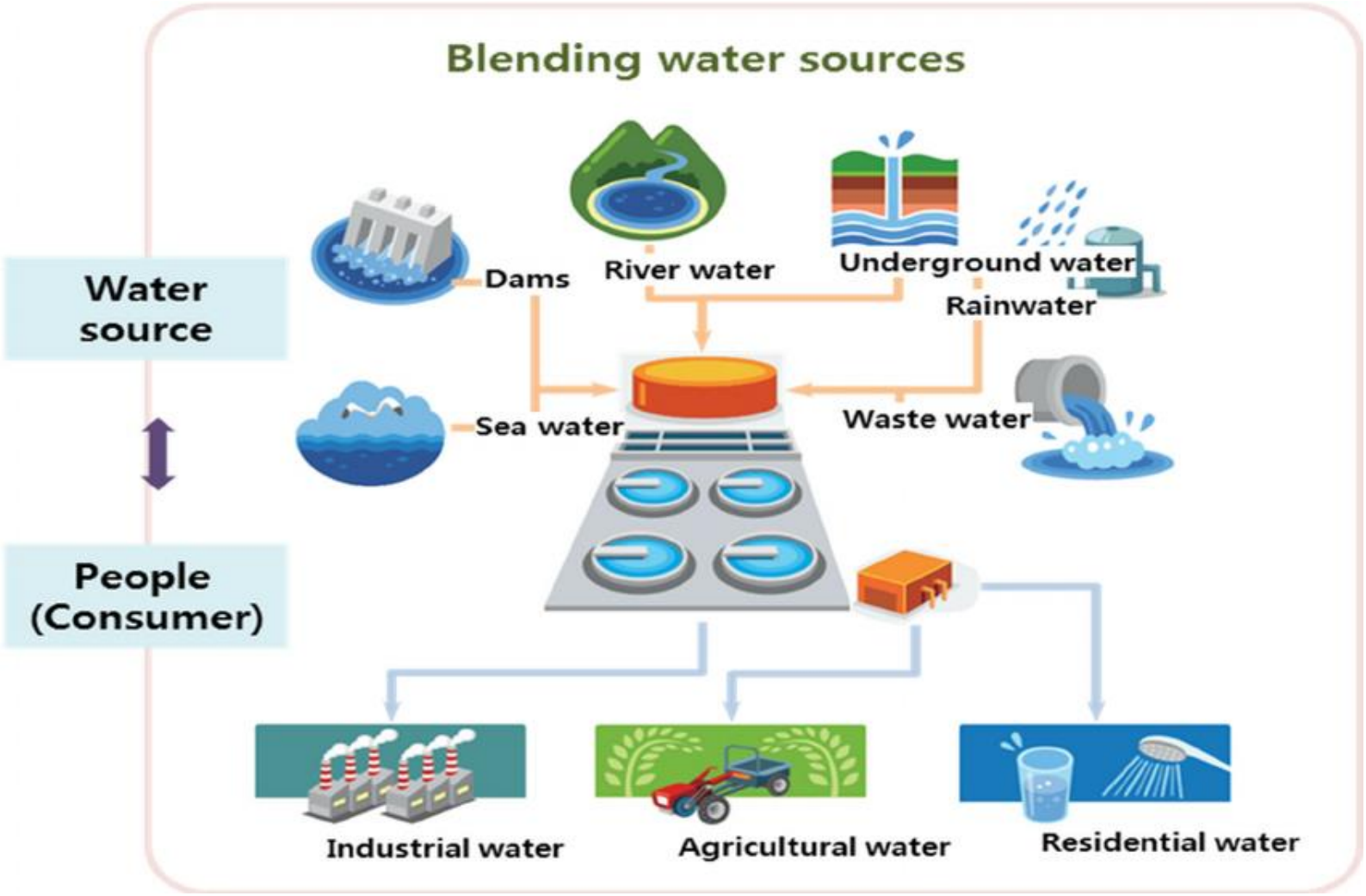
Digitalization of Water Infrastructure

NWIC

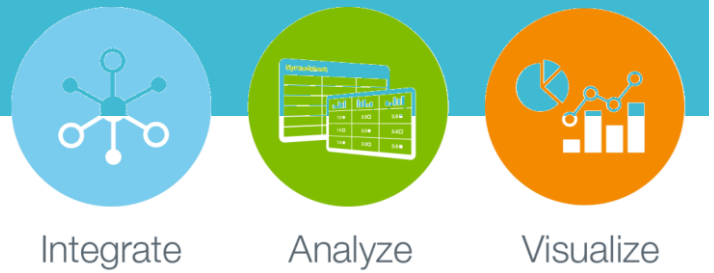
28th Oct, 2021

India-WRIS
GIS
Database

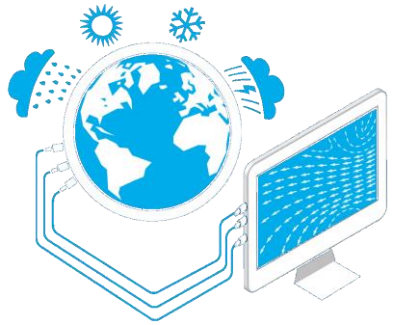
Water Resources & Consumption



Digital Water Infrastructure



- **Digitalization** of Water industry begins with **data.**
- Data generation annually in the world is estimated to be **doubling every year**
- The quality and success of digitalization projects in the water sector are closely linked to the attention and investment on the **collection, management, and classification of data**.
- The data is then structured & stored in order to be translated into **correlations and knowledge**.
- Big data streams could be translated into **useful information**, enabling end users to understand and act quickly.
- Roadmap to get us there - **Digital Water Future**



Benefits of Digital infrastructure

- Integrated and Comprehensive Water-System Knowledge
- Engage all **Stakeholders**
- **Support Decisions**
- Open the Door to Increased **Public Participation**
- Rapid and Proactive Identification of **Infrastructure Faults**
- Increased **System Resilience**
- **Managing Limited Resources**
- Greater **Cost-effectiveness**

About NWIC

National Water Informatics Center(NWIC) is an office created under Department of Water Resources, RD & GR on 28th March 2018.

Objectives of NWIC:

- Collection of available data from varied sources, generate new database, organize in standardized GIS format and provide scalable web-enabled information system.
- Maintaining, updating, collating & disseminating water data & information.
- Sharing of hydro-meteorological data amongst central & state govt. organizations, other stakeholders of water & general public.
- Provide tools to create value added maps by way of multilayer stacking of GIS database so as to provide integrated view to the water resources scenarios.
- Collaborate with national/ international research institutes.
- Provide technical support to organizations dealing with water emergency response for hydrological extremes.

VISION & MISSION

VISION & MISSION

NATIONAL WATER INFORMATICS CENTRE

Our Mission

"To provide a single window solution for comprehensive, authoritative and consistent data & information of India's water resources and allied themes in a standard national GIS framework for planning, development and management of water resources in the country"

NATIONAL WATER INFORMATICS CENTRE

Our Vision

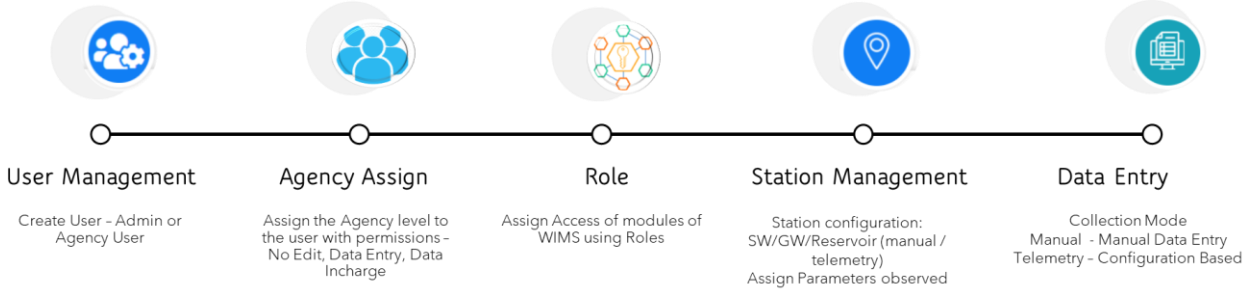
"To be a modern, state of the art data repository of water resources and allied themes to facilitate informatics based sustainable development and management of water resources of the country"

Responsibilities of NWIC

NWIC is responsible for the operations & maintenance of the national-level water databases:

- **India Water Resources Information System or India WRIS portal (www.indiawris.gov.in)**, a single window solution for all water resources data and information in a standardized national **GIS** framework.

- **Water Information Management system or WIMS**, a web enabled water resources data entry system for both **surface and ground water** resources. The data is being collected through **web-based data entry** and also in automated method through **telemetric sensors**. The platform offers various module wise applications for **State and Central agencies** for effective database addition, update and sharing.



System Overview

India-WRIS

Water Data

Dynamic Real time
Semi-Dynamic
Static data

WRIS- Tools

Input Data Builders

Utilities

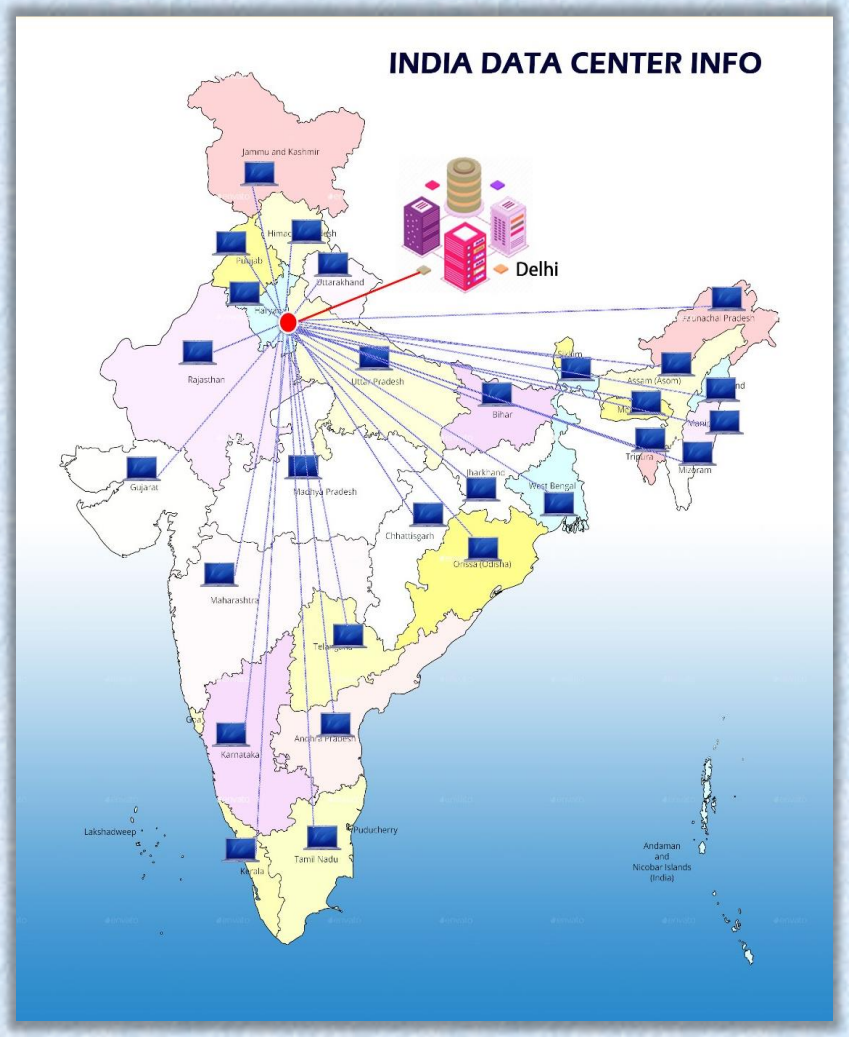
Value Added Products

WIMS

Surface Water and Ground water Data

Manual / Telemetry data management

Data Agencies



Digital Data

Central Ground Water Board

- Ground water observation well location and GW level
- Ground water quality sites and data
- Litholog well location and survey data
- Ground water resource estimation
- Aquifer systems
- Basin-CGWB

Central Water Commission

- Hydrological Observation Stations
- Surface Water Quality Stations
- Reservoir level and storage
- Glacial Lake and Water Body
- Rainfall
- WRP projects
- Reservoir sedimentation studies
- Shape files AIBP Canal , Command Area, Hydro Structure
- PMP atlas-major basins

National Remote Sensing Centre

- ET and Soil moisture
- Flood inundation maps.
- LULC, Wasteland, Land degradation, wetland cover
- Waterlogged Area and Saline areas
- Rainfall gridded data
- Ground water prospects maps
- Forest Cover – Classes

Survey of India

- Shape files of International Boundary
- State Boundary
- District Boundary
- Village Boundary
- Infrastructure Layers

Digital Data

National Water Development Authority

- Shape files
- IBTL Component
- Structure on Links (Dams, Barrages, Weirs, Anicuts)
- Detailed Links (canal, Tunnel, etc.)

