India (Republic of) (Bharat)

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Location and area

India is a federal democracy in southern Asia, comprising, with Pakistan and Bangladesh, the subcontinent of India. It geographically consists of the entire Indian peninsula and portions of the Asian mainland. India is bordered on the north by Afghanistan, Tibet, Nepal, China, and Bhutan, on the south by the Palk Strait and the Gulf of Mannar, which separate it from Sri Lanka, and the Indian Ocean, on the west by the Arabian Sea and Pakistan, on the east by Myanmar (Burma), the Bay of Bengal and Bangladesh, which almost cuts off north-east India from the rest of the country. With Jammu and Kashmir (the definitive status of which has not been determined), India has an area of 3,165,596 km^2 (3,288,000 km^2 according to www.geoanalytics.com/bims/in.htm). India is the seventh-largest country in the world and the second most populous, after China.

Topography

India may be divided into four regions:

1. The Himalaya, with the Himalaya mountains that extends along the northern and eastern margins of the Indian subcontinent, separating it from the rest of Asia. It is the highest, youngest, and one of the most active mountain systems in the world. Notable peaks wholly or partly within India include Kanchenjunga (8,598 m), the third-highest peak in the world, Nanga Parbat (8,126 m), Nanda Devi (7,817 m), Rakaposhi (7,788 m), and Kamet (7,756 m).
2. The northern river-plains, the world's largest alluvial plain and comprises the major part of the area watered by the Indus, the Ganges, and the Brahmaputra rivers. Because of the abundance of water and the rich alluvial soil, the northern plains are the most fertile and densely populated part of India. On the southwestern border with Pakistan the plains give way to the Great Indian Desert and the salt marshes known as the Rann of Kachchh.
3. The Deccan Plateau, a vast, triangular tableland occupying most of peninsular India. Generally rocky, the Deccan is an uneven plateau divided by low mountain ranges and deep valleys. Elevations range from about 300 to 900 m, although outcroppings as high as 1,220 m occur.
4. The Western and Eastern Ghats. The Western Ghats, overlooking the Arabian Sea, have a general elevation of about 900 m. The fertile Malabar Coast lies between the Western Ghats and the Arabian Sea. The Eastern Ghats average about 450 m in height. Between them and the Bay of Bengal is a narrow coastal plain, the Coromandel Coast. The two ranges meet at the southernmost point of the Deccan (near Bangalore) in the Nilgiri Hills.

Climate

Because of the peninsularity, topography, and geographical position, climatic conditions range from tropical to temperate. Except in the more mountainous regions, most of India has a uniformly tropical climate. During the southwestern monsoon season (June – November), rainfall can be very heavy. Along the slopes of the Western Ghats it often reaches more than 3,000 mm. At Cherrapunji in the Khasi Hills of northeastern India, the yearly rainfall is

almost 11,000 mm. Mean annual precipitation along the southern slopes of the Himalaya is about 1,500 mm.
The cool season of the northeastern monsoon (December – February), is usually accompanied by extremely dry weather, although severe storms, attended by slight precipitation on the northern plains and heavy snowfalls in the Himalaya, sometimes cross the country. The hot season (March – June) is most oppressive during May, when temperatures as high as 52° C are not uncommon in central India. In the vicinity of Kolkata (formerly Calcutta), the mean annual temperature is about 26° C. The mean annual temperature in the west-central coastal region of the peninsula is about 28° C. Around Chennai (formerly Madras) temperatures range between about 24° and 33° C, with an annual mean of about 29° C.

Land use

In the arid areas that adjoin Pakistan, the vegetation is sparse and largely herbaceous. The wetter Gangetic plain supports many plant species. Vegetation is especially luxuriant in the southeastern plains, where mangrove flourishes.
Arctic communities are found on the higher slopes of the Himalaya. The densely forested lower ranges of the Himalaya support numerous subtropical species. Conifers predominate in the northwestern Himalaya. To the east, the Himalayan slopes abound with tropical and subtropical vegetation. The Malabar Coast of the southwestern peninsula and the slopes of the Western Ghats, areas of high rainfall, are thickly wooded. Extensive tracts of impenetrable jungle occur in the swampy lowlands and along the lower slopes of the Western Ghats. The vegetation of the Deccan is less luxuriant (Microsoft Encarta Encyclopedia 2002).
61 % of India's land is used for agriculture, with rice as the leading crop. By 1998 about 590,000 km^2 was irrigated. Forests cover about 22 % of the land area. Commercial forestry is is largely restricted to the northern highlands, Assam, and the regions bordering on the Himalaya. Among the current environmental concerns in India are deforestation, desertification, lack of access to water, air and water pollution, and the strain placed on natural resources by a huge and growing population (Microsoft Encarta Encyclopedia 2002).

