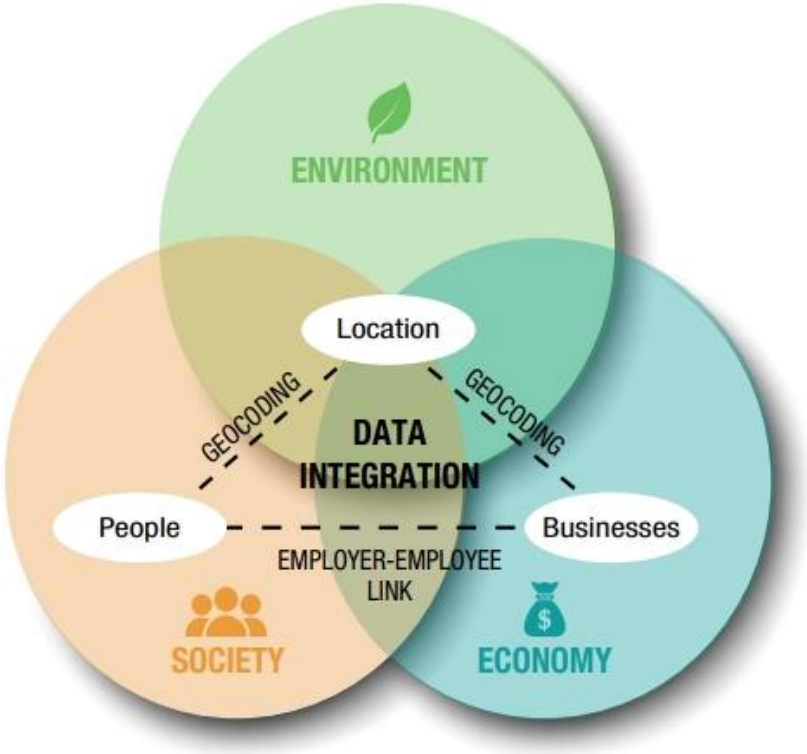
Geostatistical Integration in India.

National Statistics Office,

Ministry of Statistics and Programme Implementation,

Government of India

Integration of Statistics and Geospatial Data



- The integration of statistics and geospatial data
  - Refers to the practice of incorporating and consolidating both kinds of sources into a single dataset.
  - It has the potential to generate information far beyond the simple representation of data on a map.
  - The ultimate goal is to provide users with consistent access to and delivery of information across the geographical, social, economic and environmental spectrums.

GEOSPATIAL DATA

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STATISTICAL DATA

- Enumeration areas/census districts
- Statistical geographies
- Administrative geographies
- Addresses
- Buildings
- Cadastral parcels
- Road network data

