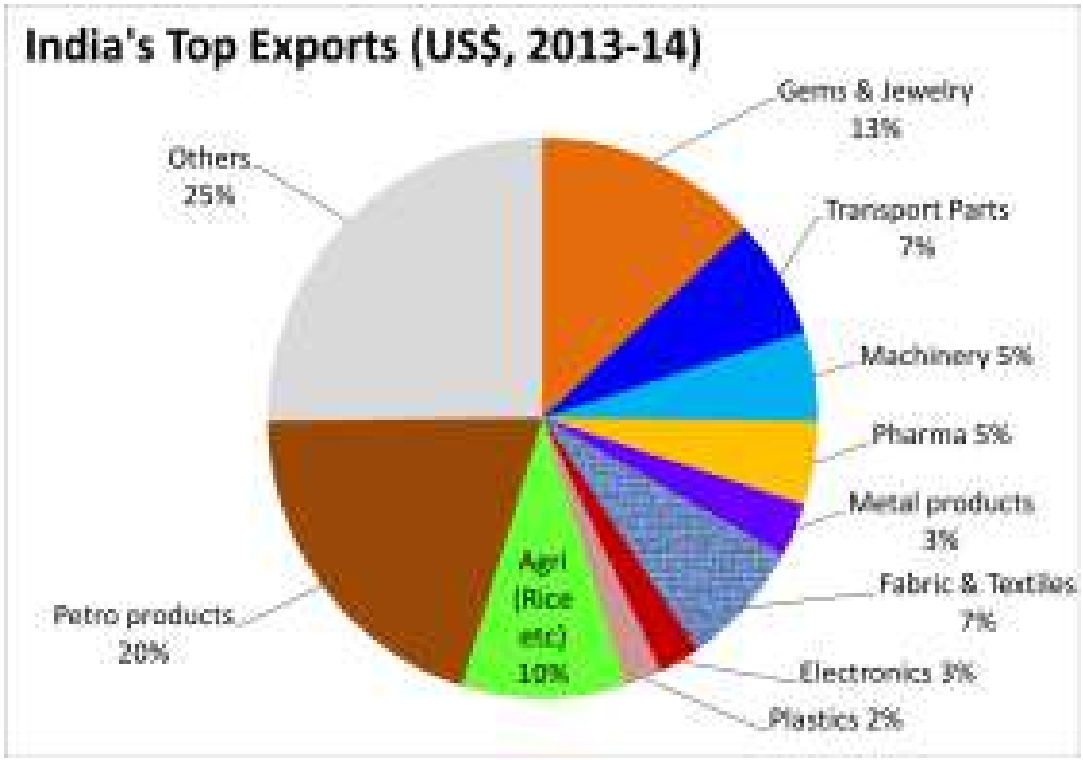
~ 40% of India's population lives in coastal areas ("Coastal State Wise Population of India")



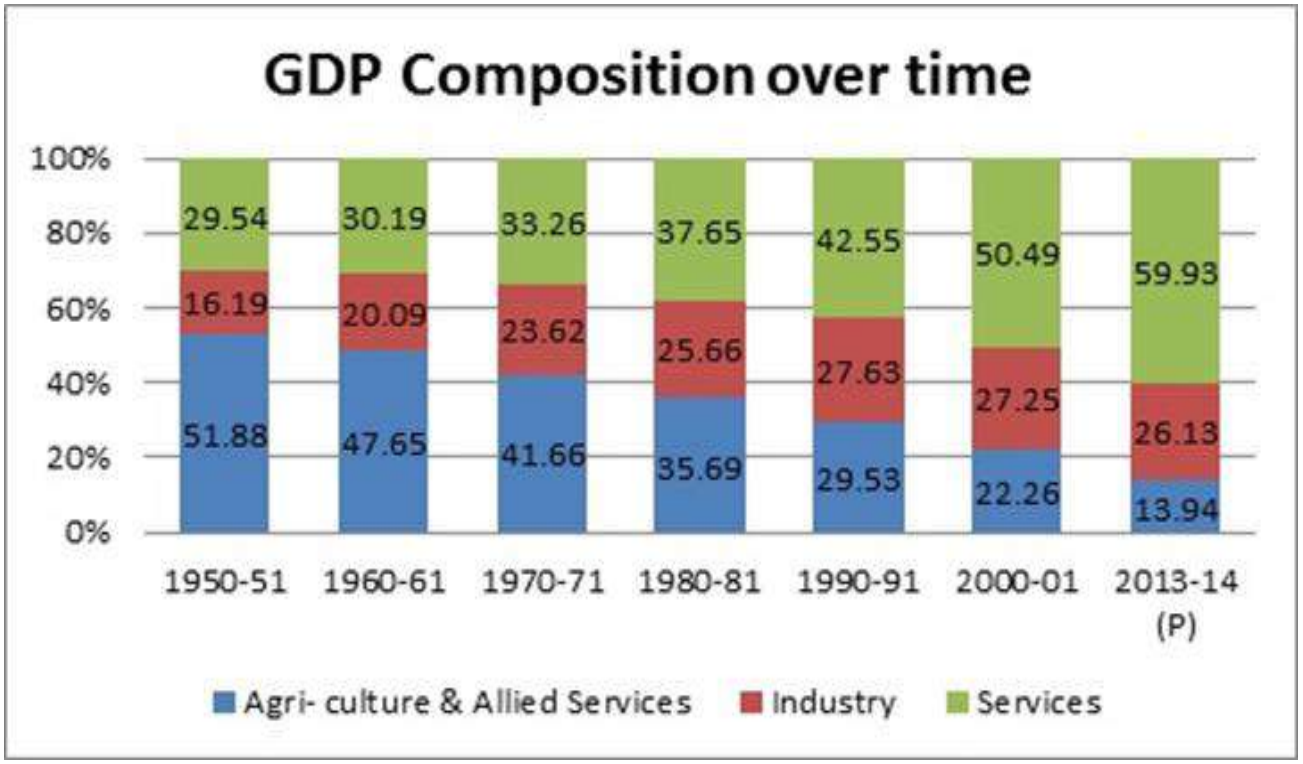
(Balakrishnan)