Indian Meteorological Department

- Gridded Rainfall Data 0.25*0.25
- Seismic zones
- Extreme Temp and RF
- District-wise Rainfall Monitoring Station Location (DRMS)
- Earthquake events

Inland Waterways Authority of India

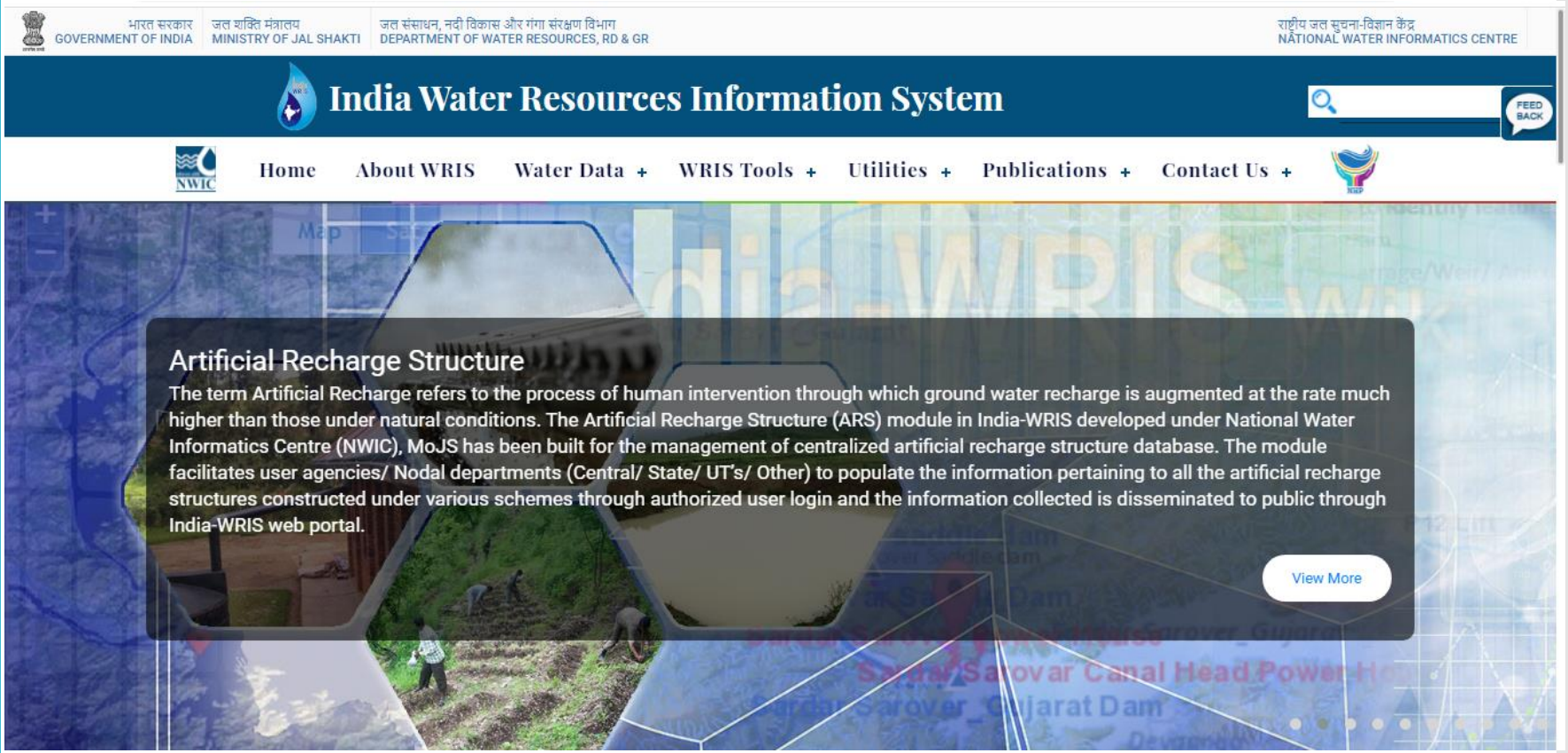
- Reports on
  - Beacon
  - Harbour Limit
  - Navigation Canal
  - Rail Road Bridge
- River(Inland Navigation)
- Settlement Location
- Waterways

Other agencies

- NHP implementing state and central agencies data (RF, water quality, Reservoir level, etc)
- MI Census Data
- Minor irrigation tank storage and capacity data
- 2011 census data (upto village level)
- Parliament and assembly constituency boundary
- Soil data (NBSS-LUP)
- Water tourism sites (States)
- DPAP and DDP (MoRD)
- Reports related to WR collected from State WRD and local state agencies

INDIA-WRIS PORTAL

https://indiawris.gov.in/wris/#/



Classification of Data Modules

Dynamic Modules

- Rainfall (mm)
- Reservoir (Level)
- River Monitoring (Level & Discharge)
- Ground Water Level (BGL Meter)
- Water Quality – Groundwater
- Water Quality – Surface water
- Evapotranspiration (mm)
- Soil Moisture (%)
- Minor Irrigation Tanks

Semi Dynamic Modules

- Groundwater Resources
- Snow-Glacial Lake
- Reservoir- Sediment studies
- Water Resources Project
- Minor Irrigation Census
- LULC
- Wasteland
- Land Degradation
- Extreme Events – Flood Inundation/Drought affected areas/Earthquake-Rainfall-Temperature
- Artificial Recharge Structure Viewer

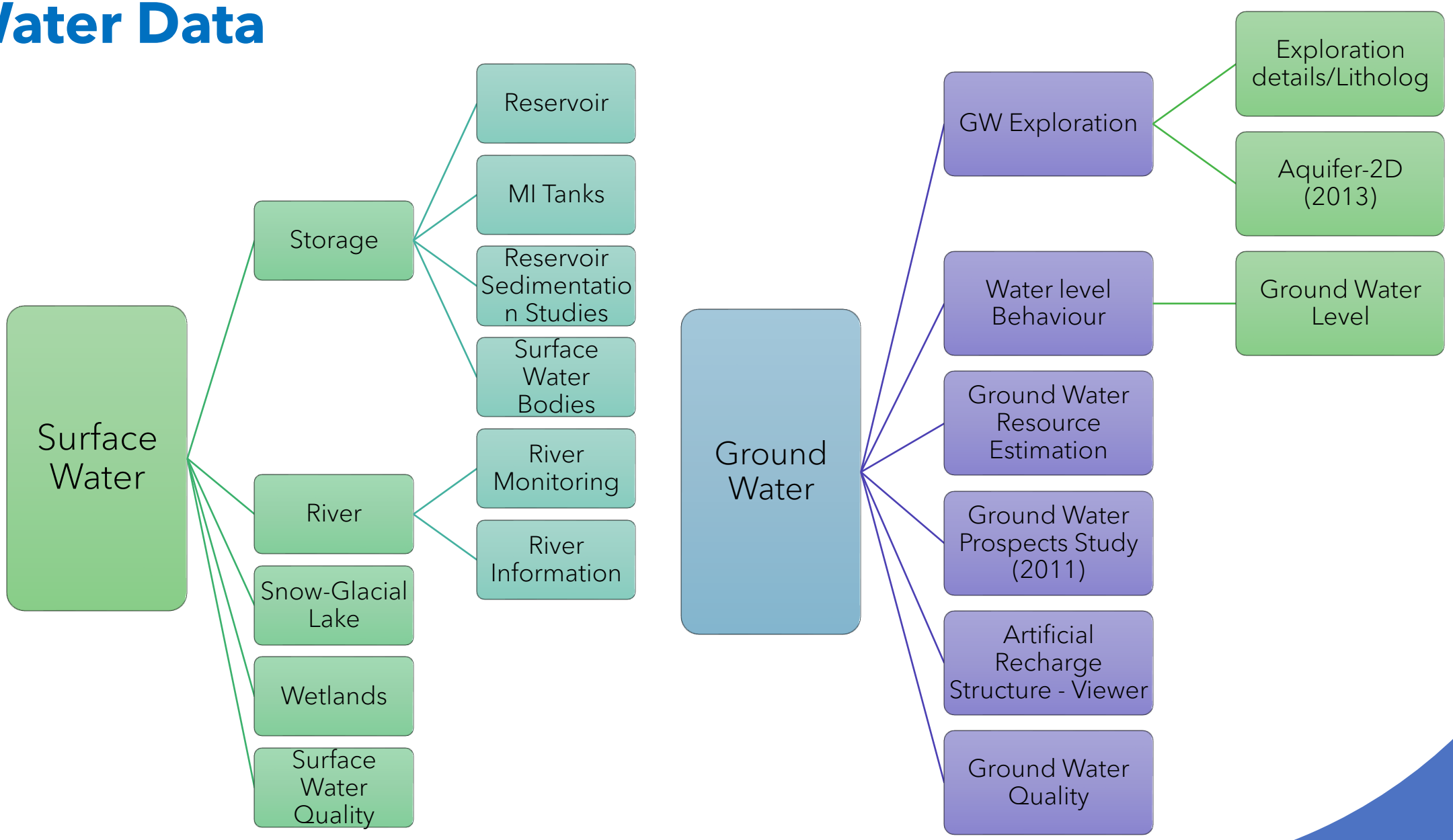
Static Modules

- Litholog
- Aquifer
- Surface Water Bodies
- River Information
- Socio Economic Census
- Groundwater Prospects
- Region-Agro-Climatic / Agro Ecological
- Soil
- Water Logging & Soil Salinity
- Wet Land
- Inland Navigation Waterways
- Inter-Basin Transfer Links
- Storm Surge Study

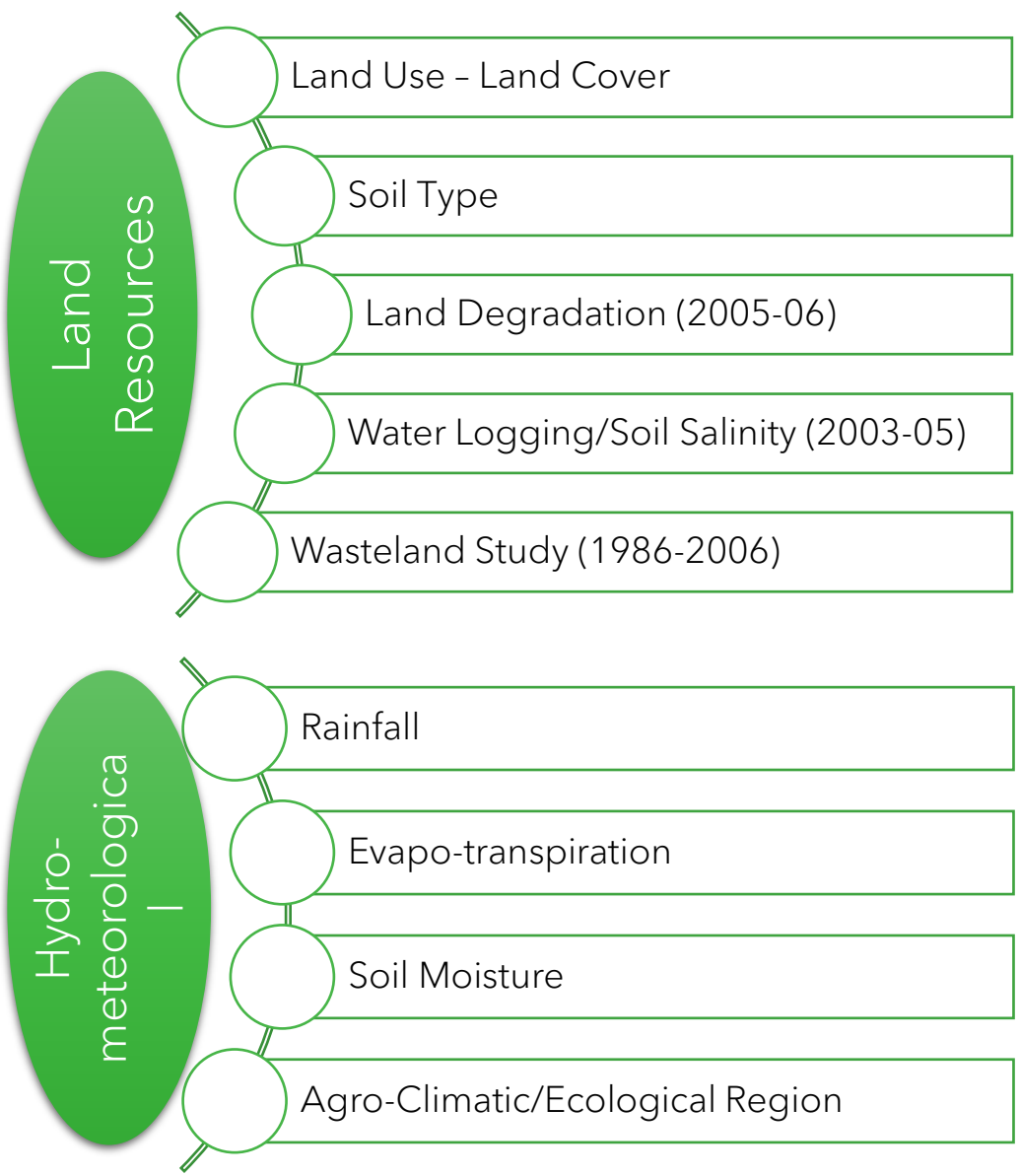
Tools + Utilities

- Online Web Editor
- Artificial Recharge Structure Data Entry
- Data / Report Download Tabular)
- Data Availability
- Geo Viewer
- WRIS WIKI
- Metadata
- District at a glance
- Probable Maximum Precipitation Atlas
- Surface Water Audit

