



## New vegetation type map of India prepared using satellite remote sensing: Comparison with global vegetation maps and utilities



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## ABSTRACT

A seamless vegetation type map of India (scale 1: 50,000) prepared using medium-resolution IRS LISS-III images is presented. The map was created using an on-screen visual interpretation technique and has an accuracy of 90%, as assessed using 15,565 ground control points. India has hitherto been using potential vegetation/forest type map prepared by Champion and Seth in 1968. We characterized and mapped further the vegetation type distribution in the country in terms of occurrence and distribution, area occupancy, percentage of protected area (PA) covered by each vegetation type, range of elevation, mean annual temperature and precipitation over the past 100 years. A remote sensing-amenable hierarchical classification scheme that accommodates natural and semi-natural systems was conceptualized, and the natural vegetation was classified into forests, scrub/shrub lands and grasslands on the basis of extent of vegetation cover. We discuss the distribution and potential utility of the vegetation type map in a broad range of ecological, climatic and conservation applications from global, national and local perspectives. We used 15,565 ground control points to assess the accuracy of products available globally (*i.e.*, GlobCover, Holdridge's life zone map and potential natural vegetation (PNV) maps). Hence we recommend that the map prepared herein be used widely. This vegetation type map is the most comprehensive one developed for India so far. It was prepared using 23.5 m seasonal satellite remote sensing data, field samples and information relating to the biogeography, climate and soil. The digital map is now available through a web portal (<http://bis.iirs.gov.in>).

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## 1. Introduction

Vegetation, 'the green blanket of the earth' is an attribute of the land. It is classified into natural, semi-natural and cultural categories, depending on the degree of human influence. The vegetation is the main component of an ecosystem. It displays the effects of environmental conditions in an obvious and easily measurable manner. Information on the vegetation type is a key input in characterizing landscape structurally and functionally. Classifying and mapping vegetation types is important for managing natural resources as the vegetation affects all living beings and influences the global climate and terrestrial carbon cycle significantly (Sala et al., 2000; Xiao et al., 2004). Vegetation type mapping also provides valuable information for understanding the distribution of natural and man-made systems by quantifying the vegetation cover from local to global scales at a given point of time continuously. Information on the distribution of vegetation types is a key input in planning at the national level for food security, wildlife habitats, sustainable natural resource management, agroforestry and biodiversity conservation in hotspot areas (Myers et al., 2000; Roy et al., 2012). It is also useful in planning protected areas and developing forest corridors. And accurate assessment of the current status of

the vegetation cover is critical for initiating vegetation protection and restoration programs (Egbert et al., 2002; He et al., 2005). Forest vegetation is particularly sensitive to climate change because the long life-span of trees does not allow rapid adaptation.

The Himalayan orography has a profound impact on the precipitation pattern of India, including the monsoonal rainfall. Nearly 65% of the area of the country falls in the biotic region of tropical deciduous forests and tropical scrub. Tropical rain (evergreen/semi-evergreen) forests are confined to narrow strips in the Western Ghats, northeast India and the Andaman and Nicobar Islands. Sub-tropical, temperate and alpine forms of vegetation occur in the Himalaya by virtue of their being the altitudinal mirror of latitude. Southwest and northeast India, with heavy annual precipitation, provide favorable conditions for evergreen and moist deciduous forests, whereas the western and northwestern regions, with low annual precipitation, support desert (Thar) and semi-arid ecosystems. The climatic classification developed by Thornthwaite (1948) made use of the average monthly temperature and precipitation to classify vegetation. Champion and Seth (1968) attempted a forest type classification of India based on broad climatic, physiographic, edaphic and local conditions, with five major types, 16 type groups, 46 sub-types and 221 ecologically stable formations in different

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