

BIHAR REMOTE SENSING APPLICATION CENTRE

**Council on Science & Technology
Department of Science & Technology
Govt. of Bihar, Patna-800001**



INTRODUCTION:

Under the aegis of National Natural resource Management System (NNRMS), Bihar Remote Sensing Applications Centre (BIRSAC) was established in 1985. It is located at IGSC-Planetarium building at Patna. It is under the administrative control of the department of Science & Technology, Govt. of Bihar. The activities of this centre are run by the rules and provisions of an autonomous society registered organization named as Bihar Council on Science and Technology (BCST).

OBJECTIVES:

- *To make inventory of natural resources of the state harnessing space science using remote sensing & GIS techniques.*
- *To avail spatial data for the development and planning of the state.*
- *To create databases at the level of State, Block, Village and ultimately parcel Level.*
- *To cater the need and requirement of spatial data for the disaster management.*
- *Above all human welfare is the prime objective using remote sensing and GIS techniques*

MISSION:

Mission of the organisation is to create natural & socio-economic database at village parcel level using Space Science for the development and planning purpose of the entire state of Bihar.

FUNCTIONS:

- **The prime function of the centre is the application of Remote Sensing and GIS in Land and Water Resources management, using space science for the development and Planning activities of the state.**
- *The centre assess the natural resources management and development needs of the state by considering an “integrated development plan” for the state on a regular (yearly, 5-yearly, long-terms) basis.*
- *It coordinates plans through supporting these development activities with informations on natural resources by RS data, along with map-based and tabular development data sets.*
- *It coordinates the establishment of GIS based spatial informatios, infrastructures for the state in tune with national efforts. To ensure availability of updated informations to Government, NGO and private sectors for development activities.*
- *To focus developmental programmes through Remote Sensing applications at the levels of districts, blocks and villages etc.*
- *To undertake training and awareness programmes / Workshops /Seminars for administrators, planners, decision makers for the state departments, academic professionals in the Universities, Colleges, NGO’s and people, on the capabilities and utilities of Remote Sensing and GIS techniques in general and Bihar Remote Sensing Centre in particular.*
- *To generate & update regularly the database of natural resources of the state using remote sensing and GIS – as a bench mark for change monitoring and further development.*

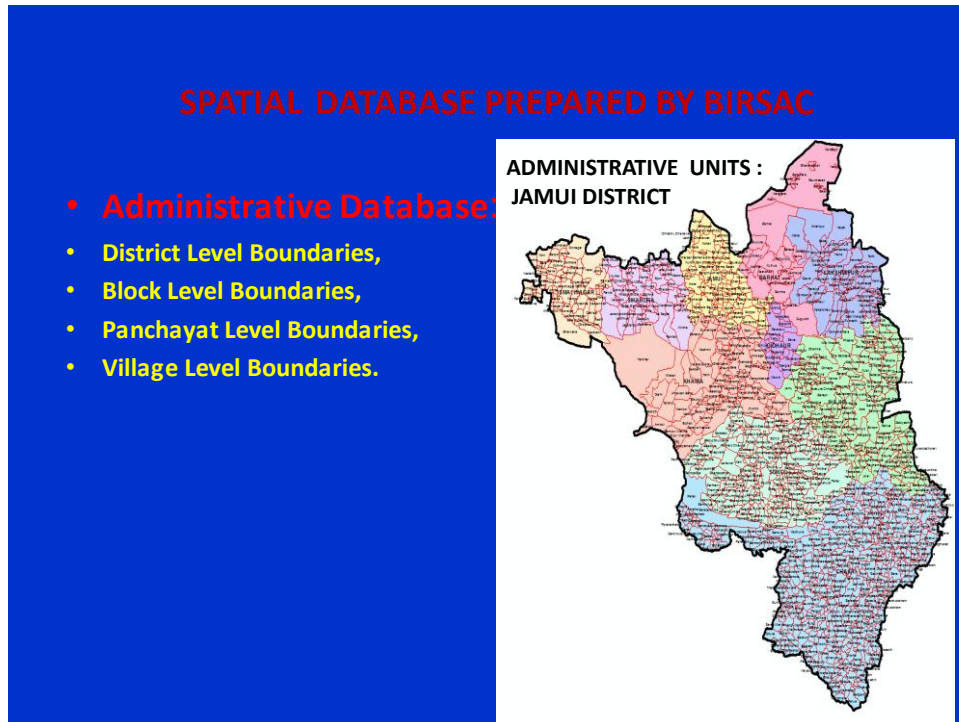
COMPLETED & ON GOING MAJOR PROJECTS

- ❖ *Use of Remote Sensing & GIS in Agricultural Application, sponsored by Dept. of Agriculture Govt. of Bihar.*
- ❖ *Remote Sensing & GIS Based Watershed Mapping of 38 Districts Of Bihar , sponsored by Soil Conservation Dept. Govt. of Bihar.*
- ❖ *SIS-DP (Space based information support for decentralized planning) Sponsored by NRSC,Hyderabad , ISRO , GOI*
- ❖ *CAPE /FASAL PROJECT Sponsored by MAHALANOBIS CROP FORECASTING CENTRE (MNCFC) Ministry of Agriculture, New Delhi*
- ❖ *Wasteland Mapping of Bihar, sponsored By Department of Industry Government of Bihar.*