Water Data


Surface Water
Storage
Reservoir
MI Tanks
Reservoir Sedimentation Studies
Surface Water Bodies
River
River Monitoring
River Information
Snow-Glacial Lake
Wetlands
Surface Water Quality
Ground Water
GW Exploration
Exploration details/Litholog
Aquifer-2D (2013)
Water level Behaviour
Ground Water Level
Ground Water Resource Estimation
Ground Water Prospects Study (2011)
Artificial Recharge Structure - Viewer
Ground Water Quality

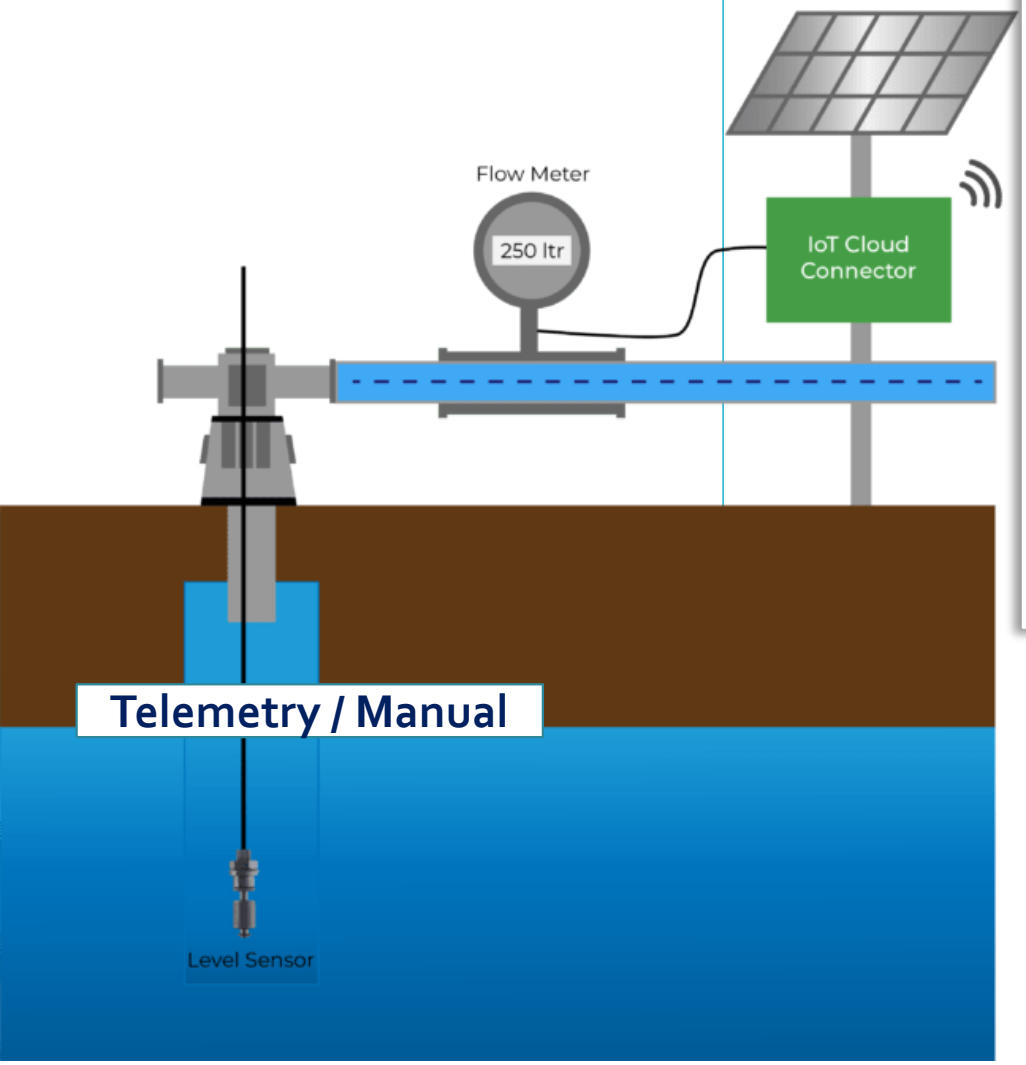
Water data


Land Resources
Land Use – Land Cover
Soil Type
Land Degradation (2005-06)
Water Logging/Soil Salinity (2003-05)
Wasteland Study (1986-2006)
Hydro-meteorological
Rainfall
Evapo-transpiration
Soil Moisture
Agro-Climatic/Ecological Region
Allied Themes
Inland Navigation Waterways
Storm Surge Study (2011)
Socio-Economic Census (2011)
Flood Inundation (2008-2010)
Drought Affected Areas (2002)
Reported Extreme Temperature, Rainfall & Earthquake Events
Projects
Water Resources Projects
Inter-Basin Transfer Links
Minor Irrigation Census

Information stored in WIMS

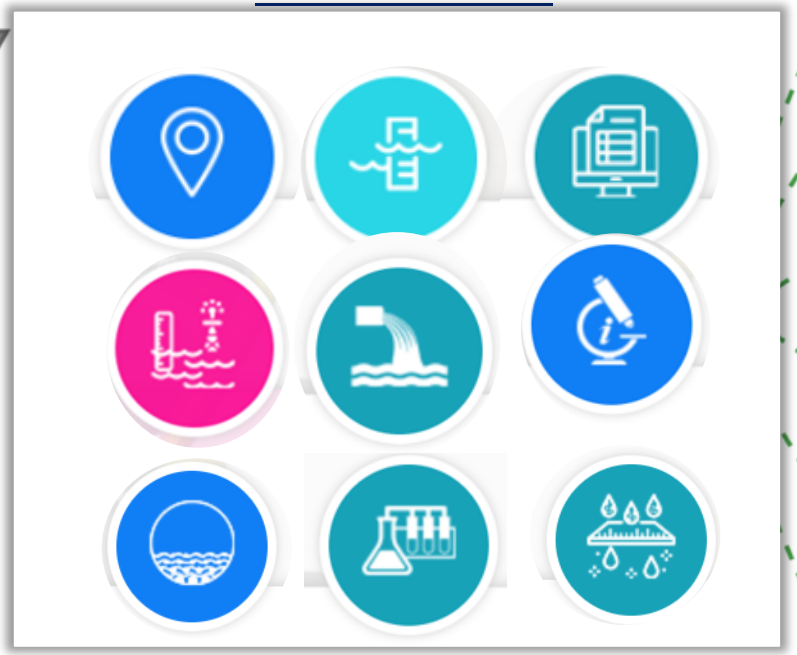
1. STATION'S METADATA
2. SURFACE WATER DATA ENTRY (e-SWIS)
3. GROUND WATER DATA MODULES
4. TELEMETRY MODULE
5. WATER QUALTY MODULES
6. FLOOD FORECAST WEBSITE

Surface Water / Ground Water



Telemetry / Manual

PARAMETERS



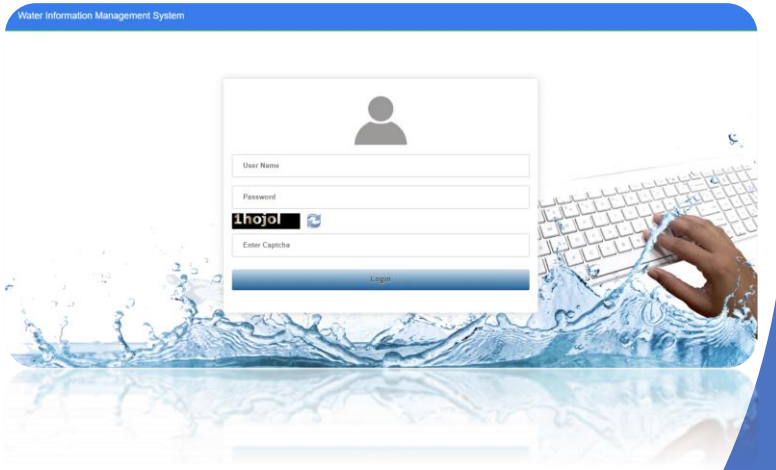
Hydrological
Meteorological
Quality
Reservoir

- Real Time Dashboards
- Reports
- Forecasting
- Alerts
- Compliance
- Mobile Application

WIMS

IMPORTANT PARAMETERS

S. No.	Water Data Component
1	Reservoir Water level
2	River Water level
3	River Discharge
4	Ground water level
5	Surface Water Quality
6	Ground water Quality
7	Rainfall
8	Sediment
9	Other Meteorological Parameters

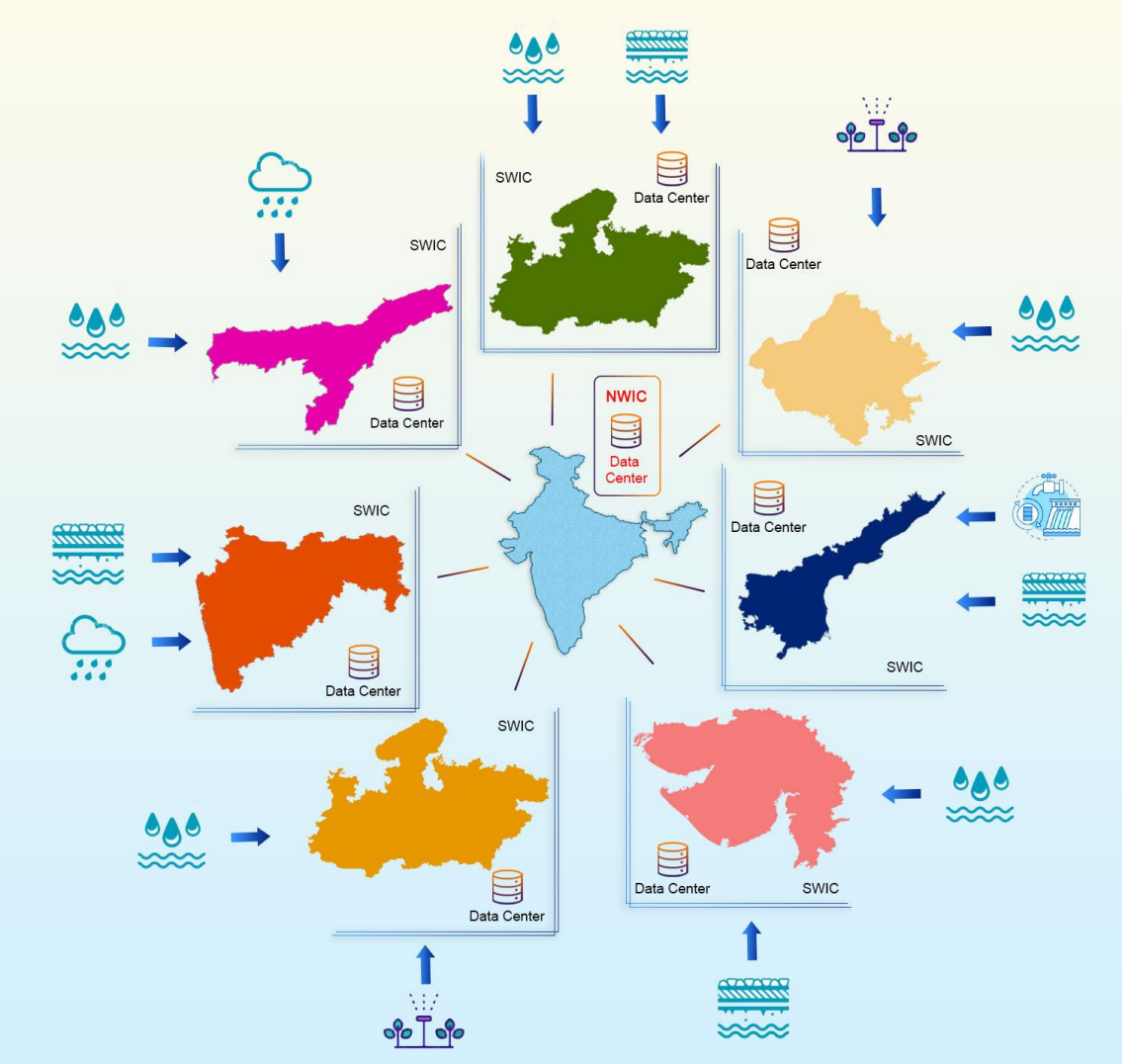


	WRIS	WIMS
Nature	GIS based Data Dissemination Platform	Data Collection Platform
Data	All spatial, dynamic time series, Semi-dynamic & Static data	Only Time Series Data
Modules	34 Modules, 2 Tools & 8 Utilities for Surface, Ground Water & Allied Themes	12 Real Time/ Near Real Time Modules for Surface & Ground Water
Users	Open for General Public	Authorized User Access for data generating agency (Centre/State)
Servers	6VMS (Development) & 8 VMs (Production) PostgreSQL	6VMs (Development) & 6VMs (Production) PostgreSQL
Hosting (Production)	NIC Cloud	Tata Cloud
Hosting (Development)	NWIC, Delhi	NWIC, Delhi

APIs for Time Series Data Sharing

SWIC

State Water Informatics Centre



India-WRIS

GIS Database

INTRODUCTION TO GIS

APPLICATION OF GIS IN INDIA WRIS WEBGIS

01

What is GIS ?