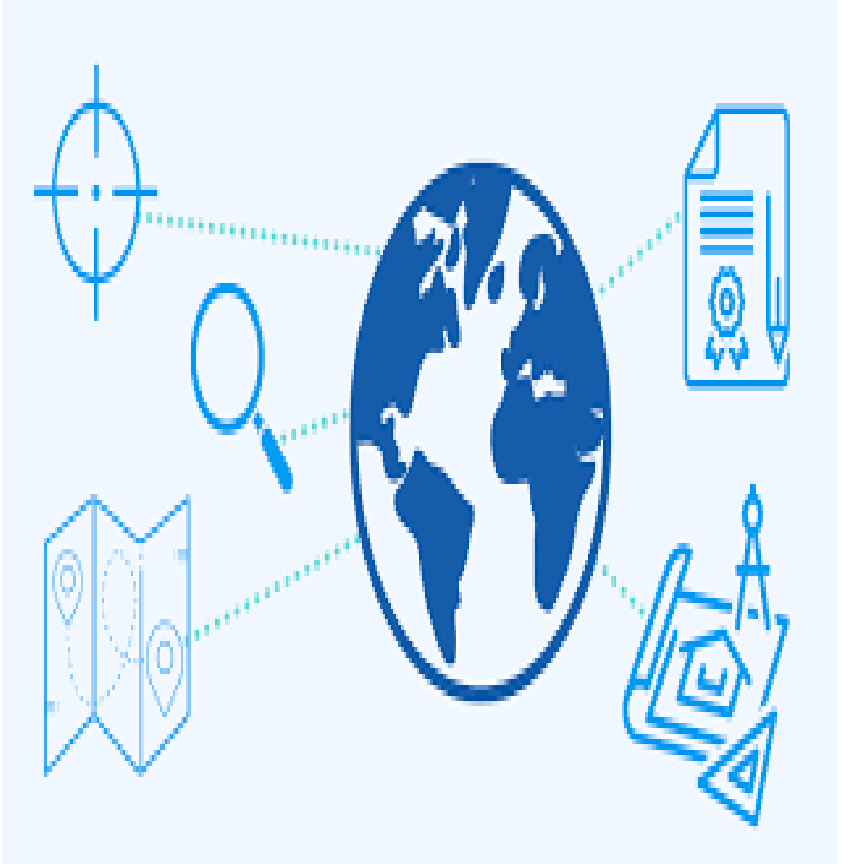
INTEGRATION

- Census data
- Household surveys
- Administrative records
- Civil registrations
- Other registers

Use of Integration of Statistics and Geospatial Data

The outcomes of the integration of digitalized statistics and geospatial data have benefits over traditional official Statistics and may be used for innovative purposes. For example

- Help in improving data quality and inter operability.
- Allowing spatial-temporal statistical analysis
- Enabling the visualization of non-geographical data in a spatial environment.
- To assist in evidence based policy making



Environmental Economic Accounting Using Geospatial Technologies

- Environment Economic Accounting are integrated statistics that highlight the relationship between environment and the economy.

- The System Environmental-Economic Accounting (SEEA) is the accepted international standard for environmental-economic accounting, providing a framework for organizing and presenting comparable statistics in an internationally agreed set of concepts, definitions, classifications, accounting rules and tables.

- NSO India began compiling environment accounts in 2018 as per the SEEA framework, supported by Inter-Ministerial Group representing various Ministries/ Departments.

Application of Geospatial Technologies

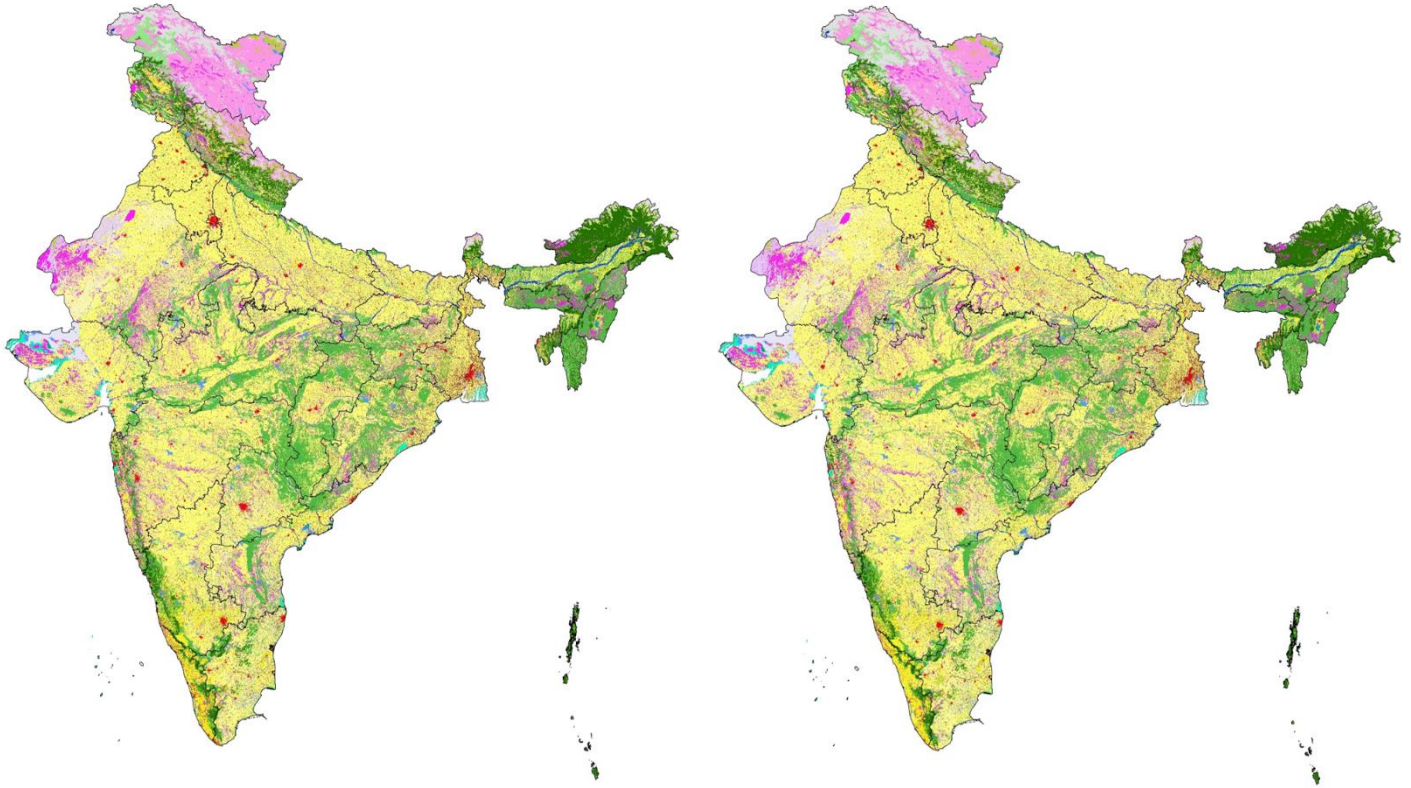
- The compilation of ecosystem accounts using the SEEA framework requires the availability of geospatial data that describes the distribution and condition of ecosystems as well as different ecosystem services.

