8. Digital Soil Mapping

Aim

1. Digital mapping of soil properties: soil depth, soil texture, pH, EC, organic carbon, field capacity, saturation, and permanent wilting point.
2. Spatial modeling of hydraulic properties using DSM info and pedometric equations.
3. Validation of Pedometric equations for soil hydraulic properties like field capacity, permanent wilting point, and saturation.
4. Validation and uncertainty analysis of the modeled outputs.

Scope

The soil maps produced by conventional soil survey and mapping techniques often represent the spatial variability in soil properties through large homogeneous polygons with a single set of attribute data. However, the different soil properties vary differently within this single large unit. Updating these maps regularly, especially for fast-changing soil properties, like soil organic carbon, soil nutrients, and hydraulic properties, is expensive and time-consuming. Thus digital soil mapping enables the establishment of mathematical relations with soil properties as a function of environmental and topographic properties.

The significant efforts in digital soil mapping are for spatial prediction of soil carbon because of its importance in monitoring land degradation and global warming. Sreenivas et al. (2016) have demonstrated the application of DSM for preparing soil organic and inorganic carbon densities for India. Besides, the Soils & LRA division has a repository of soil analytical results of samples collected under various projects. Keeping the past effort in DSM and the availability of soil analytical data, the present work is to develop DSM models and prepare soil property-wise maps for essential soil properties.

Current constraints / Challenges

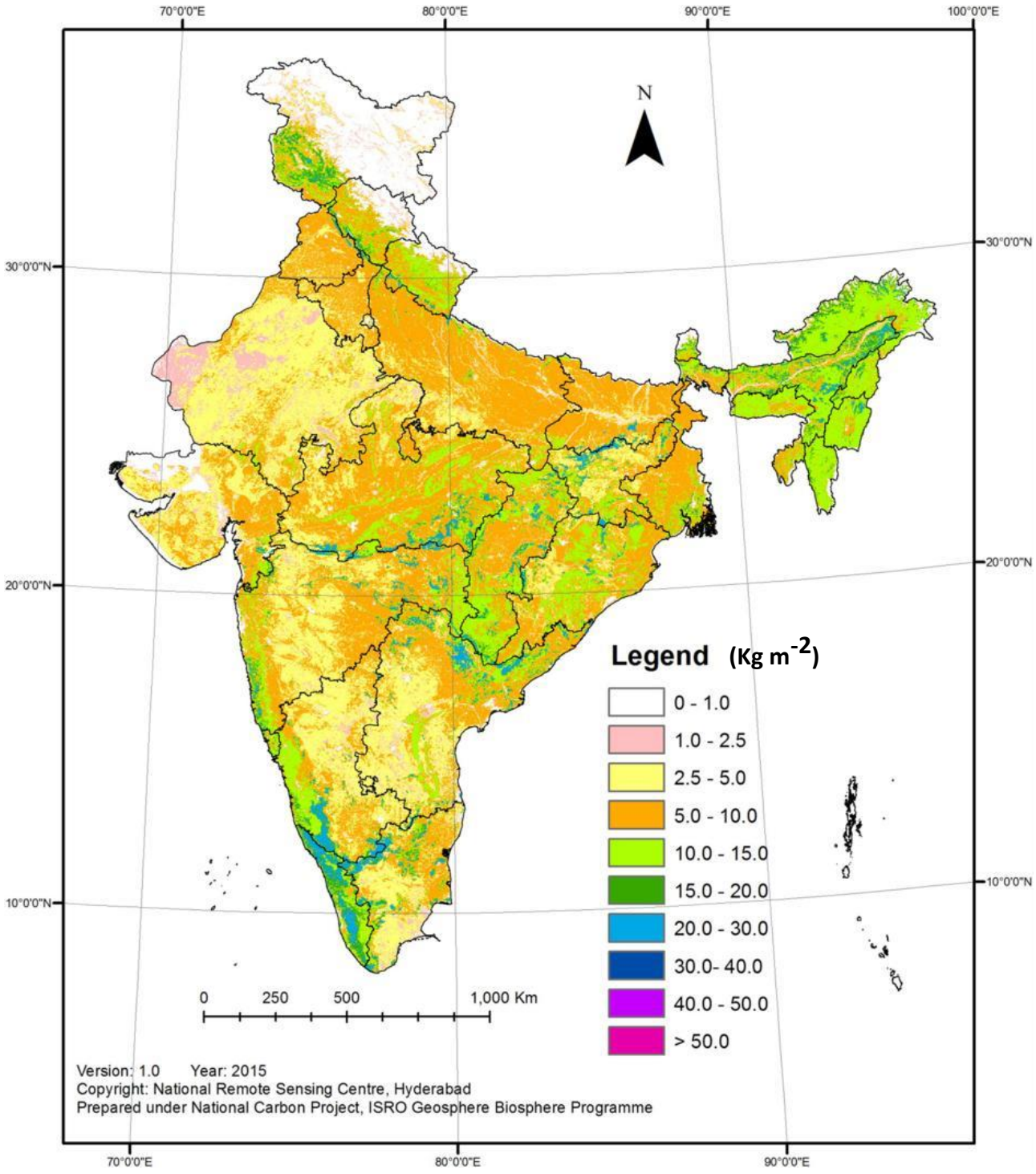
Detailed and accurate spatial soil information is required to address global and regional issues like food security, climate change, land degradation, biodiversity loss, water resource management, ecosystem health, etc. In recent years, significant progress has been made in different aspects of digital soil mapping. Although digital soil mapping is now progressing in many countries to meet various demands of soil information, challenges exist, especially for highly heterogeneous and human-affected environments. This demands the development of new theories and methodologies applicable to soil mapping.