Functions/Application of GIS

Components of a comprehensive GIS platform

02

Views of GIS

Geodatabase

Preparation of Layers

Data Publishing

03

India-WRIS Module wise GIS layers

Data Assessment

List of GIS Assets

What is GIS?

- GIS or Geographic Information System, are a set of comprehensive computer based tools, used for capturing, storing, visualization, analyzing, interpretation of geographic data for planning and decision making.
- It is a system for management, analysis and display of geographic data, also called spatial or geospatial data.
- The geographic data include all Earth-based, spatial–temporal, location and extent references, which should be relatable to one another, and ultimately, to a "real" physical location or extent.
- GIS and location intelligence applications are at the foundation of location-enabled services, that rely on geographic analysis and visualization.

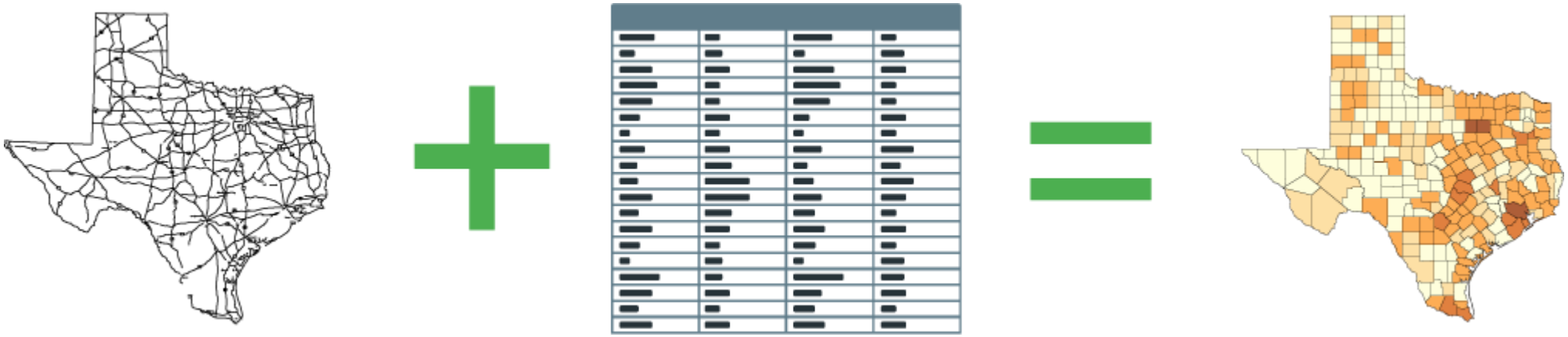
Components of GIS

What is GIS? Spatial & Non Spatial Data

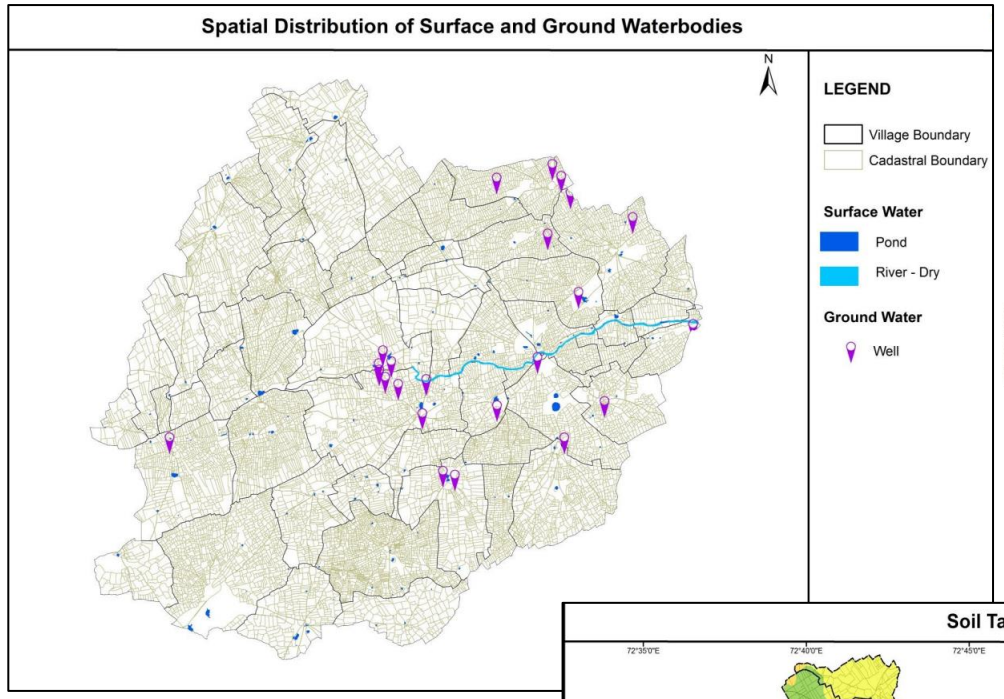
- **Spatial Data** – Data associated with a physical location on earth
  - ✓ Spatial Data includes spatial relationships
  - ✓ Includes location, shape, size.
  - ✓ To types of spatial data – ***Vector*** (Points, lines & Polygons) &
    Raster (Satellite Imagery, Digital elevation models etc.)

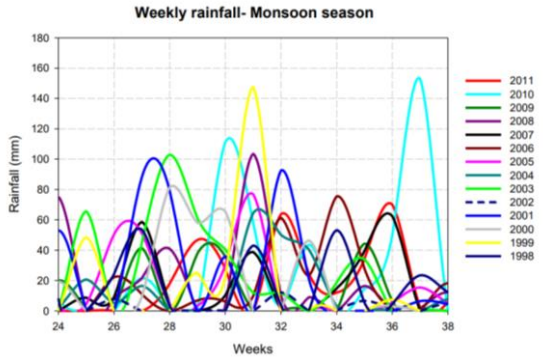
- **Non-spatial data** – Statistical or other tabular data related to specific, precisely defined location.
  - ✓ Attributes – linked in GIS to spatial data which define the location