- ❖ **CHAMAN PROJECT (Coordinated Horticulture Assessment and Management using Geoinformatics)** sponsored Space Application Center(SAC), ISRO, Ahmedabad , Government Of India.
- ❖ **SERICULTURE PROJECT: Identification of Potential areas for Mulberry Food plants , Non- Mulberry silkworm knowledge in three districts in Bihar, sponsored by NESAC (North East Space Application Centre),ISRO, Meghalaya.**
- ❖ **Administrative units has been prepared up to village level for all the districts of the state sponsored by Rural Development Dept. Government of Bihar.**
- ❖ **River Course change detection of Ganga river around Sultanganj (Bhagalpur District)and Aghawara ghat to construct bridge over Ganga sponsored by BIHAR RAJYA PUL NIRMAN NIGAM.**
- ❖ **PMKSY (Prime Minister Krishi Sinchai Yojna) Project, sponsored by the dept. of Agriculture,Govt. of Bihar.**
- ❖ **Land use/ cover mapping:_sponsored by National Remote Sensing Centre (NRSC), ISRO, Hyderabad.**
- ❖ **Land Degradation mapping: sponsored by National Remote Sensing Centre (NRSC), ISRO, Hyderabad.**
- ❖ **Wasteland mapping: sponsored by National Remote Sensing Centre (NRSC), ISRO, Hyderabad.**
- ❖ **Empowering Panchayat Raj Institution Spatiality (EPRIS) , NRSC, Hyderabad, ISRO, Government Of India .**
- ❖ **SIS-DP Update (ii Phase) (Space based information support for decentralized planning) Sponsored by NRSC,Hyderabad , ISRO , GOI**

DATABASE PREPARED FOR PLANNING AND DEVELOPMENT OF THE STATE

(A). Administrative Database:



1. District Boundary

2. Block Boundary

3. Panchayat Boundary

4. Village Boundary

(B) THEMATIC DATABASE:

5. LANDUSE / COVER :

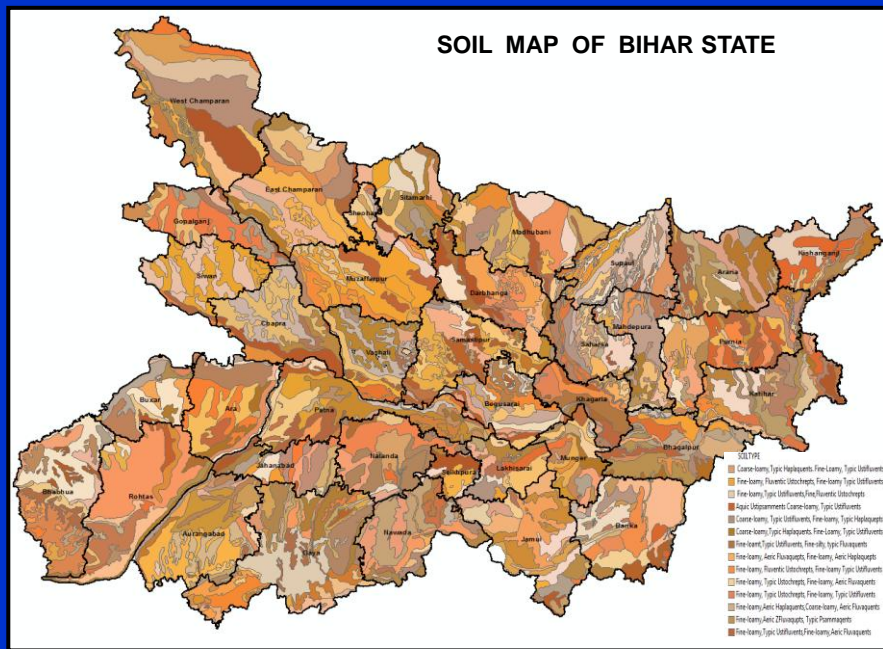
6. SOIL LAYER

7. LAND CHARACTERISTICS: SLOPE

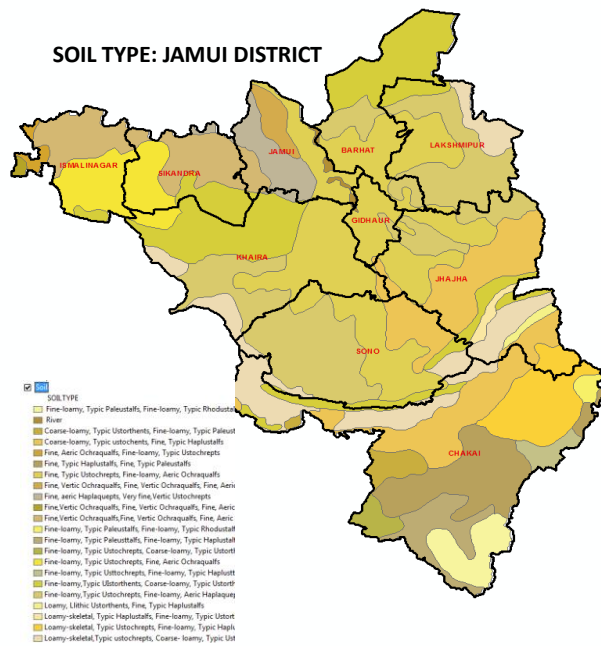
- **Thematic Layers:**
- **Land use / cover database:**
 - A: Scale: 1:50,000,
 - B: Scale: 1: 10,000.
- **Soil Layer :**
 - A: Types & Properties:
- **Land Characteristics: Slope**
 - A: Scale 10 Metre. Grids
 - B: Scale 90 metre Grids