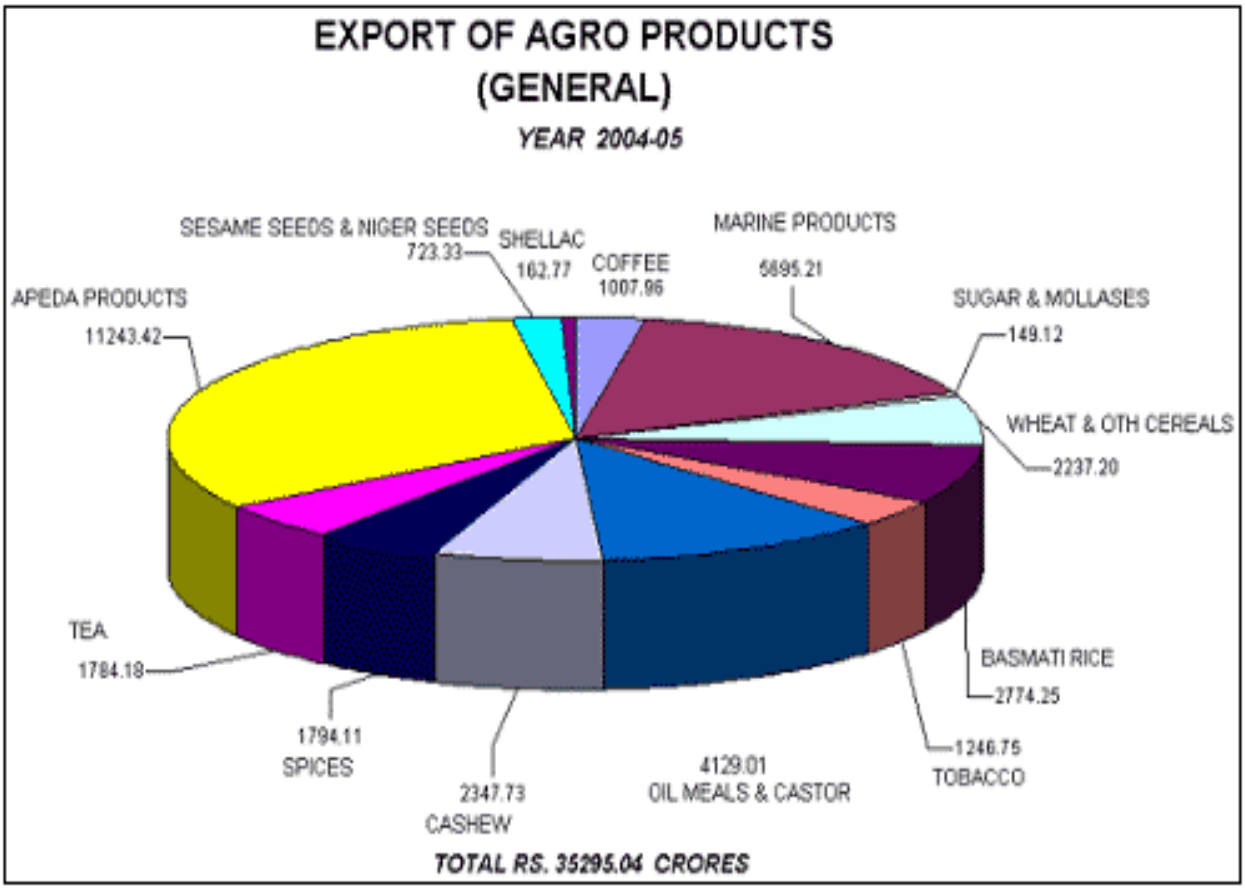


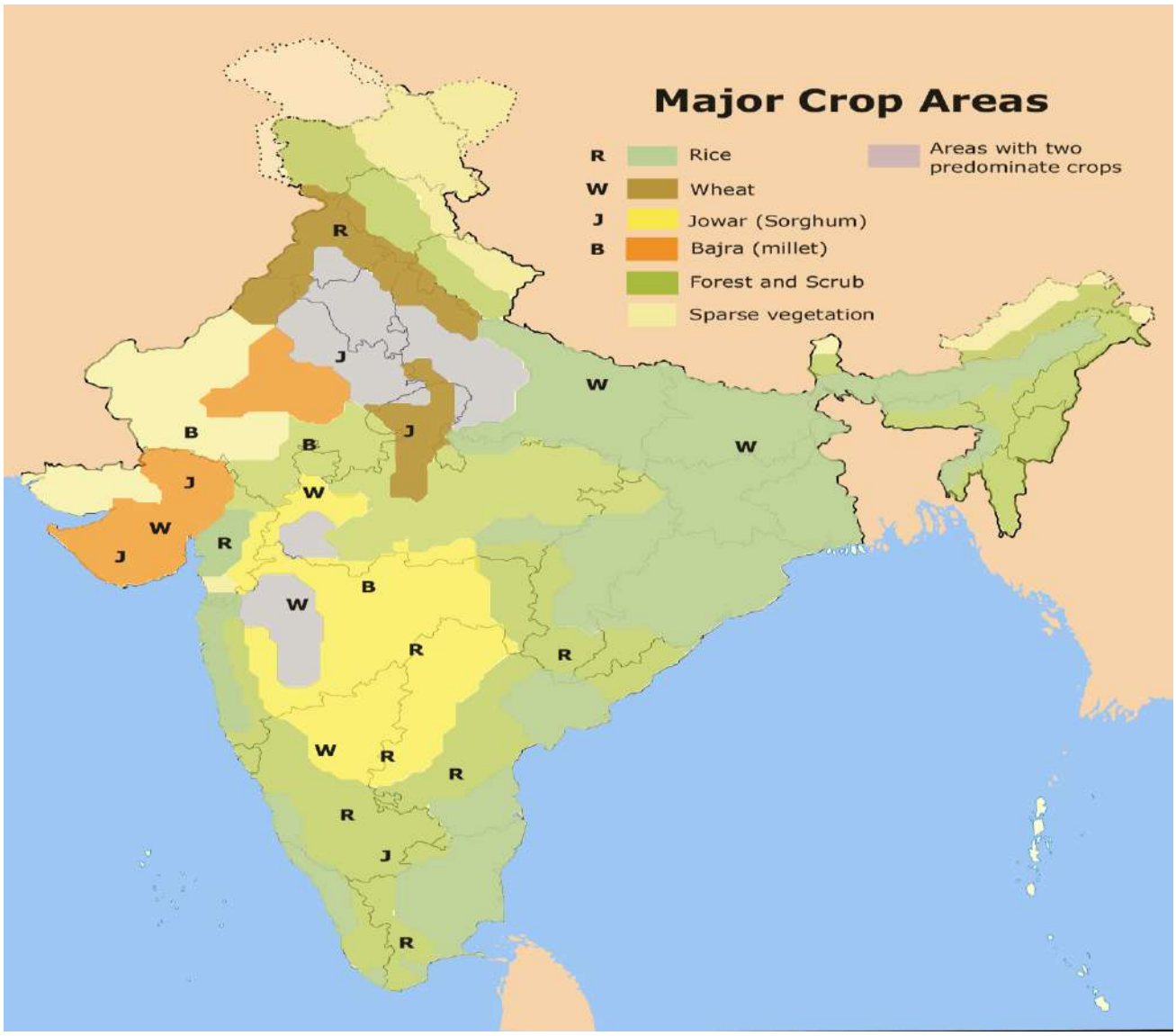

India's Top Imports (US$, 2013-14)
Electronics 7%
Gold 6%
Jewelry Stones 5%
Machinery 5%
Chemicals & Plastics 6%
Coal 4%
Transport Equipment 3%
Ores 3%
Edible Oil 2%
Crude 37%
Others 22%

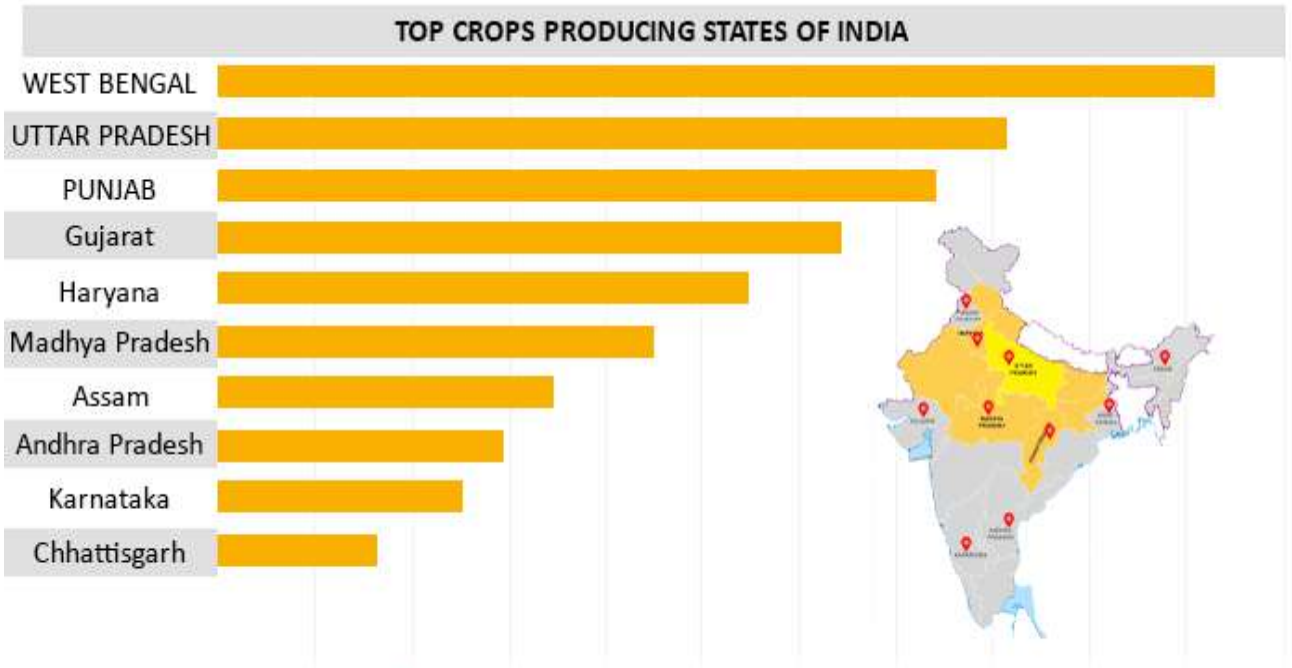

India's Top Exports (US$, 2013-14)
Gems & Jewelry 13%
Transport Parts 7%
Machinery 5%
Pharma 5%
Metal products 3%
Fabric & Textiles 7%
Electronics 3%
Plastics 2%
Agri (Rice etc) 10%
Petro products 20%
Others 25%

India is a net importer with a trade deficit of ~ 16 billion USD; < 1% of GDP (2.6 Trillion USD). It is coming to a new status of net exporter in trade.