Linking of Spatial & Non-Spatial (attribute) data together is **GIS**

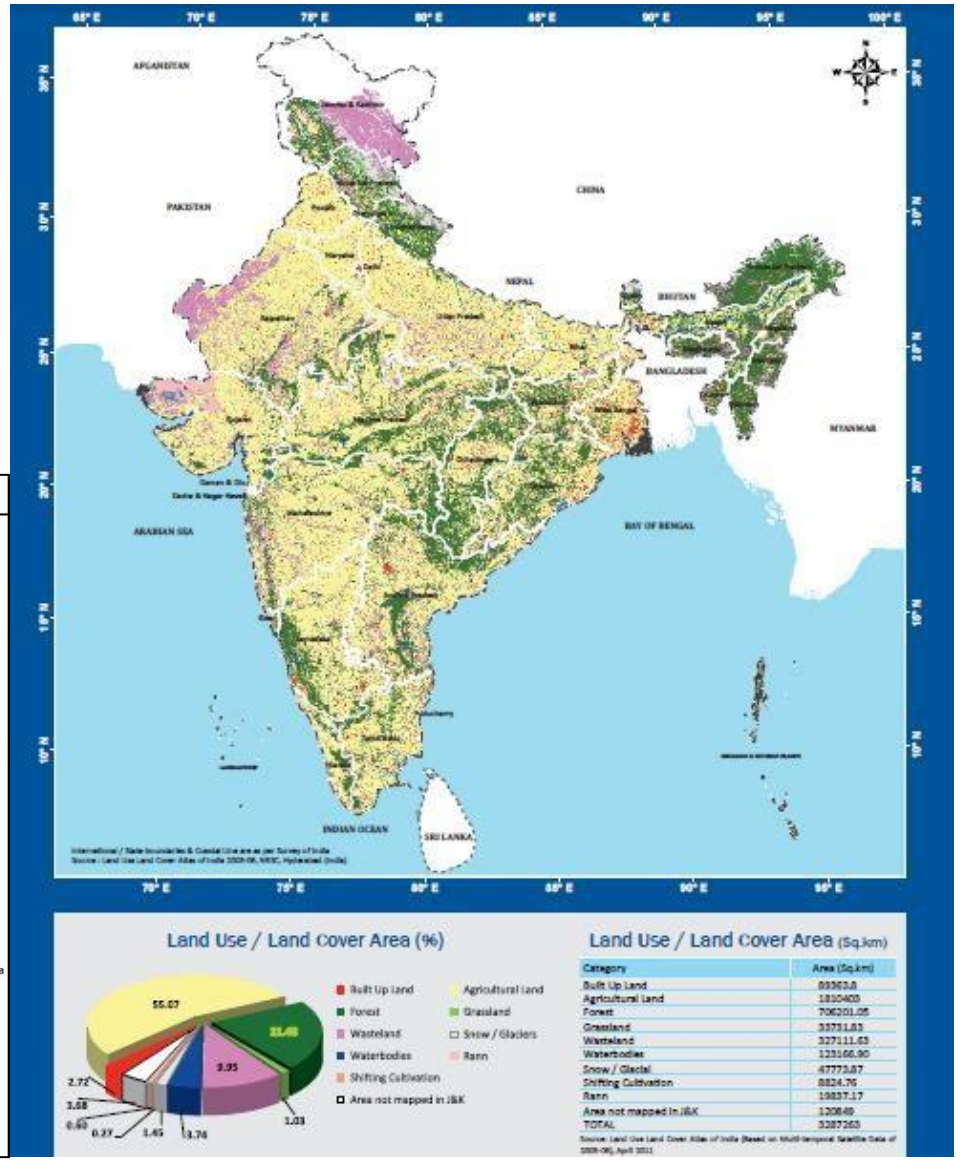


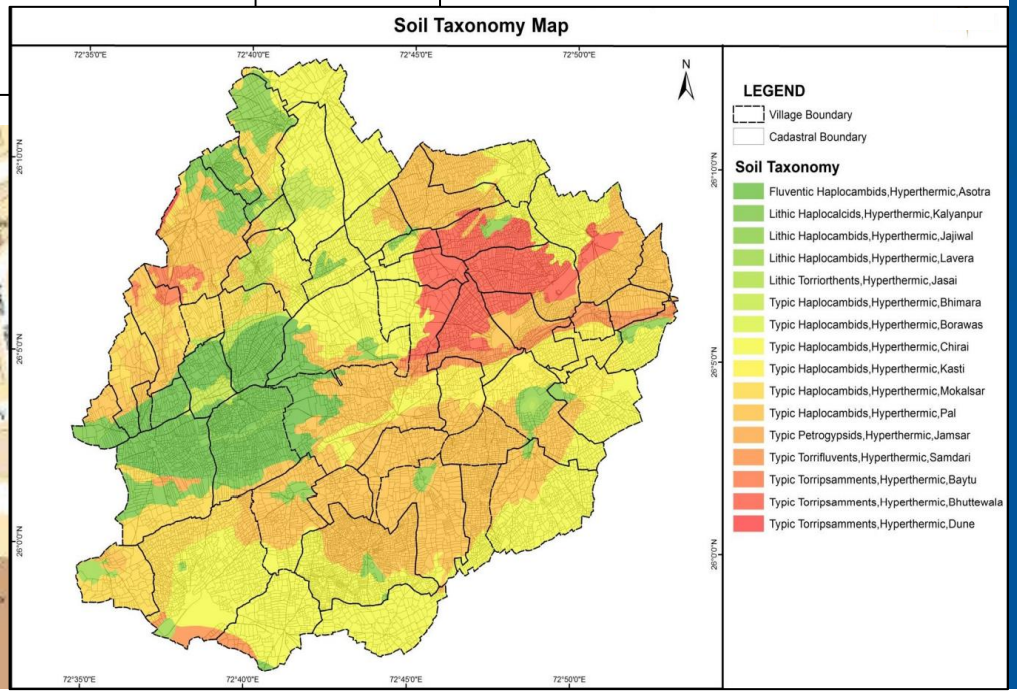
Functions of GIS: Making Maps & Charts





Land Use / Land Cover - India

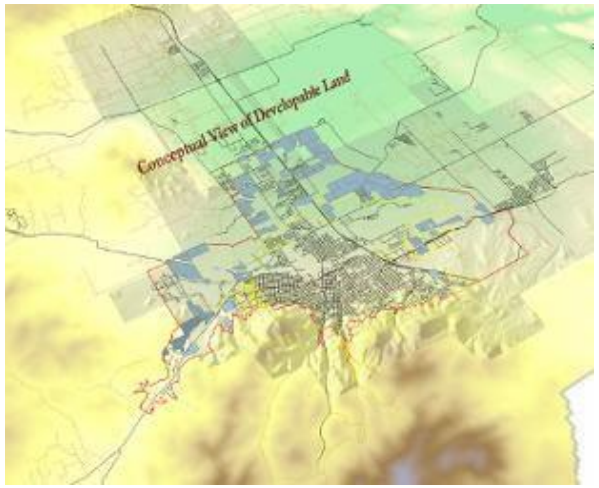




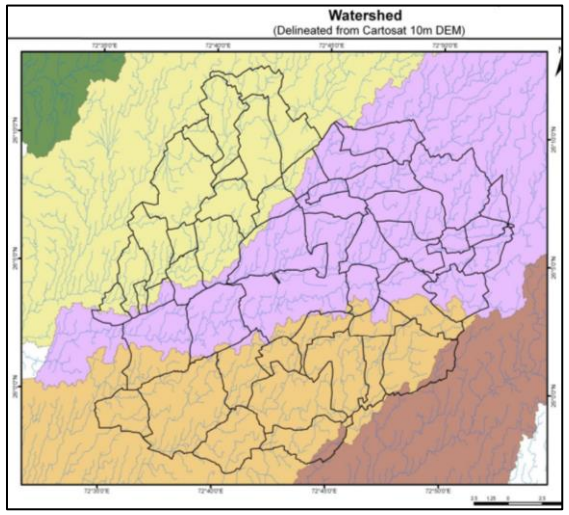
Functions of GIS: Planning and Management

City & Urban Planning

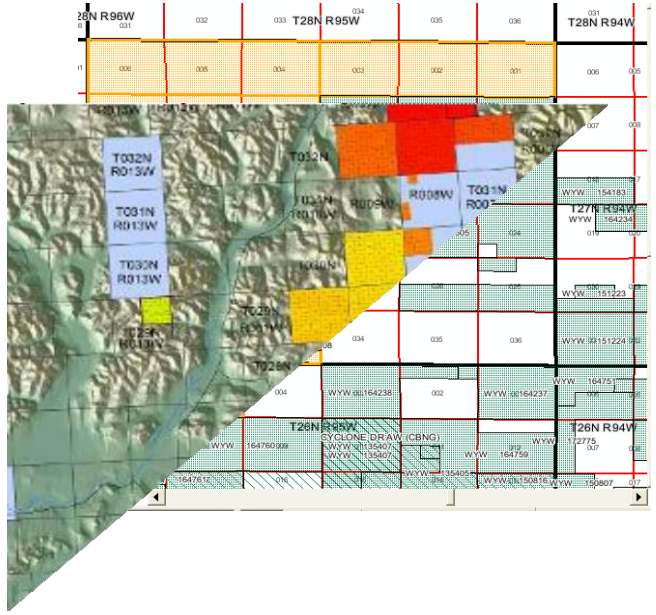
Land Use Suitability



Watershed Planning

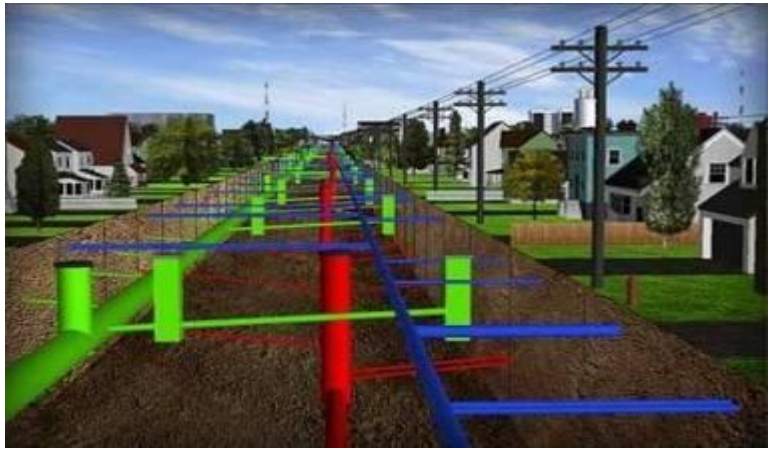


Integrated Land Management



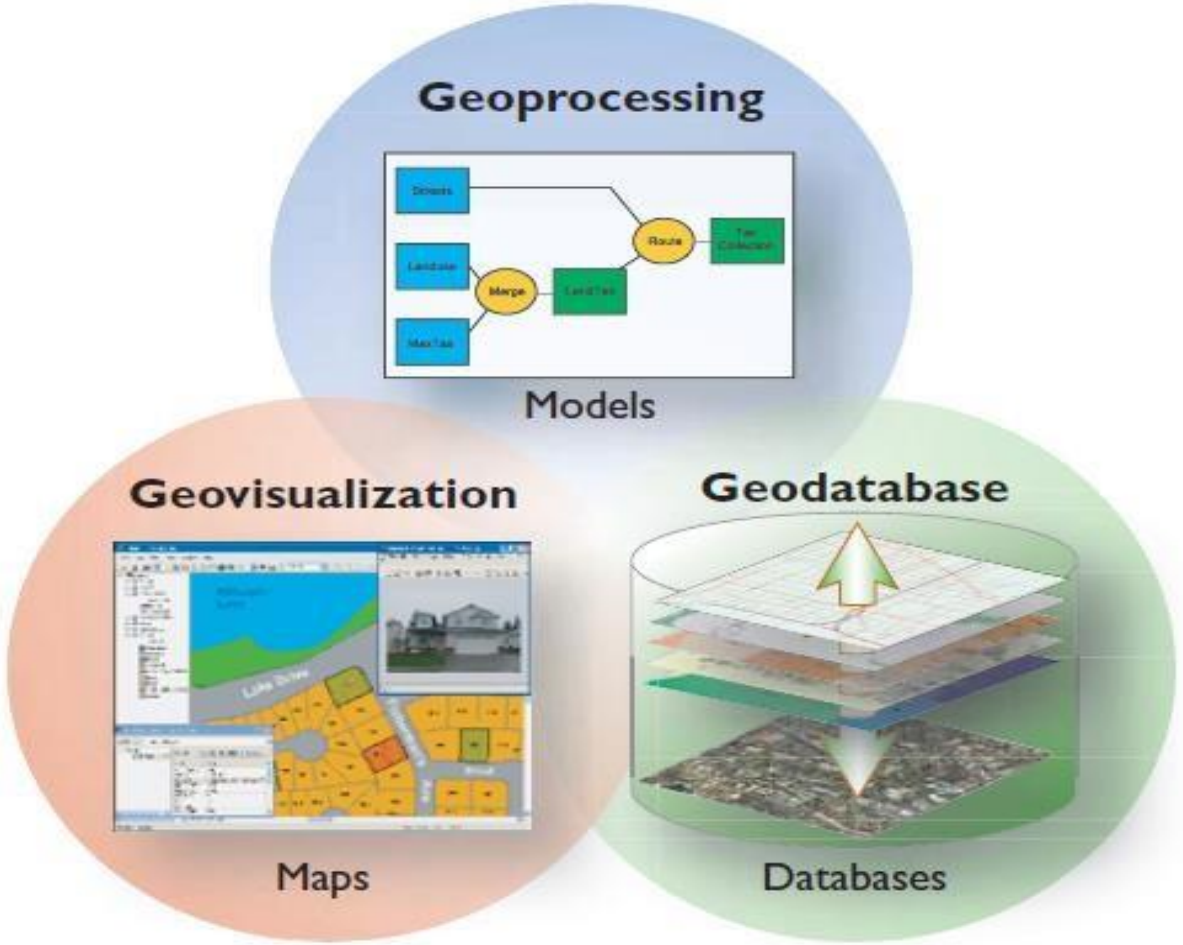
Virtual City

Manage Electricity, Water & Phone Networks



And Many more applications in managing Transport networks, natural disasters, resource Mapping, etc ……

Fundamental Aspects or Views of GIS



The three views of GIS

Views of GIS: Geodatabase View

A GIS manages geographic information.

A GIS can be thought as a spatial database containing datasets that represent geographic information in terms of a generic GIS data model— features, raster, attributes, topologies, networks, etc.

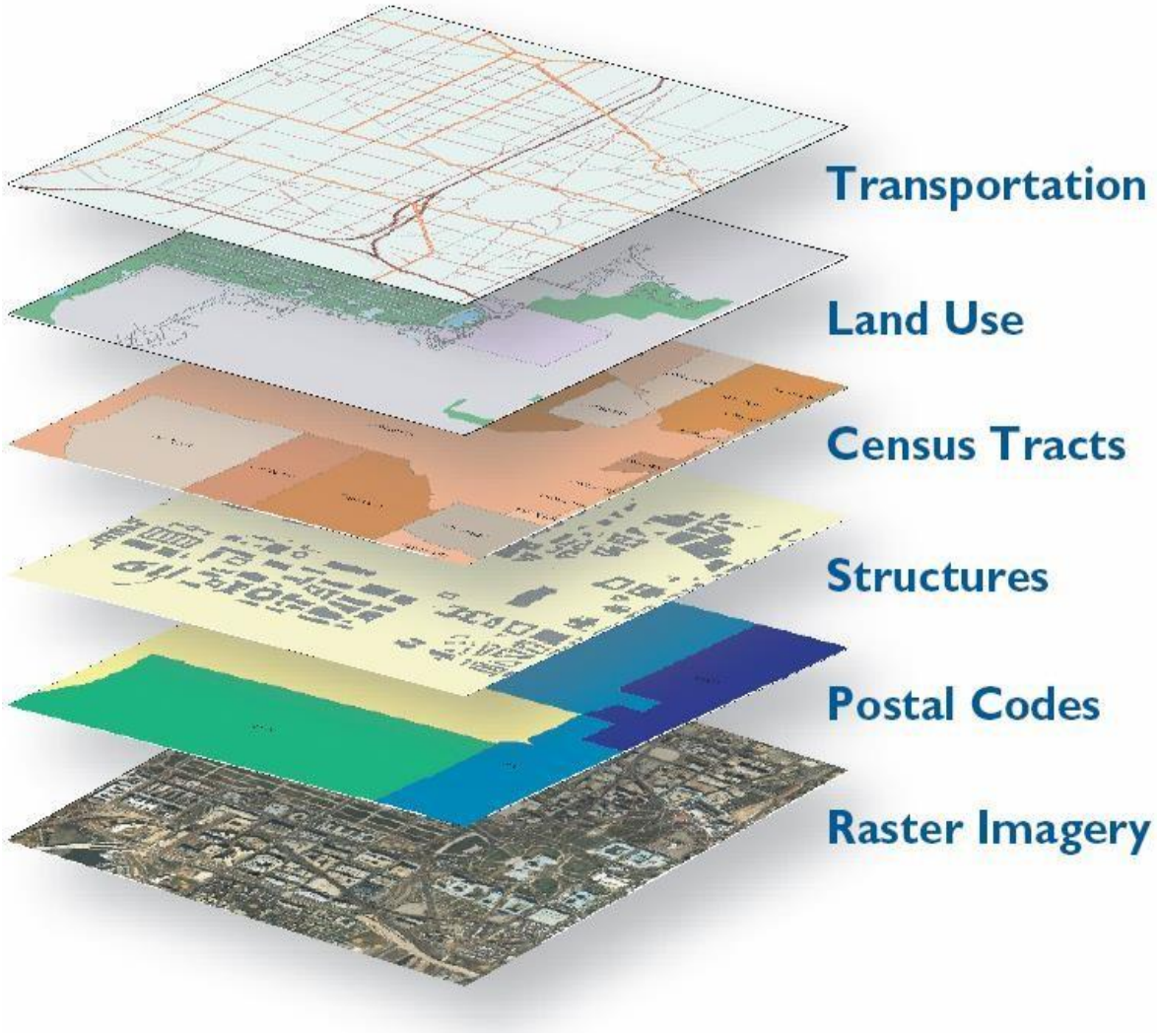
Features (points, lines, and polygons)

Raster datasets such as satellite imagery or digital elevation models.