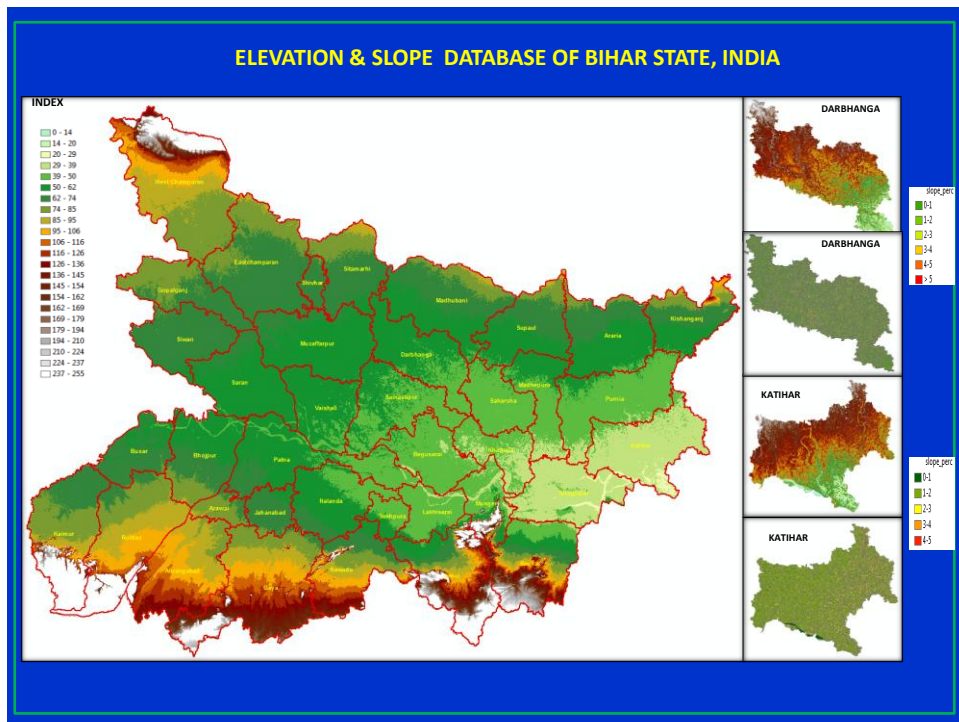
LAND USE / COVER SPATIAL DATABASE STATE TO BLOCKS & PANCHAYATS

Soil Type & Characteristics



SOIL TYPE: JAMUI DISTRICT





DATABASE PREPARED.....cont.

• **Water Resource Database:**

A: Drainage,

Scale 1: 10,000

B: Canals,

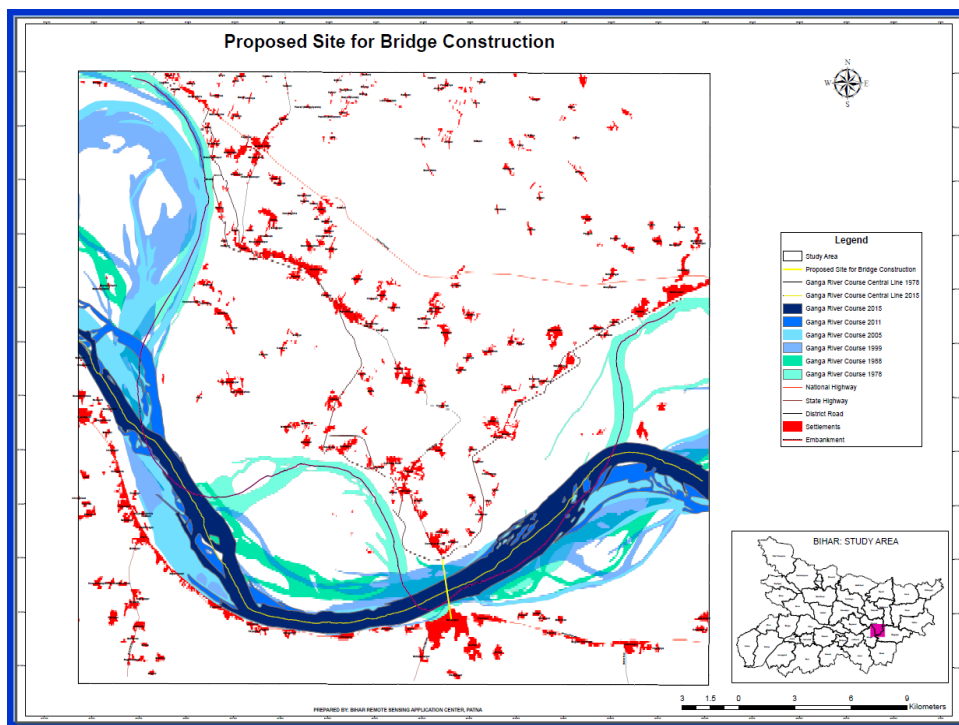
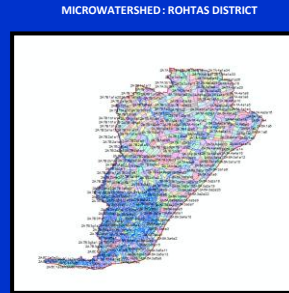
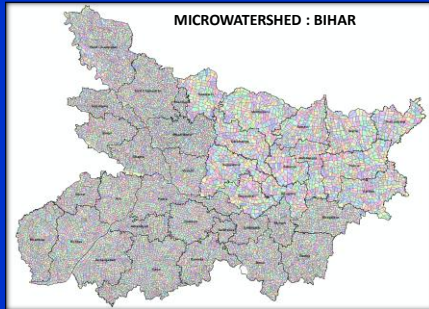
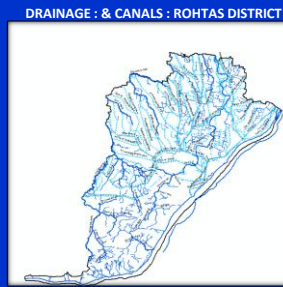
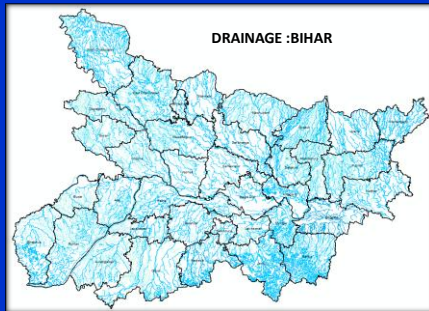
Scale 1: 10,000