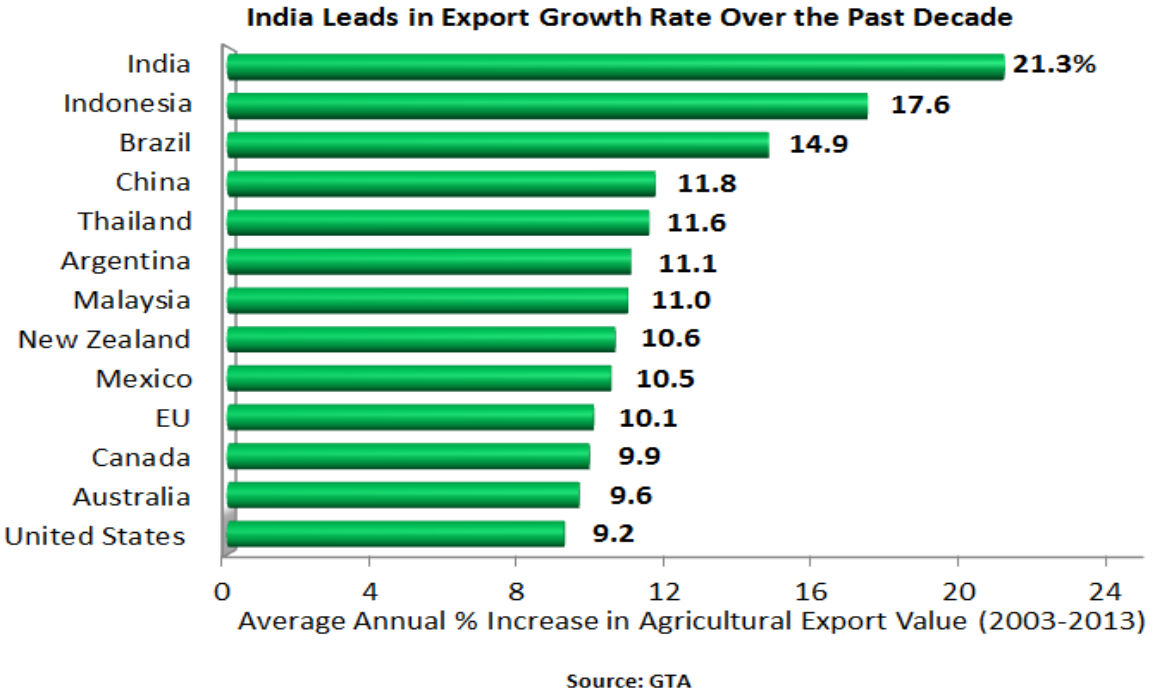




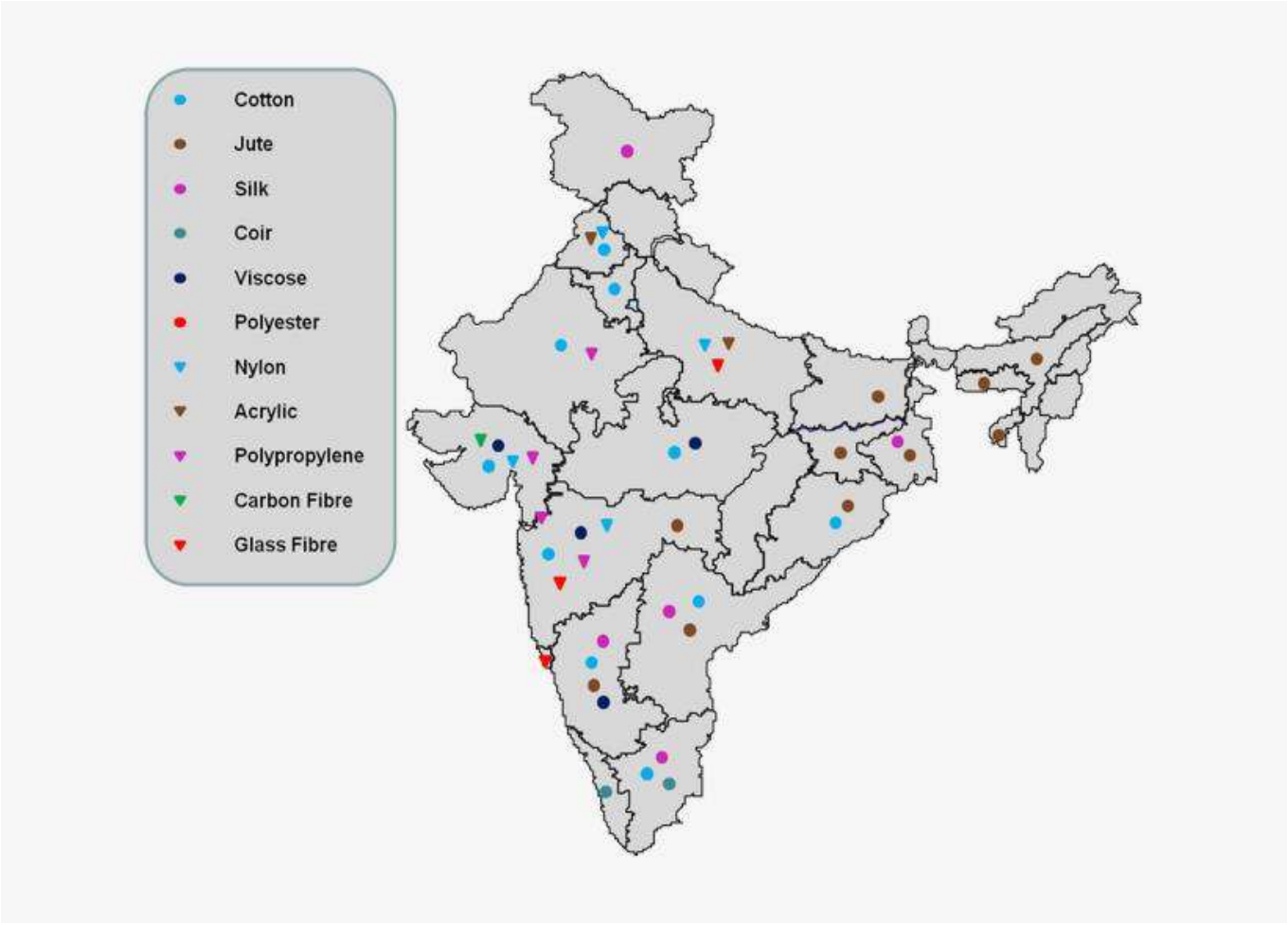




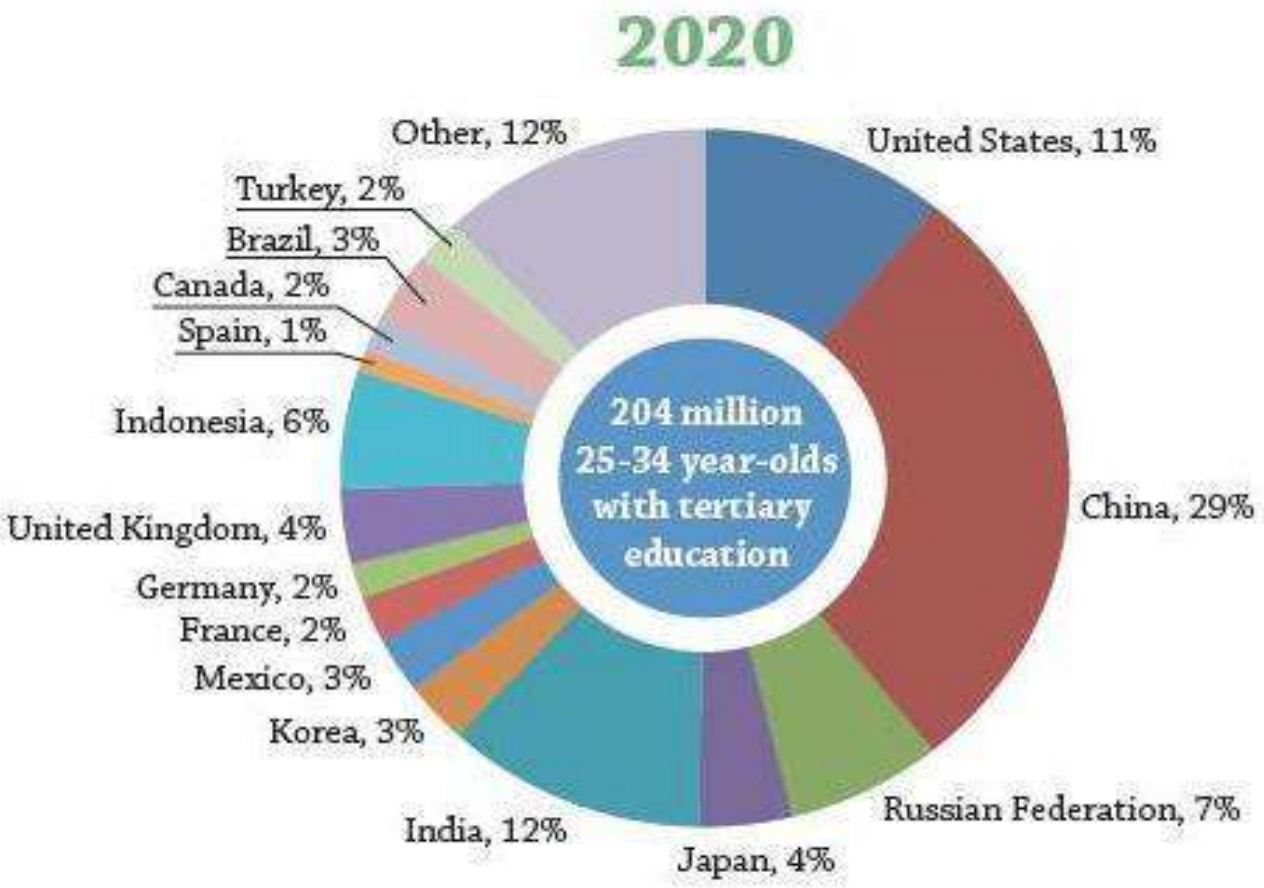
India is currently producing about 286 million tonnes of horticulture produce from an area of about 24.4 million hectares, accounting for about 13 percent of the total world production of fruits and leads the world in the production of mango, banana, papaya, sapota, pomegranate, acid lime and aonia. It is looking to scale up its Horticulture produce (Correspondent).