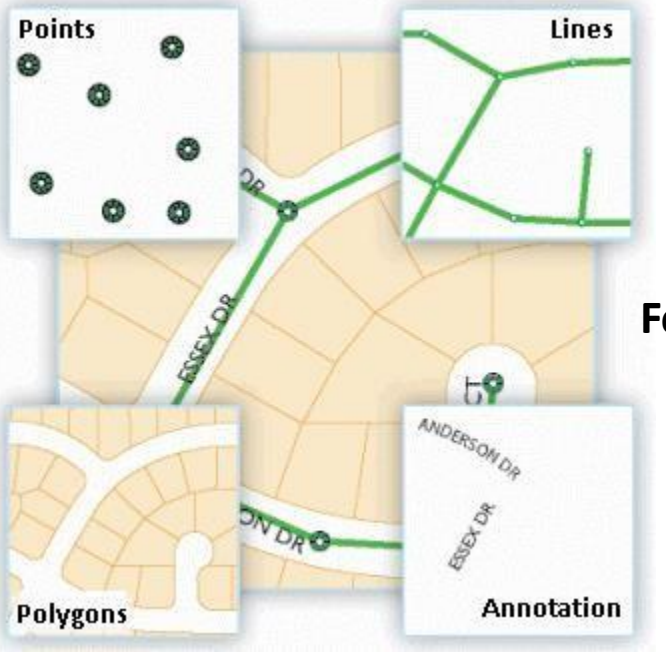
Attributes that describe the geographic objects.

Spatial Relationships: Topology and networks

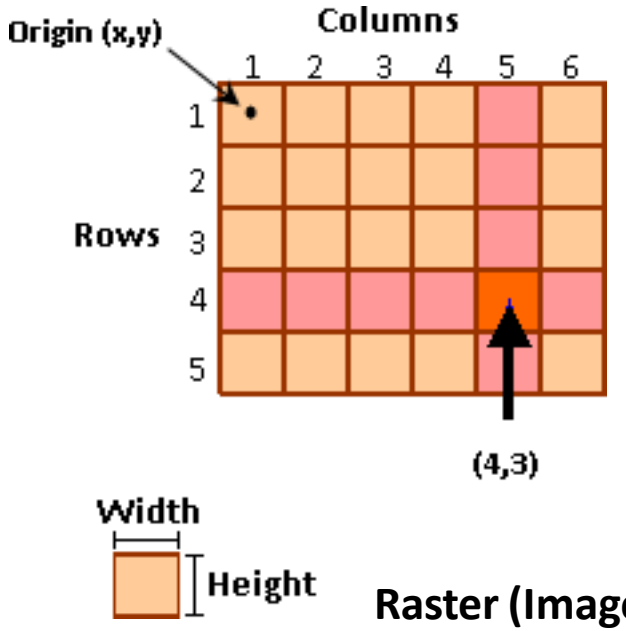
Thematic layers and datasets: geographically referenced so that they overlay onto the earth's surface and exhibit relationships with one another.



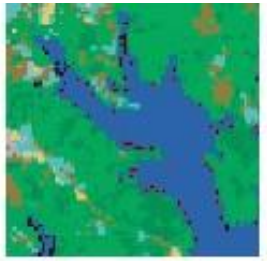
Views of GIS: Geodatabase View



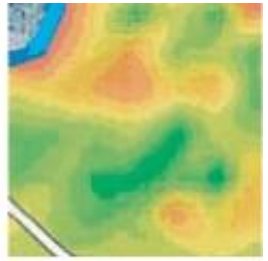
Features



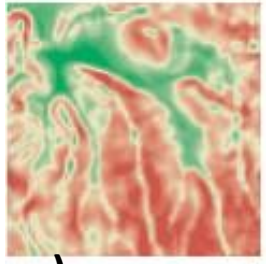
Orthophoto



Land Use

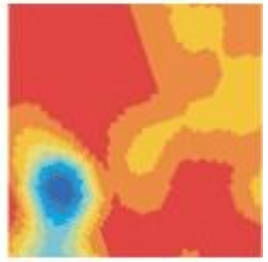


Concentration



Slope

Elevation



Population

Raster (Imagery)

Tabular View

Feature class table

PIN	Area	Addr	Code
334-1626-001	7,342	341 Cherry Ct.	SFR
334-1626-002	8,020	343 Cherry Ct.	UND
334-1626-003	10,031	345 Cherry Ct.	SFR
334-1626-004	9,254	347 Cherry Ct.	SFR
334-1626-005	8,856	348 Cherry Ct.	UND
334-1626-006	9,975	346 Cherry Ct.	SFR
334-1626-007	8,230	344 Cherry Ct.	SFR
334-1626-008	8,645	342 Cherry Ct.	SFR

Related ownership table

PIN	Owner	Relat.	Acq.Date	Assessed	TaxStat
334-1626-001	G. Hall	SO	1995/10/20	$115,500.00	02
334-1626-002	H. L Holmes	UK	1993/10/06	$24,375.00	01
334-1626-003	W. Rodgers	HW	1980/09/24	$175,500.00	02
334-1626-004	J.Williamson	HW	1974/09/20	$135,750.00	02
334-1626-005	P. Goodman	SO	1966/06/06	$30,350.00	02
334-1626-006	K. Staley	HW	1942/10/24	$120,750.00	02
334-1626-007	J. Dormandy	UK	1996/01/27	$110,650.00	01
334-1626-008	S. Gooley	HW	2000/05/31	$145,750.00	02

Attributes

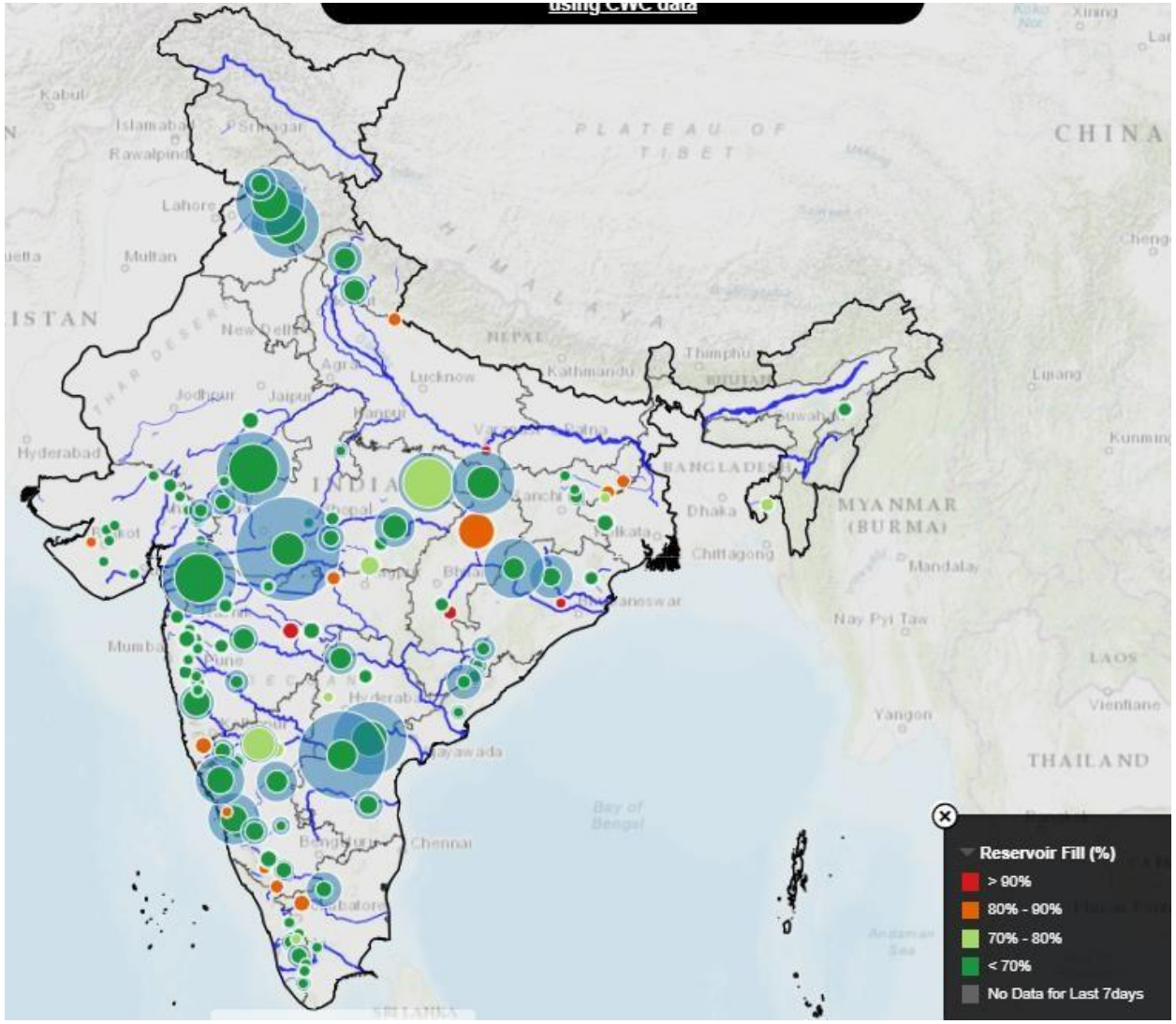
Views of GIS: The map view or The Geovisualization View

A GIS is a set of intelligent, interactive maps and other views that show features and feature relationships on the earth's surface.

Various map views of the underlying geographic information can be constructed and used as windows into the geographic database to support query, analysis, and editing of geographic information.

Each GIS has a series of two-dimensional (2D) and three-dimensional (3D) map applications that provide rich tools for working with geographic information through these views.

An Image is worth a Thousand Words.



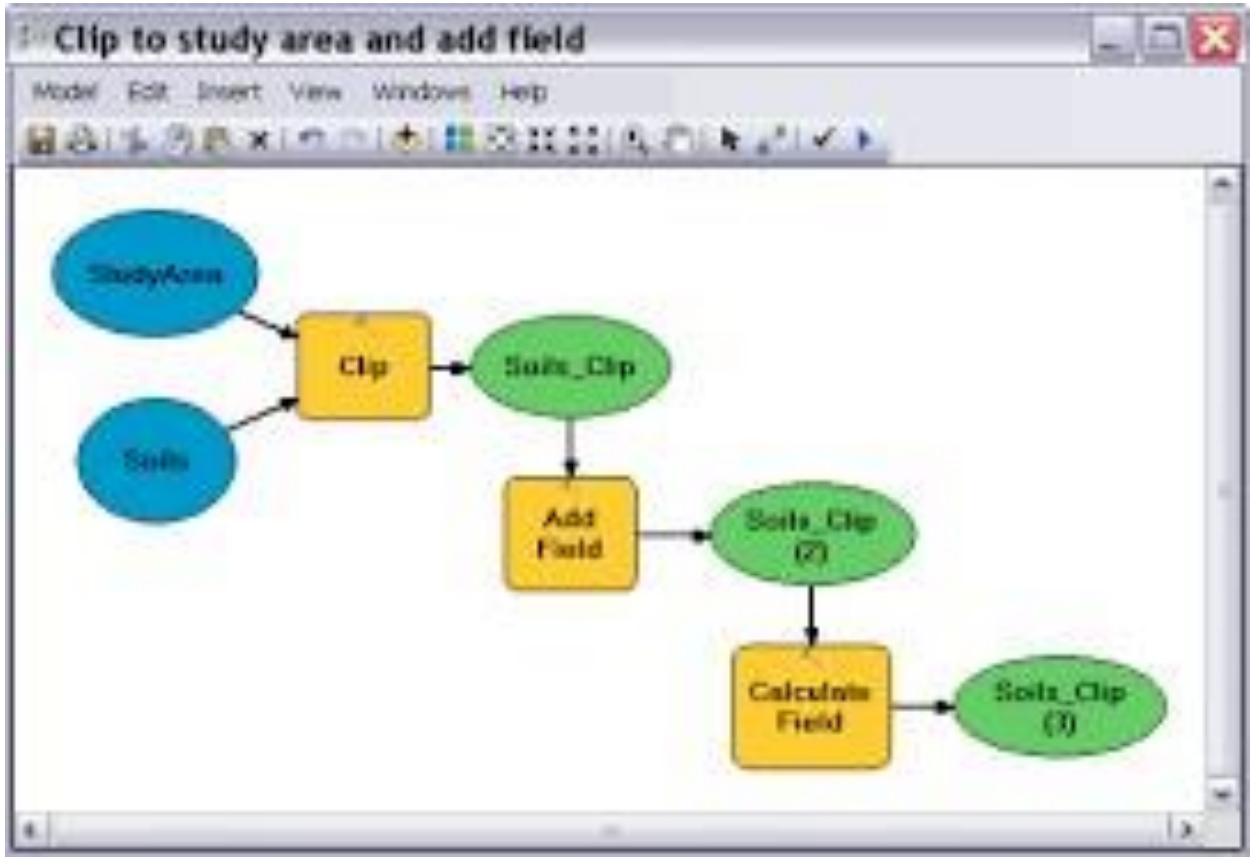
Views of GIS: The Geoprocessing view

A GIS is a set of information transformation tools that derive new information from existing datasets. These Geoprocessing functions take information from existing datasets, apply analytic functions, and write results into new derived datasets.

