

Soil Resources of India and Their Management

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PRESIDENT

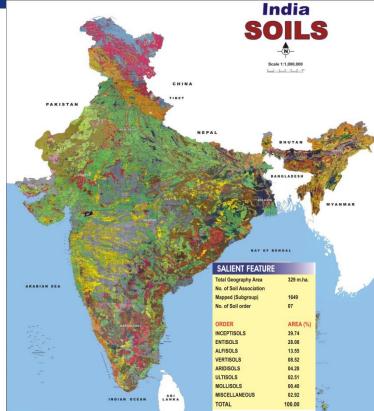
Indian Society of Soil Science, New Delhi

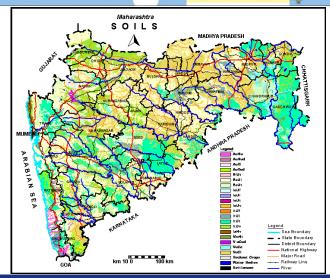
Outline

- Soil resource inventory
- Basic research in soil science
- Soil degradation and environmental security
- Soil quality and nutrient management
- Climate change and soil carbon sequestration
- Way Forward

Soil resource inventory

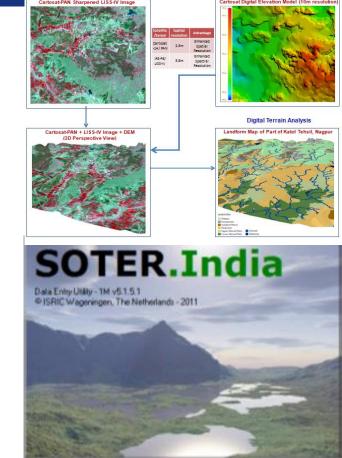
- □ Soil map of India at 1:1 m scale with:
- 7 soil orders
- 1649 mapping units
- □ Soil map of all 29 states at 1:250,000 scale (printed on 1:500,000)
- Soil information of about 20 million ha at 1:50,000 scale (71 districts)
- □ A flagship programme to generate land resource information at 1:10,000 scale initiated
- ☐ Georeferenced Soil Information System (GeoSIS, using 850 soil series information) for two important food growing areas of India (Indo-Gangetic Plains and Black Soil Region)

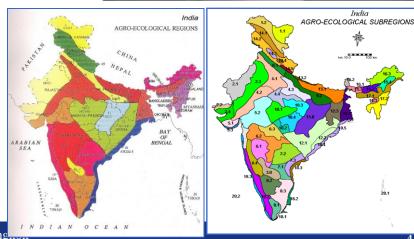




Soil resource inventory

- Application of geoinformatics in land resource characterization
- Soil spectral library developed for 128 dominant soil series representing different ecoregions
- Soil and Terrain (SOTER) datasets were finalized for 245 soil series in IGP and BSR with co-operation of ISRIC, The Netherlands
- Entire country has been delineated into 20 Agro-ecological Region (AER) and Agro-ecological subregions (AESRs) which has been refined and increased to 90 AESRs addition of some important soil parameters.





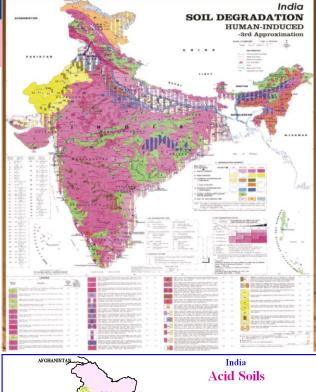
Basic research in soil science

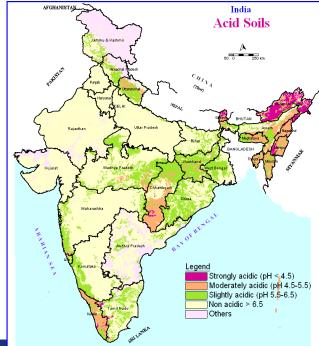
- Gibbsites were formed in an alkaline environment at an early stages of weathering.
- Micromorphological studies for pedofeatures and formation of pedogenic carbonates in the Vertisols of arid and semi-arid climates leading to subsoil sodicity.
- Mineralogical studies for different soil-size fractions.
- Research on identification of soil-modifiers like zeolites, gypsum minerals. Presence of zeolites protects the biodiversity of the Western Ghats and also persistence of Mollisols and Alfisols in Satpura and Western Ghats
- Quantification of biotite clay minerals and its role in the management of K-fertilizers
- Use of nanotechnology in soil and crop management, and enhancing input use efficiency