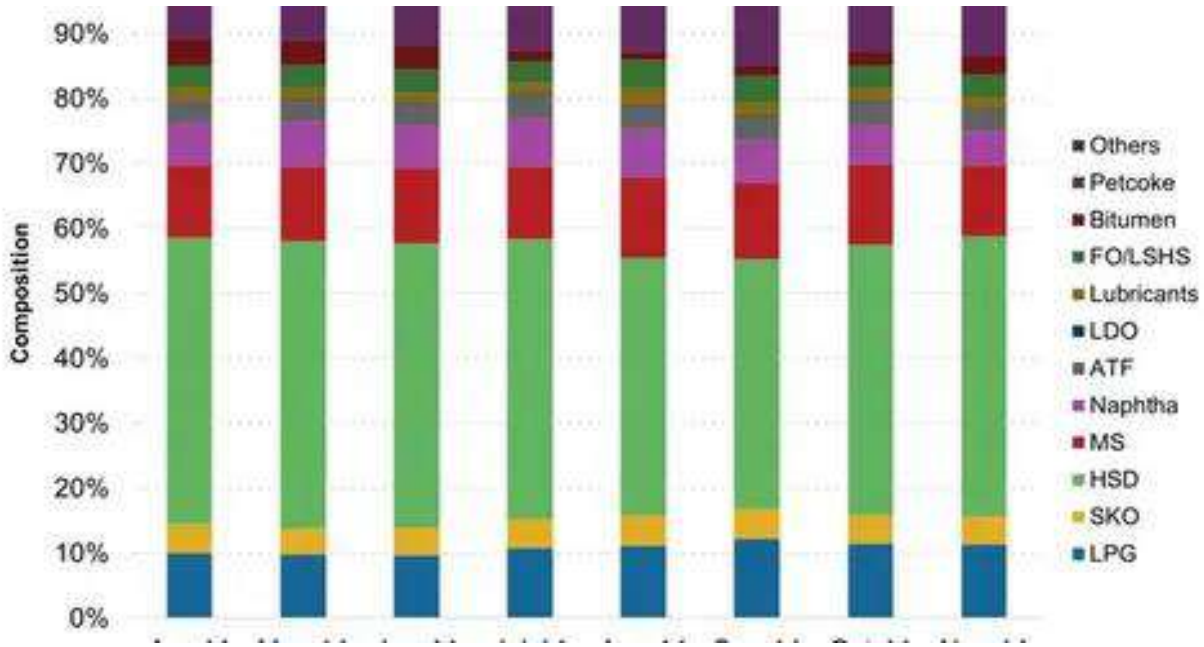
Source: GTA



Linen is to be added to this diverse list of textile produced from India.



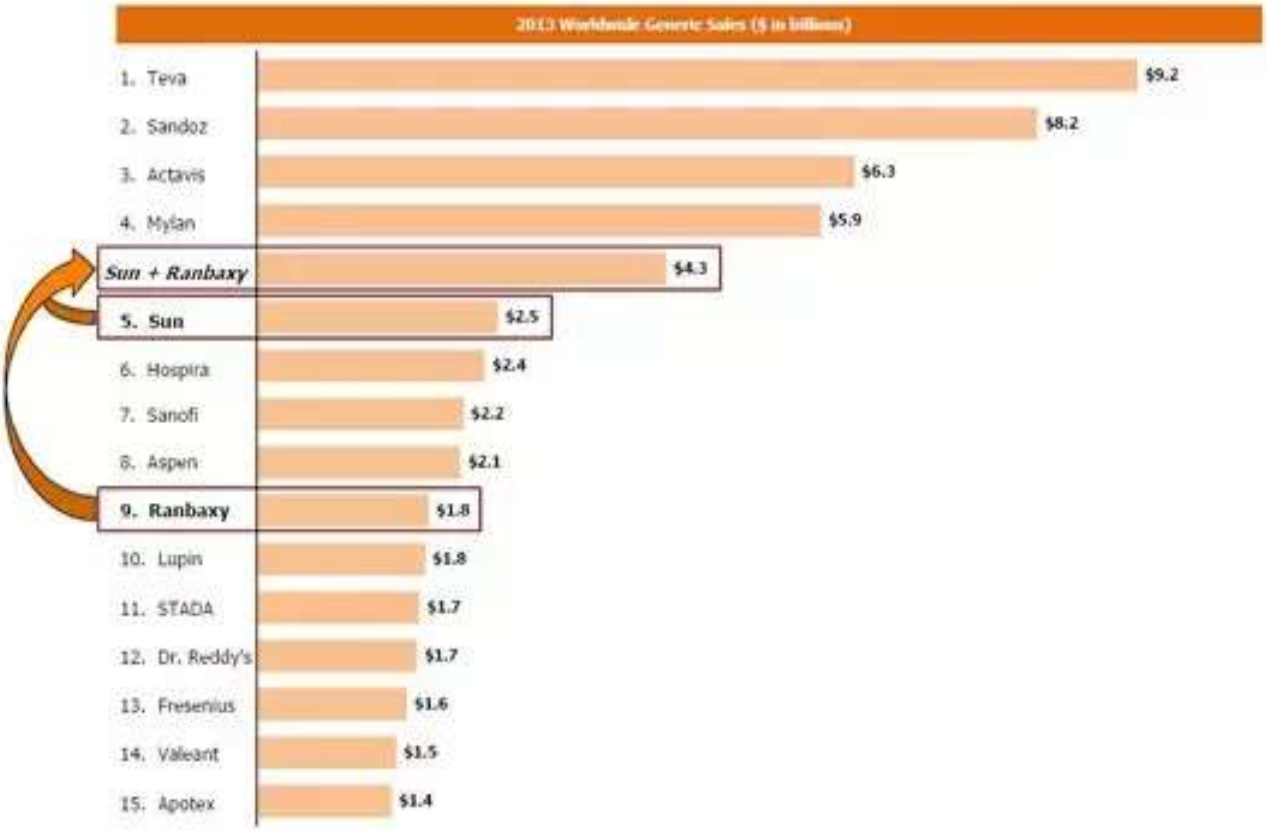
("China and India to Produce 40% of Global Graduates by 2020")



Although India imports ~ 50% of crude required, it produces a range of petroleum products for local and export markets. Reliance Industries has the worlds largest refinery in Gujarat.

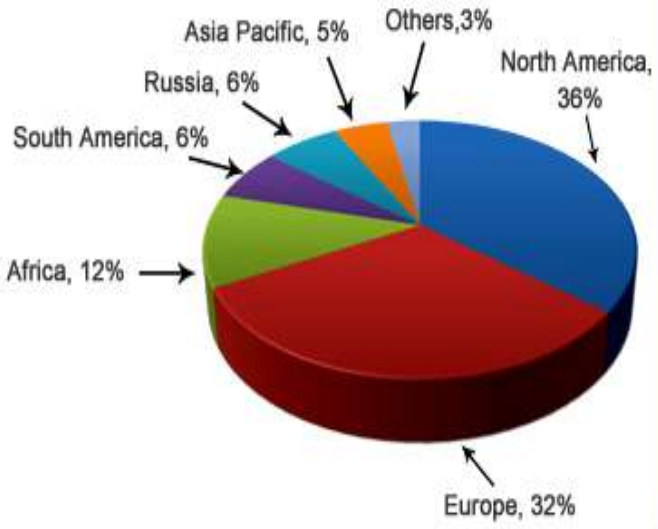
India remains the leading country in the world to outsource. IT platforms using companies all use outsourcing. It forms a major component of service sector [IT industry, logistics, insurance etc]. Service Industries are overtaking as the major revenue stream of Indian economy. The real GDP of this market is a Trillion USD in 2020. India is third after the USA and Philippines in the outsourcing market. (Accelerator).