Geoprocessing involves the ability to string together a series of operations so that users can perform spatial analysis and automate data processing—all by assembling an ordered sequence of operations.

Data + Tools = New Derived Data

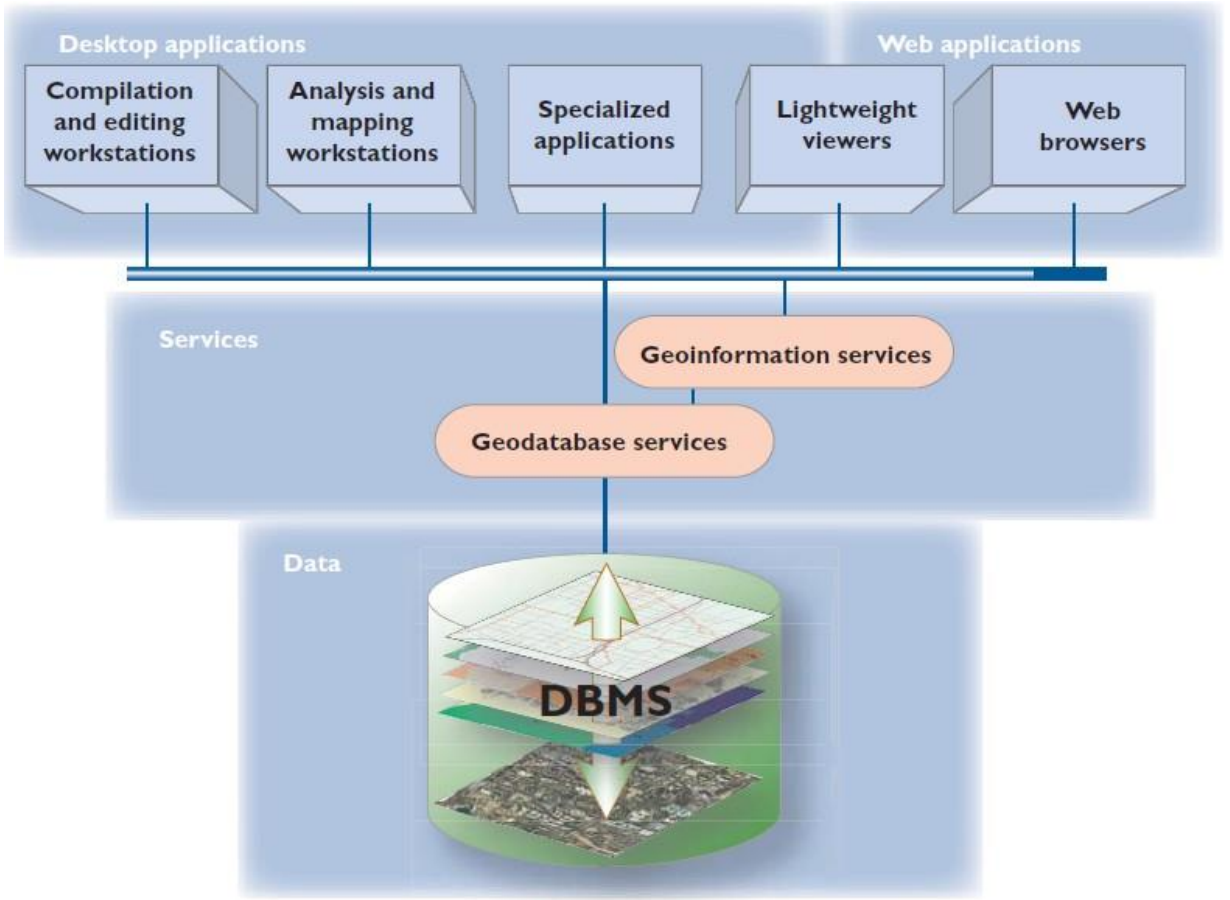
Geoprocessing is the key framework for modelling and analysis.



Models

Components of a Comprehensive GIS Platform

- Geographic database to store and manage all geographic datasets.
- A Web-based network for distributed geographic sharing and management.
- Desktop and server applications for:
  - ✓Data compilation
  - ✓Information queries
  - ✓Spatial analysis and Geoprocessing
  - ✓Cartographic production
  - ✓Image visualization and exploration
  - ✓GIS Data Management
- Modular software components to embed GIS logic in other applications and develop custom applications
- Geoinformation, Geodatabase services for multitier and centralized GIS system



The ArcGIS system

Web AppBuilder
Web App Templates
JavaScript API

Web

Collector
Survey 123
ArcGIS for
Android & iOS
AppStudio

Mobile

Desktop

ArcGIS Desktop
ArcGIS Pro
ArcGIS Earth
ArcGIS Engine
ArcReader

ArcGIS Online
Business Analyst Online
Community Analyst
Amazon EC2

Cloud

Online

Enterprise

ArcGIS Enterprise
ArcGIS Server
ArcSDE/Data Stores
Portal for ArcGIS

India WRIS WEB GIS Layers preparation and Hosting Using ArcGIS

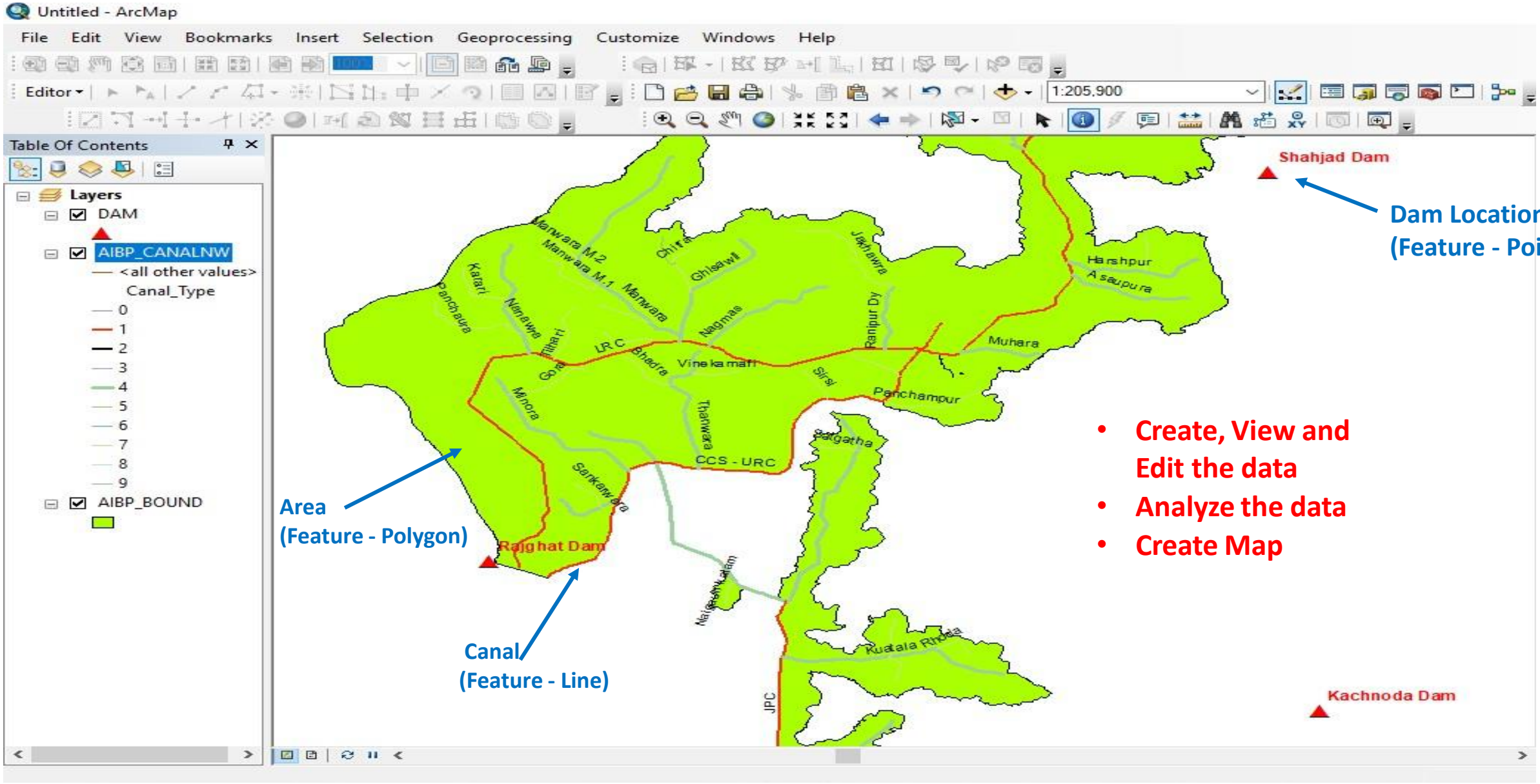
Preparation of Layers

Data Source: It varies from:
Data from CWC,
Concerned State & Central Govt. Departments,
delineation from IRS LISS IV + Cartosat merged Satellite data

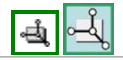
Ancillary/Secondary data : Topo sheets (SOI) 1:50,000 scale
Google earth (Spatial Check)
Historical data

Software Used: ARC GIS

ARC GIS: Arc Map



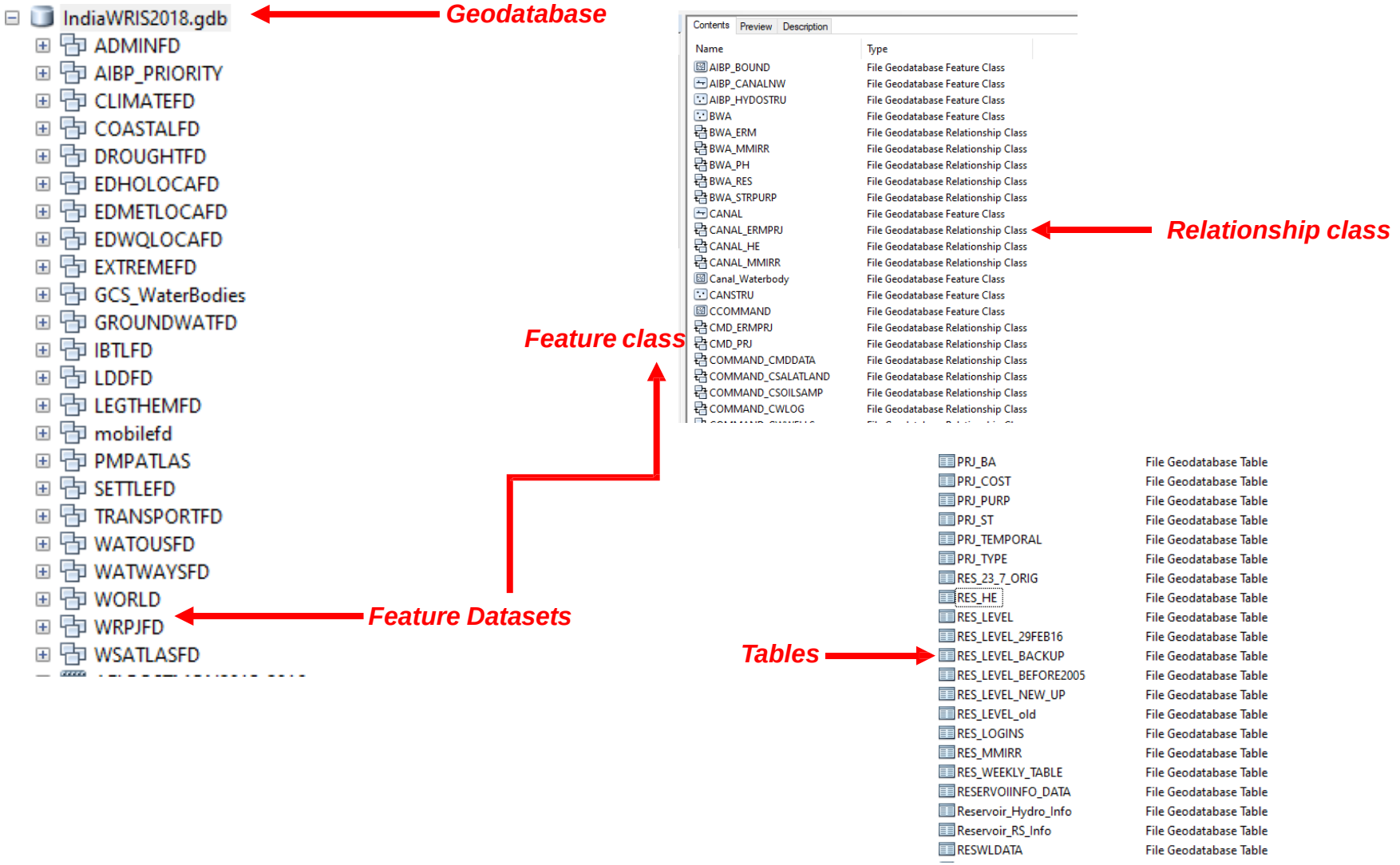
Geodatabase Architecture – ArcGIS

The geodatabase structure for spatial data	
Symbol	**Description**
	File Geodatabase
	Feature datasets
	Feature class - Point
	Feature class – Line
	Feature class – Polygon
	Relationship Class
	Geometric Network class
	Topology Class
	Raster Catalog
	Raster Dataset
	Domain Table (object) Class
	Registered Geo-database Table (object) Class
	External Data file (*.dbf)
	External Data file (*.xls)