C: Ponds,

Scale 1: 10,000

D: Watersheds up to micro-level.

WATER RESOURCES INVENTORY & DECISION SUPPORT: BIHAR



DATABASE PREPARED.....cont.

- **Human Habitation or Settlements**

Scale 1:10,000

- **Orchards**

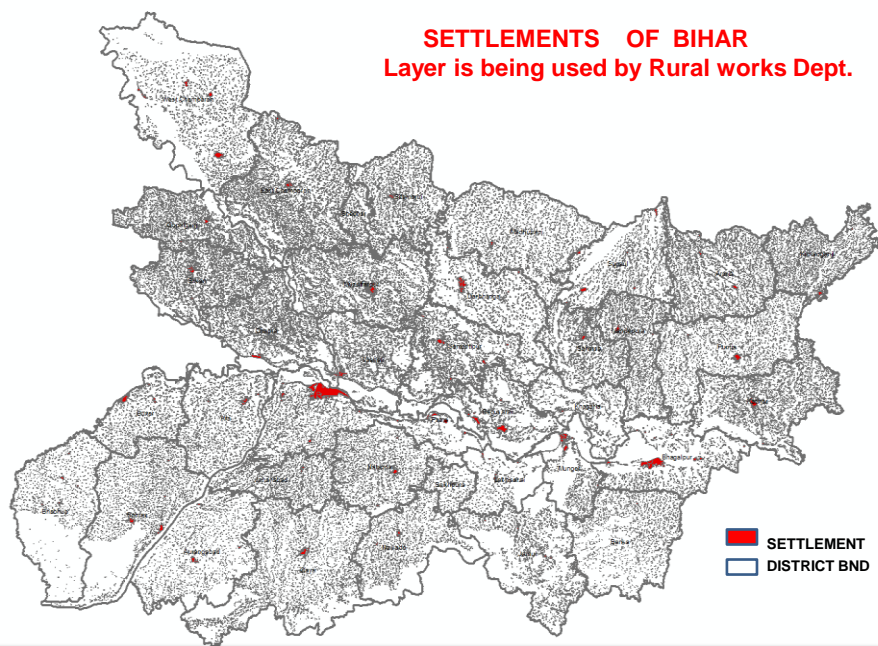