- NSO India uses Geospatial data as input for compiling several environment accounts. For instance,
  - Compiling extent accounts and asset accounts for land and forest
  - Accounts for wasteland, degraded land, wetlands, biodiversity etc. have also been derived.
  - Several ecosystem services such as soil erosion prevention service uses geospatial layer.
  - Some of the SDG indicators are also being derived by using Geospatial data (e.g. forest cover)

Land Use and Land Cover Accounts:

- Land-use and land-cover (LULC) change is an important indicator for monitoring environmental changes and a vital input for informed decision making in the context of land management.
- Spatial LULC datasets by NRSC are used to compile Asset Accounts for Land Use.
- The asset accounts and change matrix show land cover gains and losses over time and can inform policy action on the main land use processes.

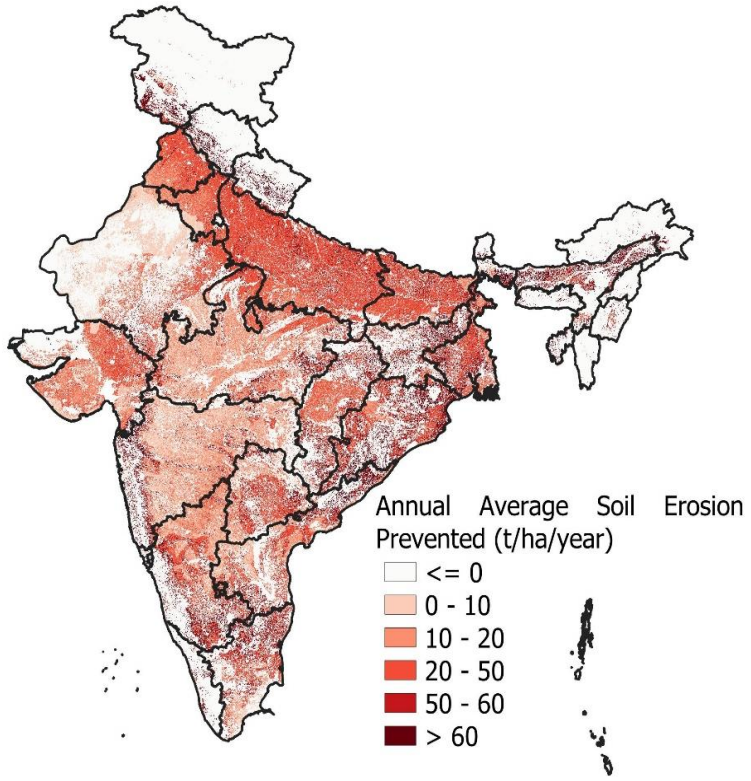
NRSC: Land Use/land Cover Maps (2011-12 and 2015-16)



Soil Erosion Estimates

- Owing to the impacts of soil erosion on decline in productivity of arable and nonarable lands, estimation of soil erosion is of utmost importance.
- NSO India has estimated soil loss prevention services provided by croplands for years 2005-06, 2010-12 and 2015-16.
- The map shows the spatial distribution of Soil Erosion prevention services by Croplands, which is the amount of soil loss that could be prevented when land cover is croplands instead of bare soil, in 2015-16.