0.1 mm 3 0.0 kV 6.25 E2 17 09 / 02 NBSSDKP

Soil degradation and environmental security

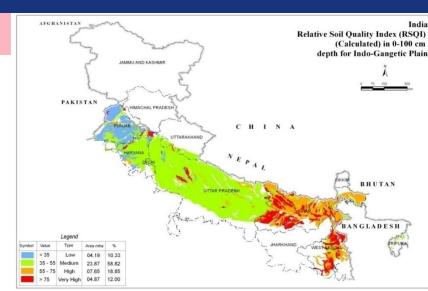
- □ About 120.7 mha is degraded
- ☐ Characterization and mapping of salt affected soils (6.73 mha)
- ☐ Characterization and mapping of acid soils (30.9 mha with pH <5.5)</p>
- Reclamation and Management of problem soils
- Bio-remediation/phytoremediation of contaminated soils

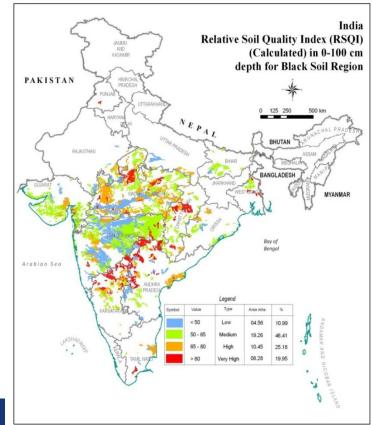




Soil quality and nutrient management

- □ Development of soil and land quality indices for major crops
- Integrated nutrient management and input use efficiency
- Characterization and prospecting of large soil biodiversity
- □ Conservation agriculture
- □ Precision agriculture
- Research on cropping sequence under different soil environmental conditions
- Land evaluation and agricultural land use planning
- □ Benchmark spots (hotspots) for monitoring soil and land quality





Climate change and soil carbon sequestration

- ☐ Estimation of soil carbon stock and carbon sequestration potential:
- SOC 63 Pg (1 Pg = 10¹⁵ g) in the first 150 cm depth of Indian soils

Based on soil carbon stock:

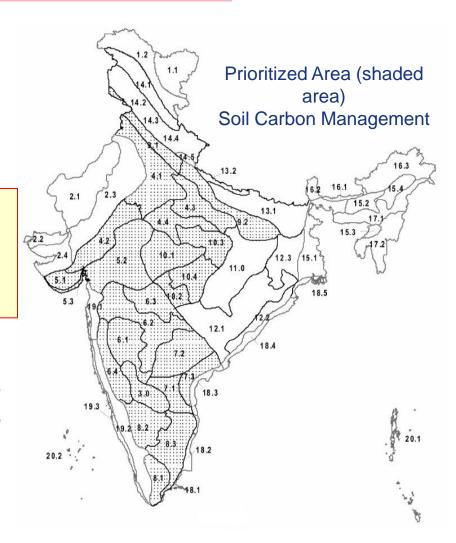
Prioritized area for C sequestration : 155.8 mha

Arid: 49.0 mha

Semi-arid: 116.4 mha

Sub-humid: 34.5 mha

- Modelling of soil organic carbon and emission of greenhouse gases under different climate change scenarios
- Mitigation and adaptation strategies for GHGs emission



Way Forward

Land resource inventory on 1:10,000 scale for the entire country in phases. Use of hyperspectral and LiDAR data for hastening land resource inventory Basic research to understand the cause-effect relationships of soil-crop dynamics Policy for agricultural land use planning Research on hydro-pedological and pedometrics Climate resilient/Climate smart agriculture Refinement of AESRs boundaries of the country **SOTER** database for the entire country

FAO Workshop Bangkok

Simulation modeling to understand soil

processes *vis-à-vis* climate change

physical

Thank You