Scale 1:10,000

- **Transport Networks**

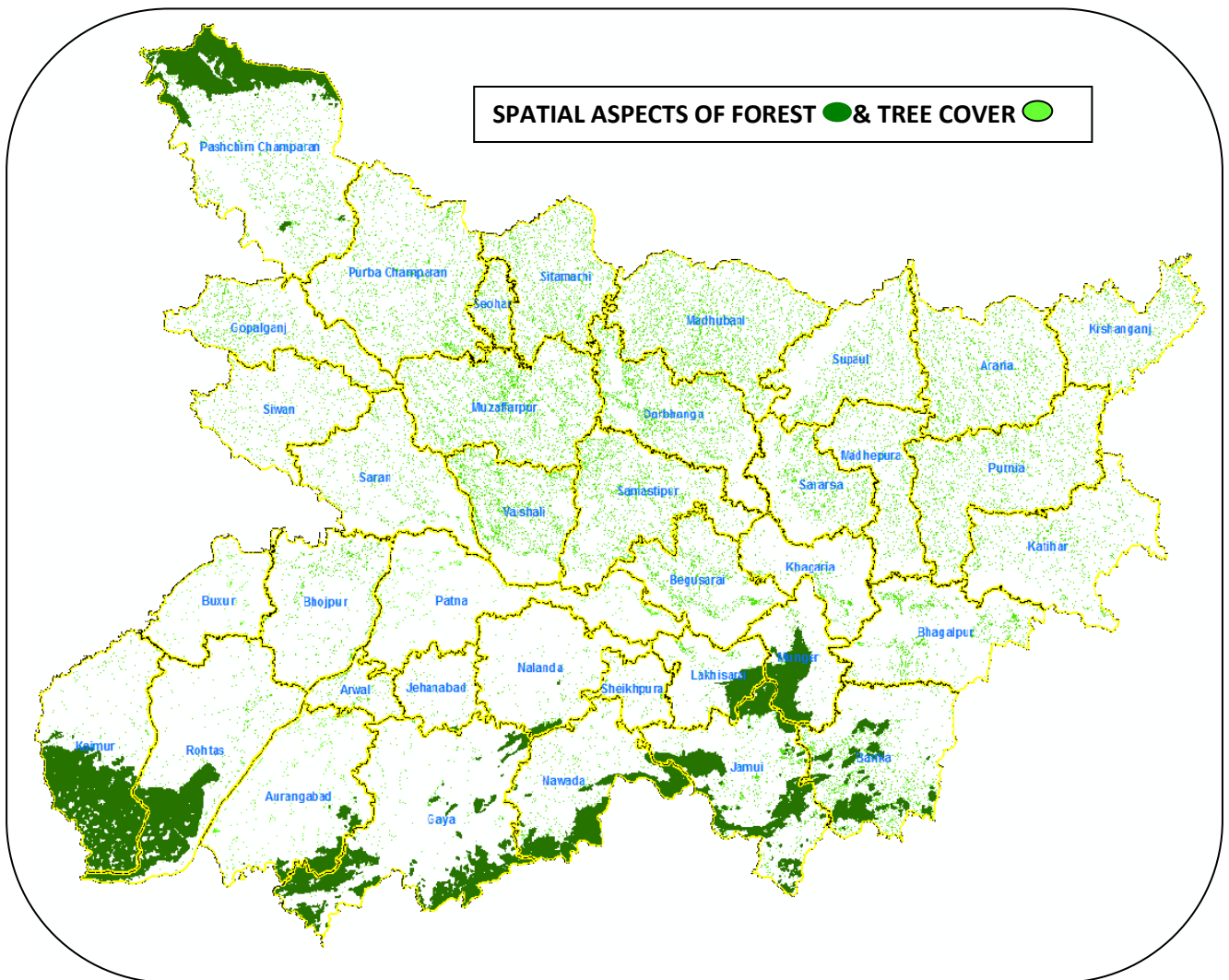
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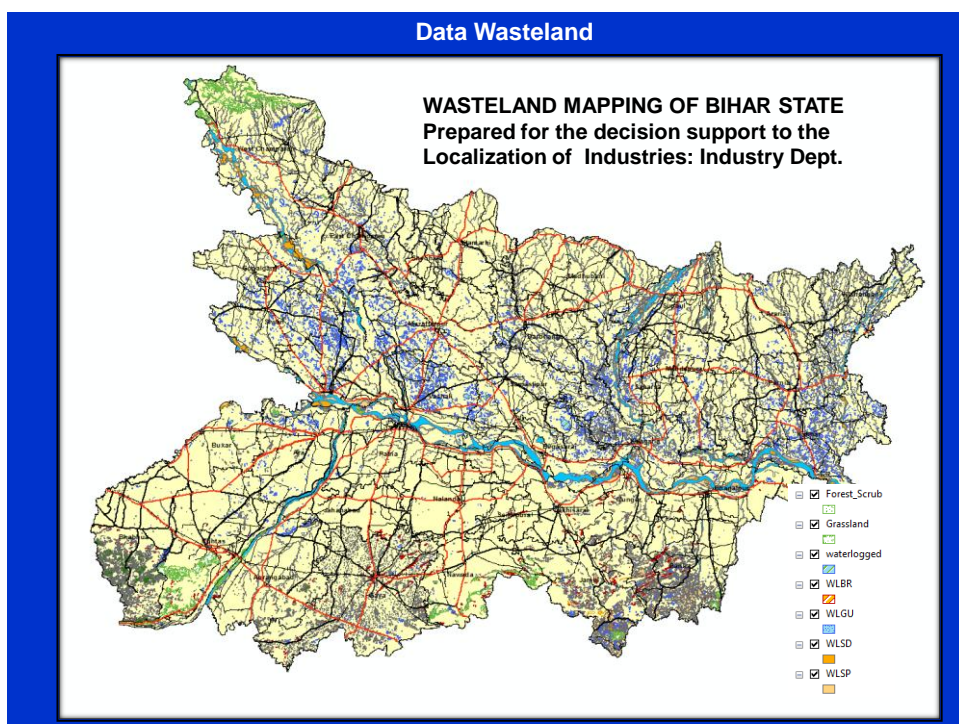
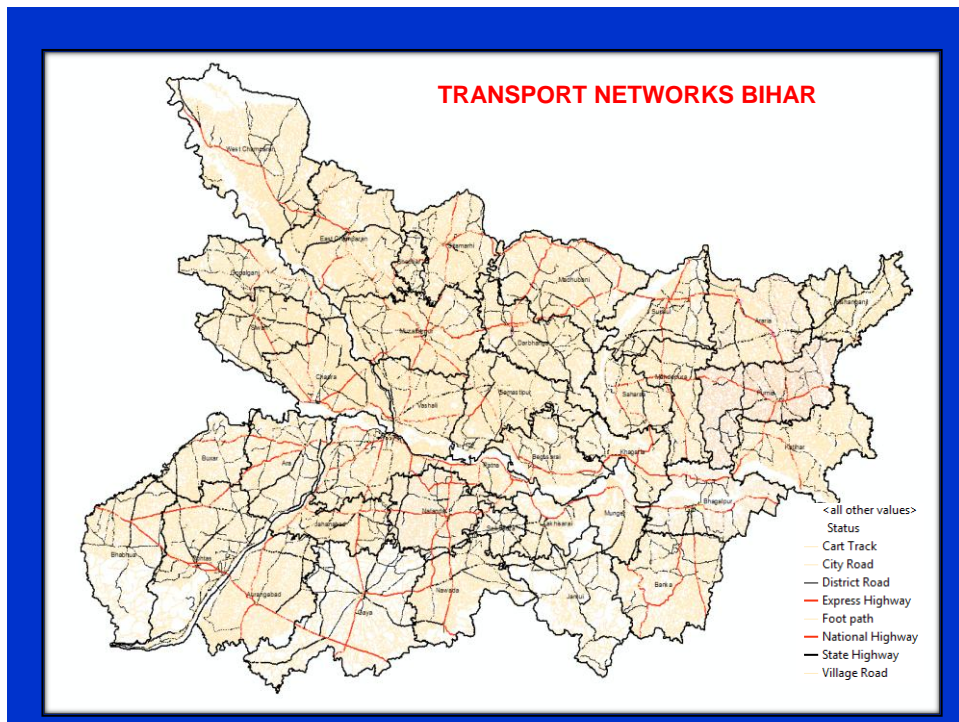
Spatial Aspects of Human Habitation in Bihar