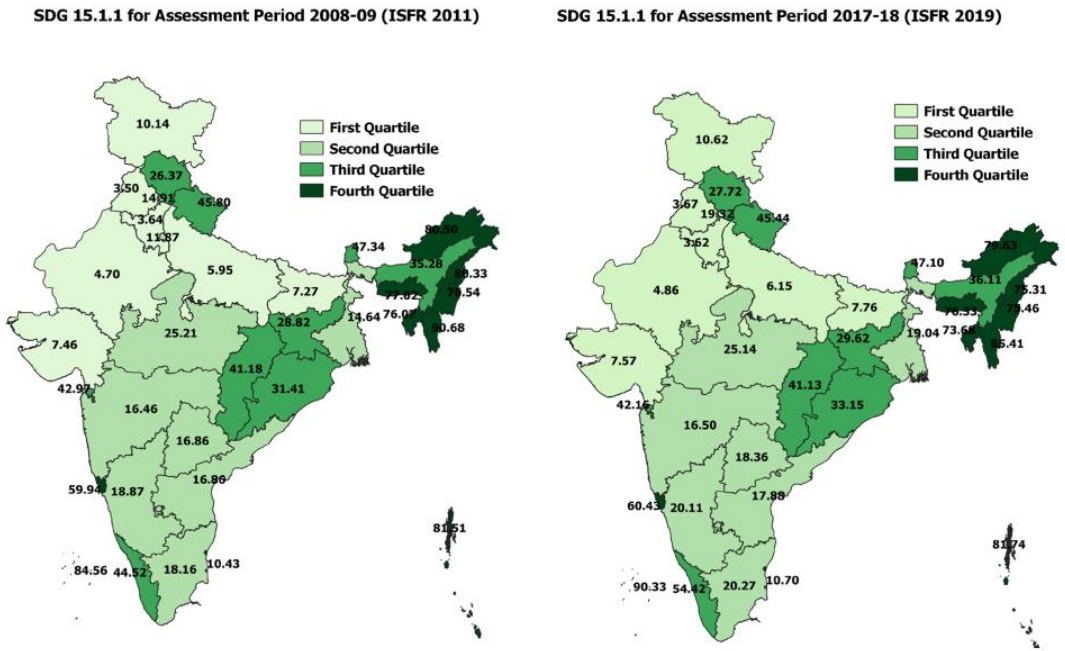
Soil Erosion Prevention Services-2015-16



Other Environment Accounts

- India State of Forest Report (ISFR) by the Forest Survey of India (FSI), is available with a periodicity of two years. Satellite images are used to get this information.
- Forest cover data are used for computing many SDG indicators. One such indicator is SDG indicator 15.1.1 which is Forest area as a proportion of total land area. The indicator is expressed as percentage and is calculated using the extent account for forests.
- The maps show the SDG indicator 15.1.1 for the states of India for years 2008-09 and 2017-18.