Expected outcome

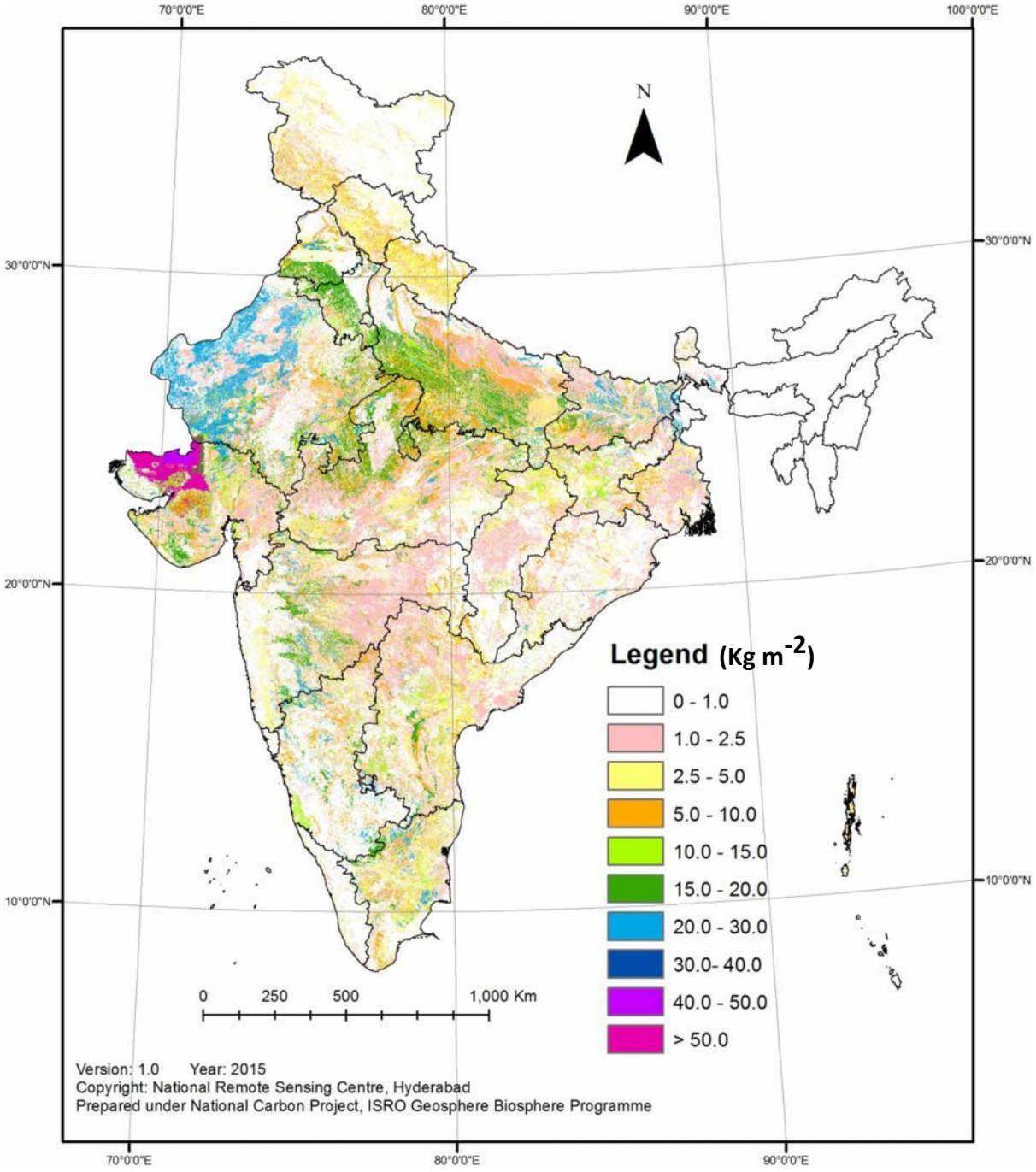
Digital raster outputs of various soil properties: soil depth, soil texture, pH, EC, organic carbon, field capacity, saturation, permanent wilting point, undisturbed bulk density at 30m spatial resolution

Time frame

a. Total Duration : 3 years
b. Start Date: 01.08.2021
c. End Date: 31.03.2024



Soil organic carbon density map of India



Soil inorganic carbon density map of India