SETTLEMENTS OF BIHAR
Layer is being used by Rural works Dept.



Bihar State Forest Resources





BIRSAC PROJECT STATUS

S.N	PROJECTS & SPONSORING ORGANIZATION
1.	CAPE/FASAL MNCFC, New Delhi
2.	Use of Remote Sensing &GIS in Agriculture Department Of Agriculture, GOB
3.	CHAMAN PROJECT Space Application Center,
4.	Empowering Panchayati Raj Institution Spatiality (EPRIS) NRSC, Hyderabad, DOS,
5.	DGPS mapping of Gaya & Koderma districts for Rail corridor creation, Indian Railways
6.	Tree cover & Forest mapping of all 38 districts of Bihar. CM Sposored Project Dept. of Sc& Tech GOB
7.	Sericulture (Phase II) NESAC, Meghalaya
8.	IWMP Monitoring & Evaluation NRSC, Hyderabad
9.	Generation of digital Soil Fertility /Nutrients Maps using Soil health card
10.	GIS MAPPING OF RIVER COURSES / SAND DEPOSITS AND MINING AREAS FOR BIHAR STATE Dept. of Mines & Geology, GOL.
11.	The inventory of Waterbodies for the entire state of Bihar. Dept. of Fisheries, GOB
12.	Minor Mineral Surveillance System
13.	SIS-DP UPDATE NRSC-ISRO-HYDERABAD
14.	MINING SURVEILLANCE

Following studies can be done in different sectors, using Remote Sensing and GIS by the Bihar Remote Sensing Application Centre, Taramandal Complex, Patna.

AGRICULTURE

Ongoing Projects:

- *Major crop (Rice, wheat, jute and potato) inventory mapping and forecasting*
- *Land use mapping (1:10000 & 1: 50,000)*
- *Crop status monitoring*
- *Orchard mapping of major fruit producing districts (Vaishali, Muzaffarpur, Darbhanga, Madhubani etc.)*
- *Watershed (IWMP) Project of all the districts of Bihar based on remote sensing and GIS*
- *Dhaicha (Sesbania) inventory of all districts of Bihar.*
- *Sericulture potential analysis and mapping of three districts i.e,Bhagalpur,Munger and Gaya.*

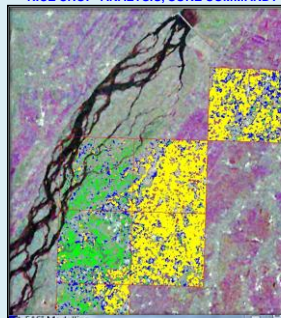
Following are possible illustrative applications in Agriculture.