Extent Accounts using Geospatial Data



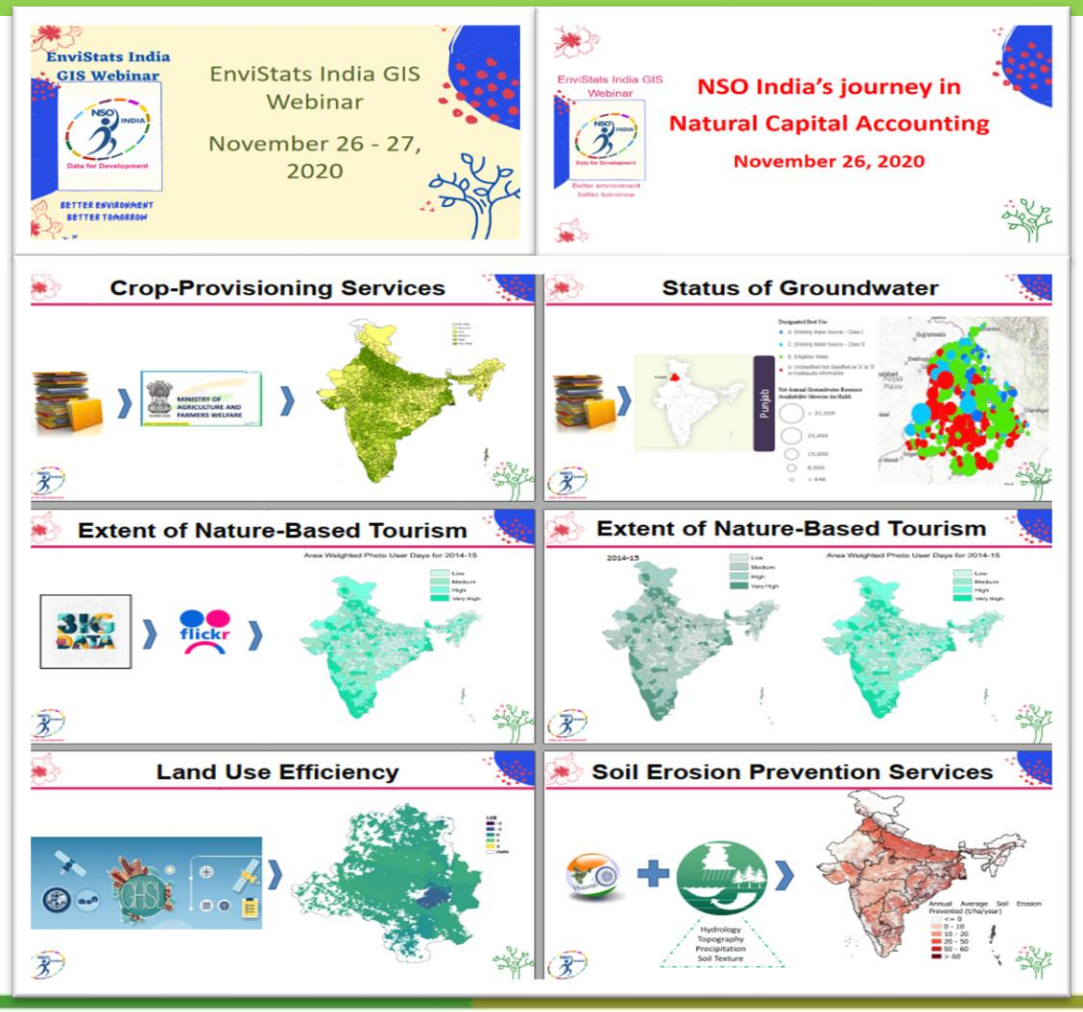
Source: MoSPI

EnviStats India GIS Webinar

- NSO, India conducted 2-days' virtual event 'EnviStats India GIS Webinar' on 26-27 November, 2020.

- The objective was to share the experiences of NSO, India in using GIS datasets for the compilation of environment accounts and to interact with users of 'EnviStats India'; an annual publication containing Environment Accounts.

EnviStats India GIS Webinar



Data integration in assessment of Forest and Tree Cover

- Forest Survey of India (FSI) under Ministry of Environment, Forests and Climate Change, Government of India assesses forest and tree cover of the country in biennial cycle.
- Forest and Tree Cover assessment involves integration of geospatial data and survey of data.
- This integration aims to improve the value of the statistical information that is being produced.
- Forest cover assessment includes
  - ➢ all areas more than 1 hectare in extent and having tree canopy density of 10% and more irrespective of land use, legal status and ownership, is done using satellite data

Data integration in assessment of Forest and Tree Cover

- **Forest Cover is assessed through nation-wide wall-to-wall forest cover mapping of satellite images (Census Operation)**
- Tree cover assessment includes
  - small patches of trees which are less than 1 ha in extent and which are not included in the forest cover due to technological limitations of spatial resolution of satellite data
- **Tree cover is assessed using a methodology based on stratified random sampling using high-resolution remote sensing data and field measurements on sample plots.**
- Information on **tree cover** along with **forest cover** gives a complete extent of tree resources of the country which is often termed as **'Forest & Tree Cover'**
- The extent of both provides a complete picture of forest and tree cover in the country.

Thank You