Wetlands

The total area of wetlands of India (excluding rivers) is 582,860 km^2 (18.4% of the country), 70% of which comprises areas under paddy cultivation (www.geoanalytics.com/bims/in.htm). At the end of 18^{th} century a large wetland area covered a total of 18,000 – 20,000 km^2 in the delta of the Ganga-Brahmaputra-rivers in the present India and Bangladesh (Richards 1991). Freshwater swamp in India "originally" (before human influence) covered 12,889 km^2 against currently 67 km^2 (1% of former area). Mangroves originally covered 14,007 km^2 against currently 3,035 km^2 (22% of former area), seasonal salt marshes originally 23,524 km^2 against currently 23,985 km^2 (> 100% of former area) (www.geoanalytics.com/bims/in.htm).
Baer (2001) estimates the mangrove area on 6,817 km^2, the major mangrove areas being the Sundarbans, the Andaman & Nicobar Islands, Coringa, and Mahanadi. The Sundarbans included 6,000-10,000 km^2 of mangrove swamps (Scott 1991, Gosselink & Maltby 1991).

Peatlands

Peat deposits have been reported from various holy lakes in Himachal Pradesh including those with floating islands of *Phragmites* (Sharma 1970, Sharma & Singh 1972a, b, Sharma & Chaunan 1988).

Vishnu-Mittre & Gupta (1970) and Mukherjee (1972) report on the presence of sometimes thick (up to 4.5 m) peat layers, alternated with clay layers and generally covered with clastic deposits, in West Bengal State: “The occurrence of peat in this region was observed by the senior author through the window of the train passing through Abdul to Howrah during April 1968” (Vishnu-Mittre & Gupta 1970). Also Gupta (1981) mentions peat in active floodplains of the Ganges and Bramaputra rivers, e.g. 90-120 cm thick burried peat bands in and around Kolkata.

Gupta & Khandelwal (1982) found peat layers up to 4 m in the swampy areas of lakes in Uttar Pradesh. Jain et al. (2000) report on a peatland situated in the western part of the Sikkim Himalaya.

Kivinen & Pakarinen (1981) mention the presence of peatland in India but present no estimates for its area.

Bord na Mona (1985) and Shrier (1985), referring to the FAO/UNESCO 1971-1981 Soil Map of the World 1:5,000,000, mention Histosol area resp. a “mire area” of 320 km² on the west coast of India, south of Alleppey. Andriesse (1988) uses this figure for the extent of organic soils, Schneider & Schneider (1990) and Pfadenhauer et al. (1993) for peatlands, and Rieley et al. (1996a) for “peat swamps”.
Kivinen & Pakarinen (1980) estimate the peatland area (> 30 cm peat) in India as being 1,000 km^2. Markov et al. (1988) use this figure for the area of „peat resources“ (peat thickness not mentioned), with a peat thickness up to 9 meters and with 300 Mt of peat. Lappalainen & Żurek (1996b) reproduce these values for the “peatland” area (without mangroves) and the estimated peat resources.
According to the interpreted World Soil Map (Van Engelen & Huting 2002) 1,653 km^2 of histosols exist in India and 80,329 km^2 of gley soils.

Mire and peatland losses

Ghosh (2000) reports that most wetlands in eastern India are under threat of transformation due to urbanization pressures. Mangroves are destructed on a continuous basis (Chatterji 2000). The peatland area south of Alleppey is used principally for rice production with careful water table management to prevent shrinkage and irreversible drying of the peat (Shrier 1985).

Still to be checked:
Jain, A., Rai, S.C. & Sharma, E. Terrestrialization of a peat lake in the Sikkim Himalaya. Unpublished paper submitted to the International Peat Journal 2001.
NEDECO. 1961. Report on the feasibility of diking and draining the peat exploitation areas in the Ganges Delta and some agricultural aspects of the scheme. Cited in Andriesse 1988
Sahni, B. 1927. A note on the floating islands and vegetation of Khajiar, near Chamba in the N.W. Himalayas. Journal of the Indian Botanical Society 6: 1-7.
Sukumar R., Ramesh R., Pant R.K. & Rajagopalan G. (1993). A C-13 record of late Quaternary climate change from peats in southern India. *Nature* v.364 p.703-705.
Sharma, C. & Chaunan, M.S. 1988. Studies in the Late/Quaternary vegettaional history in Himachal Pradesh – 4. Rewalsar Lake II. Pollen et Spores 30: 395-408.