World's 5th Largest Specialty Generic Pharma Co

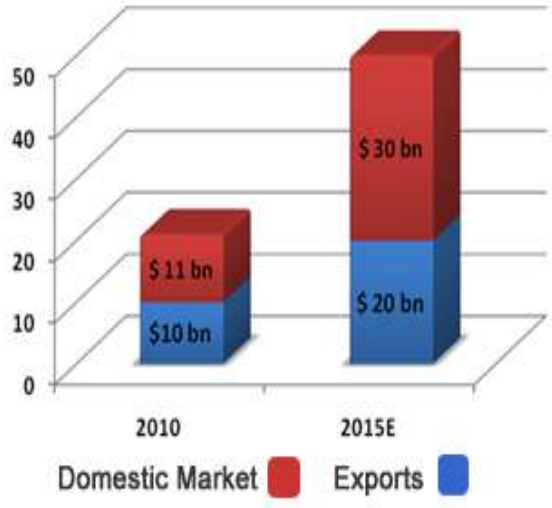


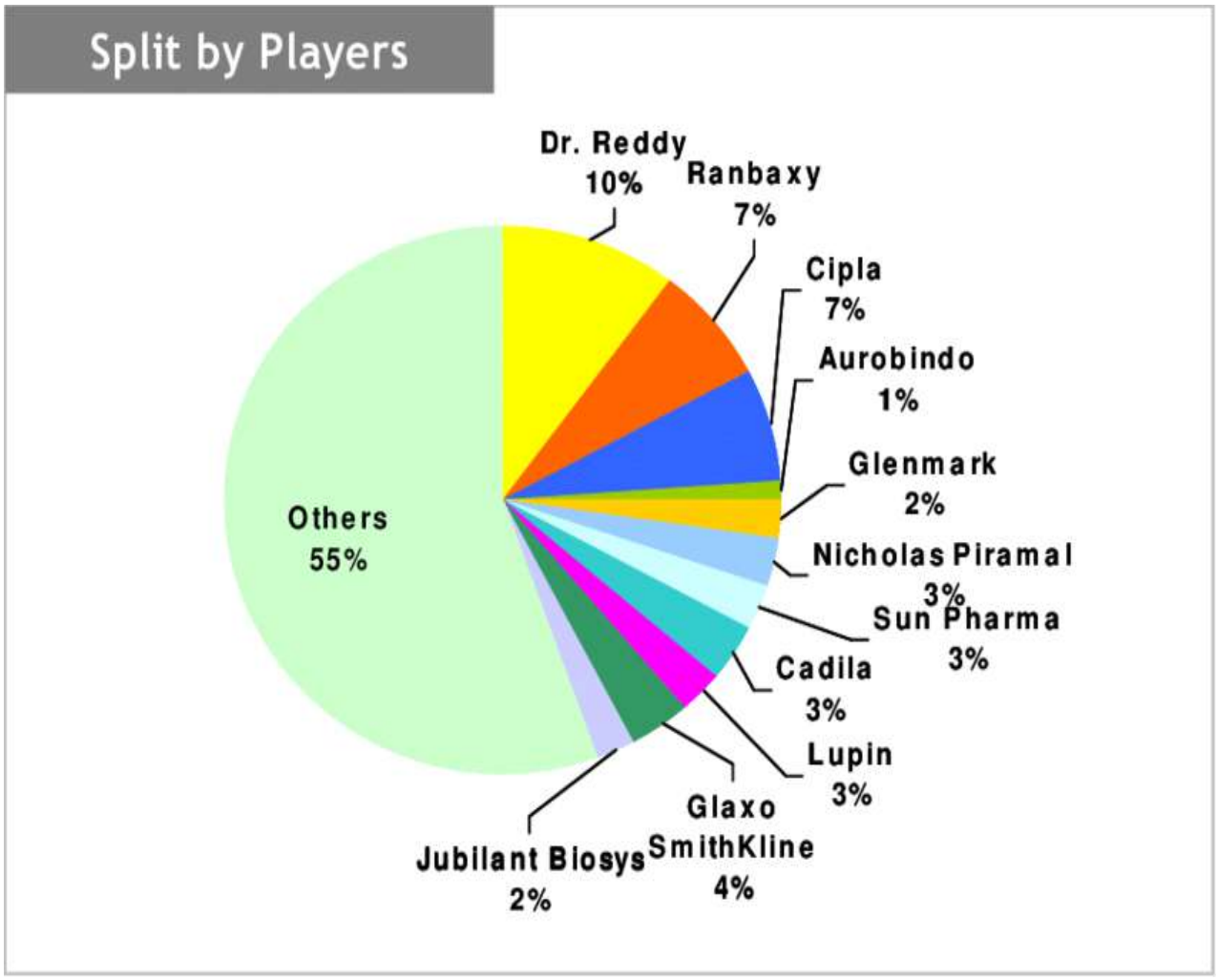
Source: Evaluate Pharma, Company filings.

Indian Pharma Exports in 2008-09



Indian Pharma Turnover





Indian pharmaceuticals industry has become the worlds largest supplier of OTC and generic medicines manufacturers. To this is now being added, biopharmaceuticals with its range of plant, animal and human products including vaccines.

India has a long history of producing and crafting gold and jewellery from precious stones. Albeit its natural resources of precious stones and metals have dwindled, it still imports raw materials and is the world's largest processor and manufacturer of jewelleries.