- *Crop Acreage Estimation & Forecasting of Important crops e.g. Maize, Pulses, Sugarcane etc.*
- *Land suitability for various crops*
- *Use of fertilizer assessment*
- *Crop damage estimation*
- *Crop intensity monitoring and mapping*
- *GIS Mapping and acreage estimation of Orchards e.g.Mango, Lichi, Banana, Makhana etc.*
- *GIS mapping of agricultural lands showing single, double cropped areas.*
- *Potential zones for agro-Plantations.*
- *Sericulture potential analysis and mapping.*

SEGMENT APPROACH, WEST CHAMPARAN



RICE CROP ANALYSIS, SONE COMMAND.



District	yield model equation	Yield/Q/Ha.	RMSE
Rohtas	$Y = -83.938 + 0.1658(\text{FB1RH}) - 0.488^*(\text{JA1RH}) + 0.238^*(\text{NV2RF}) + 0.674^*(\text{YR})$	26.38	1.8

2008:
Jul 13, Aug 06, Aug 30

SOIL

Completed Project

Digital database of soil types, properties and texture for the entire state.

Following are illustrative possible applications regarding soil.

- *Soil suitability analysis for various crops.*
- *Mapping and identification of soil erosion, fluvial erosion, sheet, gully, ravines etc; its extent and intensity of various erosion classes.*
- *Land degradation : wasteland extent, type, reclamation*
- *Water logging : extent, permanent water logging & seasonal water-logging , its extent and reclamation.*
- *Salinity: Identification and extent mapping.*

WATER RESOURCES

Completed Project

- *River course mapping of Mahananda River, Chandan and Gerua River
(Sponsored by : Irrigation Department, Govt. of Bihar)*

Ongoing Projects:

- *Change detection mapping of the river course of Ganges River (Aguari - Sultanganj)
for construction of Bridge.*

(Sponsored by : Bihar Pul Nirman Nigam)

Following are illustrative possible applications for Irrigation Department

- *Identification of traditional waterbodies of the entire state*
- *River Course detection and mapping*
- *Identification of potential ground Water zones*
- *River network analysis for entire state*

- *Digital database creation of Lakes, Ponds, Reservoirs, oxbow lakes, Chaurs (Permanent / temporary waterlogged areas), sedimentation studies.*
- *GIS mapping of Command areas for irrigation purposes.*
- *Identification of canals and location of sluice gates*
- *Location and Identification of embankments*

URBAN DEVELOPMENT

Completed Projects:

- *GIS mapping of Patna Municipal area in the year of 2000 using satellite data.*

Following are illustrative possible applications for Urban Development Department

- *Urban Zonation, classification of sectors, infrastructure mapping*
- *Urban Growth rate detection, urban sprawl, urban land use.*
- *Transport network in urban area and other urban infrastructure facilities.*
- *GIS Maps of schools, colleges, Universities and other educational facilities in urban areas.*
- *GIS Maps of Hospitals, Private as well as govt., health centers, emergency hospitals and nursing homes, blood banks, medical colleges in towns and urban areas of the state.*
- *Digital database of residential areas, Apartments, Government colonies, Commercial areas, Markets, Shopping centers, Malls etc*
- *Location and Identification of centers for entertainment as Cinema halls, Multiplex, Museums, etc.*
- *GIS Mapping of urban drainage system.*
- *Digital database creation and updation of all towns and cities of Bihar.*
- *Urban quality, slum (growth & extent) & mapping of urban heat island extent & its impact.*
- *Traffic : load, peak hours, traffic congested areas, problem & solution through GIS.*
- *Parking Area : Site selection, planning viability limit, GIS & mapping.*
- *Gas Pipeline: Suitable route planning, monitoring in urban areas*

FOREST & ENVIRONMENT

Following are illustrative possible applications for Forest & Environment Department

- *Digital Mapping of forests in the state: extent, type, density, etc.*
- *Change Detection analysis of forest area of the state.*
- *Identification of forest plantation , plant diversity.*
- *Identification of forest degradation in the area : Deforestation (extent)*
- *Biomass estimation*
- *Eco sensitive zonation.*

LAND REVENUE

Following are illustrative possible applications for Land Revenue Department

- *Topographic & Cadastral surveying and mapping*
- *Integrated Land Information system development*
- *Preparation of plot wise land utilization, land capabilities and land cover data.*
- *Availability of real-time land information for a price to the user agencies/stakeholders.*
- *Single and multiple point accessibility of digital land information for unfettered access.*
- *Integration of the process of registration with the process of mutation for automatic updation of digital land information*

RURAL DEVELOPMENT

Following are illustrative possible applications for Rural Development Department

- *Rural infrastructure mapping*
- *Delineation of rural growth centers & their planning.*
- *Spatial allocation of rural industries mapping.*
- *Rural sanitation mapping.*
- *Rural-urban (rurban) or mixture of urban-rural land use mapping & their impact studies.*
- *Location, planning, evaluation and inventory of different flagship programmes i.e MNREGA, NRHM, JNNURM etc.*

HUMAN RESOURCE

Following are illustrative possible applications for Human Resource Department

- *Digital database creation of School, college and technical institution.*
- *Mapping of population characteristics (human migration, unemployment, literacy / illiteracy etc.) at micro level*
- *Population and resources study & mapping*
- *Mapping and identification on disease extent (e.g., vector borne disease), concentration, and probable affected areas.*