The revenues generated by ISRO from launching satellites for other countries reached 1250 crores in 2019 (Narasimhan).

India is one of the top 5 countries in the World for Entrepreneurship (Start Ups) aided by the IT Industry with the Government considering starting a NASDAQ equivalent stock market for emerging businesses. Agriculture, Textile and IT are emerging as major contributors to its growing economies with plans of modernisation. Health Tourism and Biotechnology (pharma + biotech) are growing sectors with Serum Institute of India being the Worlds largest vaccine manufacturer. There is a rural revolution with digital payments, telecommunication and agrotechnology reaching the rural areas and a supporting civic amenities National plan to provide better living conditions (electricity, potable water, water for farming, toilets, public health, primary health care, basic life insurance cover etc)

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ISRO's Journey To SPACE
Turning Miles into Milestones

- SOUNDING ROCKETS
- SLV-3
- ASLV
- PSLV & GSLV

2000's

14 We carried Canada, Germany, Singapore and many other countries **to Space** to enhance broadcasting services and conduct research on how weather affects Ka-band satellite communications.

13 **Mars Orbiter Mission,** India's first interplanetary mission **to the red planet, successfully launched** by PSLV-C25 **for exploration** of Martian surface mineralogy and atmosphere by indigenous scientific instruments.

12 **India's first cryogenically-fuelled rocket** engine launched its first Radar Imaging Satellite (RISAT-1) and the heaviest communication satellite, GSAT-10 to image the Indian landmass, both during morning and evening around 6:00 AM and 6:00 PM equatorial crossing.

11 Launched student-made satellites **Jugnu, SRMSat, VesselSat-1** from the Indo-French satellite Megha-Tropiques to study the water cycle and energy exchanges in the tropical region.

09 India successfully launched its **16th remote-sensing satellite** Oceansat-2 and six nano European satellites in 1,200 seconds to study surface winds and ocean surface strata for weather forecast.

08 India launched it's **first award winning lunar probe Chandrayaan-I** that hoisted the Indian **TRICOLOUR** on the Moon, completing 95% of primary objectives in just 10 months.

07 **Launched CARTOSAT-2,** along with Indonesia and Argentina to generate a detailed map of India from Delhi to Goa with state-of-the-art panchromatic camera.

05 **INSAT-4A, India's heaviest communication satellite** and also the first satellite to be launched in the series took off for providing high quality television, telecommunication, and broadcasting services.

03 Launched RESOURCESAT-1, the most advanced remote sensing satellite that enhances the data quality of the other satellites for better in situ observation.

02 **Launched Kalpana-1,** the first dedicated meteorological satellite that monitored unattended meteorological platforms and informed about cyclones, tornadoes, earthquakes and any natural disasters in India.

01 Placed 3 satellites, **TES, PROBA, BIRD** simultaneously in sun synchronous orbit to detect hotspots like forest fires and volcanoes from space.

00 **INSAT-3B,** the satellite that primarily serves business communication, mobile communication and developmental communication like 3G, 4G, was successfully launched and placed in orbit.

1990's

96 Third developmental launch of **PSLV with IRS-P3** for remote sensing of earth's natural resources and Study of X-ray Astronomy by placing it in the polar sunsynchronous orbit.

94 One of the Indian interplanetary network satellites, **SROSS-C2 was launched** for conducting astrophysics, Earth Remote Sensing, and upper atmospheric monitoring experiments as well as for new and novel application-oriented missions.

1980's

88 **IRS-1A** was the first remote sensing mission, launched to provide **imagery for various land-based applications**. The mission's long-term objective was to develop indigenous remote sensing capability.

84 In April, Indo-Soviet manned space mission put the first Indian, Rakesh Sharma in space.

82 **INSAT-1A** was a multi-purpose satellite system, launched to provide two high power TV broadcast and twelve telecommunications national coverage transponders, in addition to also providing meteorological services.

81 India launched its first 4 staged launch vehicle **SLV-3, Rohini D1 and Bhaskara II,** low orbit Earth Observation Satellite that collected data on telemetry, oceanography and hydrology.

1970's

79 **Bhaskara-I,** the first experimental remote sensing satellite built in India aboard the Intercosmos launch vehicle. The main objectives were to conduct earth observation experiments.

76 India undertook the **Satellite Instructional Television Experiment** (SITE) to telecast a series of educational programs on health, family planning, agriculture and the like to over 2,500 Indian villages via the US satellite

75 First indigenously built Indian satellite Aryabhatta was launched by the Soviet Intercosmos rocket. The satellite carried three experiments, one each in X-Ray Astronomy, Solar Physics and Aeronomy.

72 Eventuated airborne remote sensing experiments to space for development, planning, monitoring and conservation of resources.

1960's

69 **Indian Space Research Organisation** (ISRO) came to life On August 15 1969, under Department of Atomic Energy.

63 First two-stage sounding rocket imported from Russia (M-100) and France (Centaure) launched from TERLS.

62 Rocket launching station was formed at Thumba (TERLS) because it is located very close the magnetic equator of the Earth at 8°32'34" N and 76°51'32" E making it the ideal location for scientists to conduct atmospheric research for low-altitude, upper atmosphere and ionosphere studies.

REFERENCE
- ISRO MILESTONES
- ISRO
- WIKIPEDI

SLV: Satellite Launch Vehicle
ASLV: Augmented Satellite Launch Vehicle
PSLV: Polar Satellite Launch Vehicle
GSLV: Geosynchronous Satellite Launch Vehicle
GSAT: Geo-Stationary Satellites
INSAT: Indian National Satellite System
IRS: Indian Remorte Sensing Satellite
SROSS: Stretched Rohini Satellite Series
TERLS: Thumba Equatorial Rocket Launching Station

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Chapter 5: Governance

Parliamentary constituency of India – 543 constituencies