ENERGY DEVELOPMENT

Following are illustrative possible applications for Energy Development Department

- *Power plant location, service area, area of influence & viability mapping*
- *Energy distribution network system development & mapping*
- *Suitable site selection of power plants*

- *Energy production, distribution & consumption patterns.*

Home

Following are illustrative possible applications for Home Department

- *Bihar police information system (BPIS) development & mapping.*
- *GIS Maps of all the police stations & police zones for all districts*
- *Crime prone areas, crime Zonation, crime mitigation, information system (GIS) and mapping.*

DISASTER MANAGEMENT

Following are illustrative possible applications for Disaster Management Department

Floods:

- *Identification & Mapping of Flood affected areas.*
- *Real time flood maps.*
- *Flood forecasting & warning system development.*
- *Damage assessment of crops, houses & natural resources.*
- *Flood management: Pre flood, near real time flood data, flood information, post flood management.*

Drought :

- *Assessment of Drought*
- *Drought damage assessment .*
- *Mapping and identification of drought affected areas.*

Cyclones :

- *Cyclone damage assessment mapping & GIS.*

Earthquake :

- *Damage assessment*

TOURISM

Following are illustrative possible applications for Tourism Department

- *Digital database creation and mapping of tourist places in Bihar.*
- *Transport Network : Road, Rail & airways connectivity of tourist places.*
- *Decision support system for development of tourist sites*
- *Tourist information system development*

HEALTH

Following are illustrative possible applications for Health Department

- *Spatial location-allocation analysis of medical centers like hospitals, dispensary, PHC, WWC, Anganbari centers, blood bank with facilities available at the centers.*
- *Hospitals and nursing centers GIS for urban areas.*
- *Identification of endemic and non-endemic area and their association with the environmental factors*
- *Hospital service zone mapping .*

INDUSTRY

Following are illustrative possible applications for Industry Department

- *Industrial Information & decision support system*
- *Spatial location of all types of industries (heavy, medium, small scale industries) and its attributes mapping*
- *Industrial centers and their service area mapping*
- *Site selection for a particular industry/industries & their resource base mapping*

ROAD CONSTRUCTION

Following are illustrative possible applications for Road Construction Department

- *Digital database of road network*
- *Road monitoring system*
- *Road condition assessment using mobile apps*
- *Decision support system for transport network creation & management*

BIHAR RAJYA PUL NIRMAN NIGAM

Ongoing Project:

- *Change detection mapping of the river course of Ganges River (Aguari - Sultanganj) for construction of Bridge.*

Following are illustrative possible applications for Bihar Rajya Pul Nirman Nigam

- *Identification and mapping of bridges, culverts, etc.*
- *Site suitability analysis for construction of bridges.*
- *Decision support system for integrating remote sensing in bridge condition assessment*
- *Evaluation of sites for a river bridge*

SUGARCANE

Following are illustrative possible applications for Sugarcane Department

- *Crop inventory and monitoring*
- *Land suitability evaluation and mapping*
- *Change detection mapping and analysis*

- *Sugarcane estimation and production assessment*
- *Decision support system for the localization of Sugar Industry.*

MINING

Following are illustrative possible applications for Mining Department

- *Site suitability analysis for sand mining*
- *Application of Remotely Sensed Data and GIS in assessing impact of mining activities on the environment*
- *Remote sensing and GIS application in management of mining land and proximate habitat*
- *Detecting and mapping land surface areas covered by stones, bricks.*
- *Mining Suveillance*

SCIENCE & TECHNOLOGY

Following are illustrative possible applications for Science & Technology Department

- *Spatial analysis of technical institution (Government / private) i.e. Engineering & Polytechnique institutions*
- *Spatial management and planning of technical institution*

LABOUR MANAGEMENT

Following are illustrative possible applications for Labour Management Department

- *Labour migration study based on GIS analysis*
- *ITI localization and spatial analysis*
- *Labour concentration analysis and mapping*

ANIMAL & FISHERIES DEVELOPMENT

Following are illustrative possible applications for Animal & Fisheries Development

Department

- *Potential Zone mapping of fisheries*
- *Inventory and mapping of lakes, Ponds and resevoirs.*
- *GIS mapping of live Stock, poultry farming etc.*

POTENTIAL USER ORGANIZATIONS:

-  *Department of Agriculture , Government of Bihar*
-  *Soil conservation, Department of Agriculture Government of Bihar*
-  *Water Resources department , Government of Bihar*
-  *Rural Development department, Government of Bihar*
-  *Land Revenue Department, Government of Bihar*
-  *Urban Development Department , Government of Bihar*
-  *Industry Development Department , Government of Bihar*
-  *Bihar Rajya Pul Nirman Nigam Ltd.(BRJPN)*
-  *Disaster Management Department, Government of Bihar*
-  *National Remote Sensing Centre,(NRSC, Hyderabad) , ISRO, Government of India*
-  *Space Application Centre,(SAC, Ahmedabad) Department of Space, Government of India*
-  *MAHALANOBIS CROP FORECASTING CENTRE (MNCFC) Ministry of Agriculture, New Delhi*
-  *North East Space Application Centre (NESAC, Meghalaya), ISRO, Government of India*
-  *Indian Railways*

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