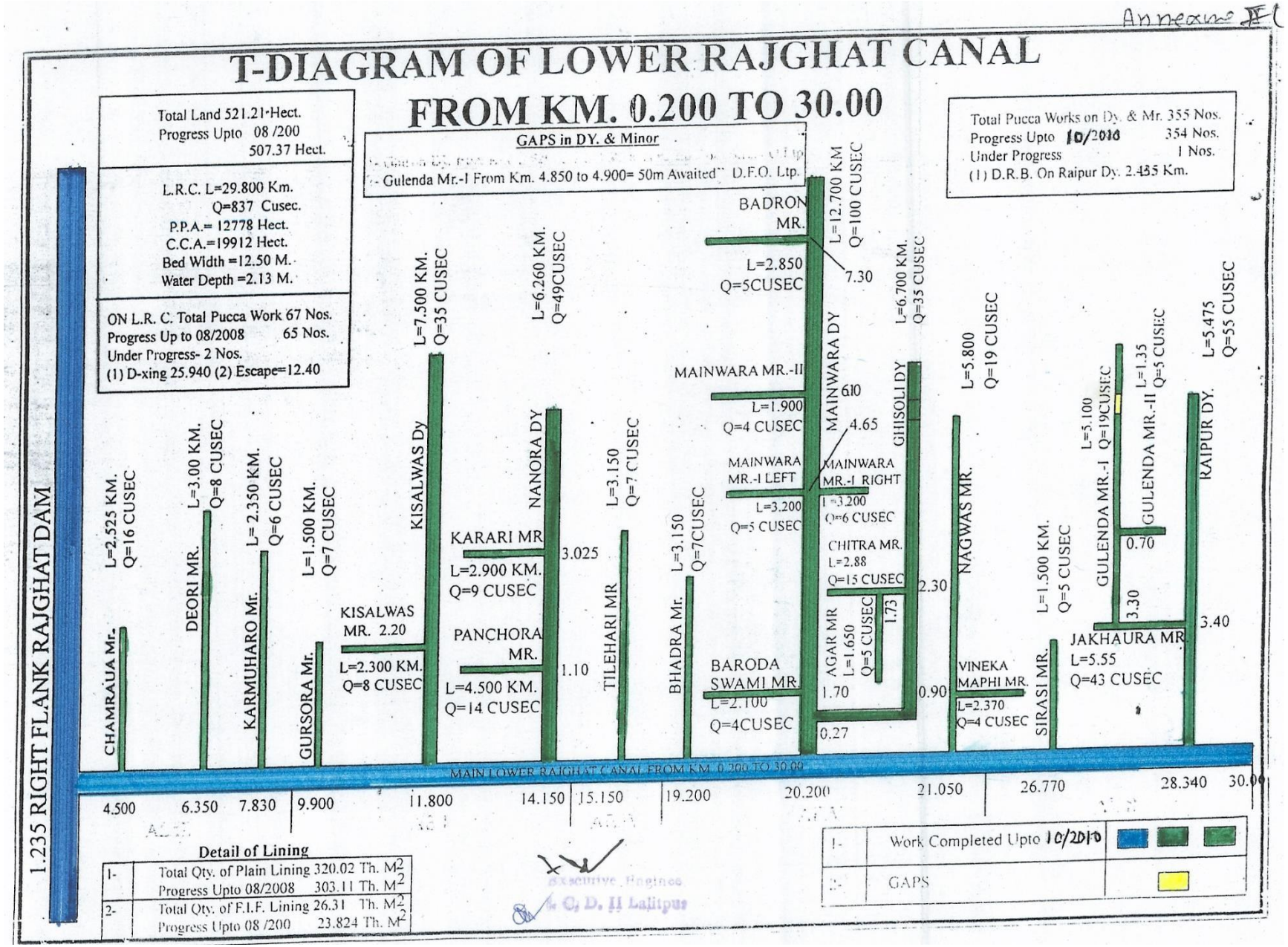
Map Document

Module – Based addition of spatial entities for creation of map service.

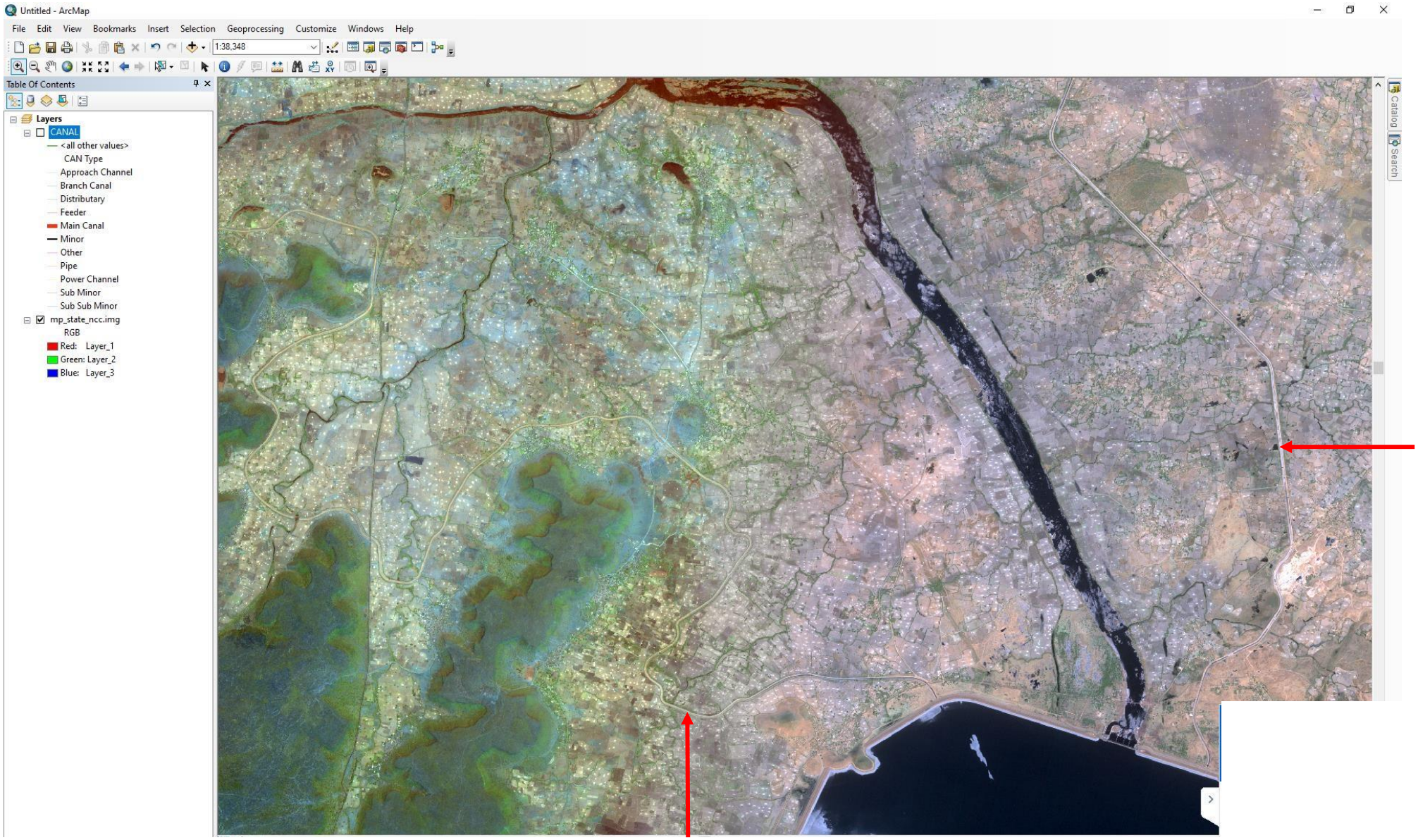
Example: Geodatabase (Tree structure) of WRP



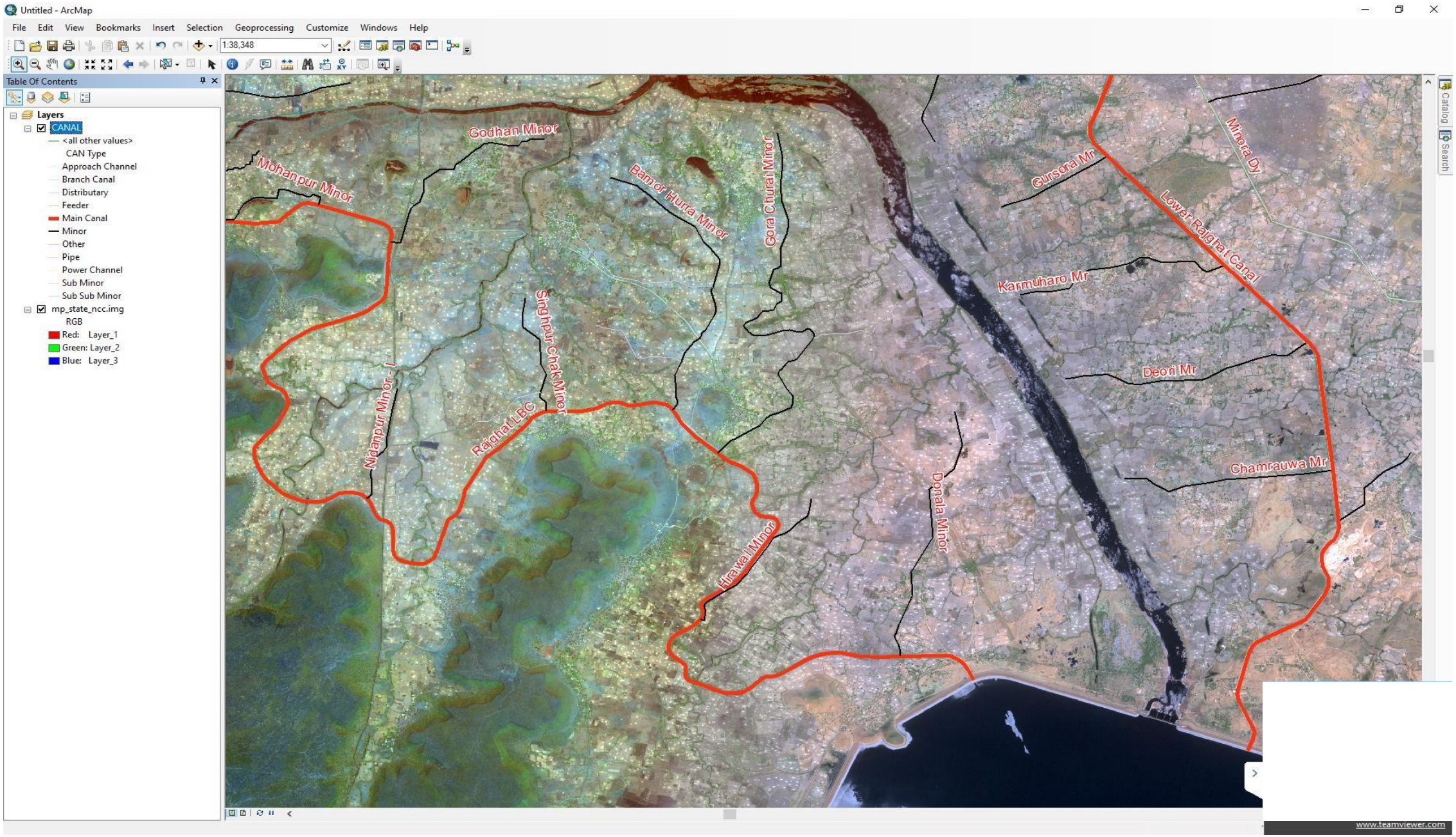
Hardcopy data from State WRD



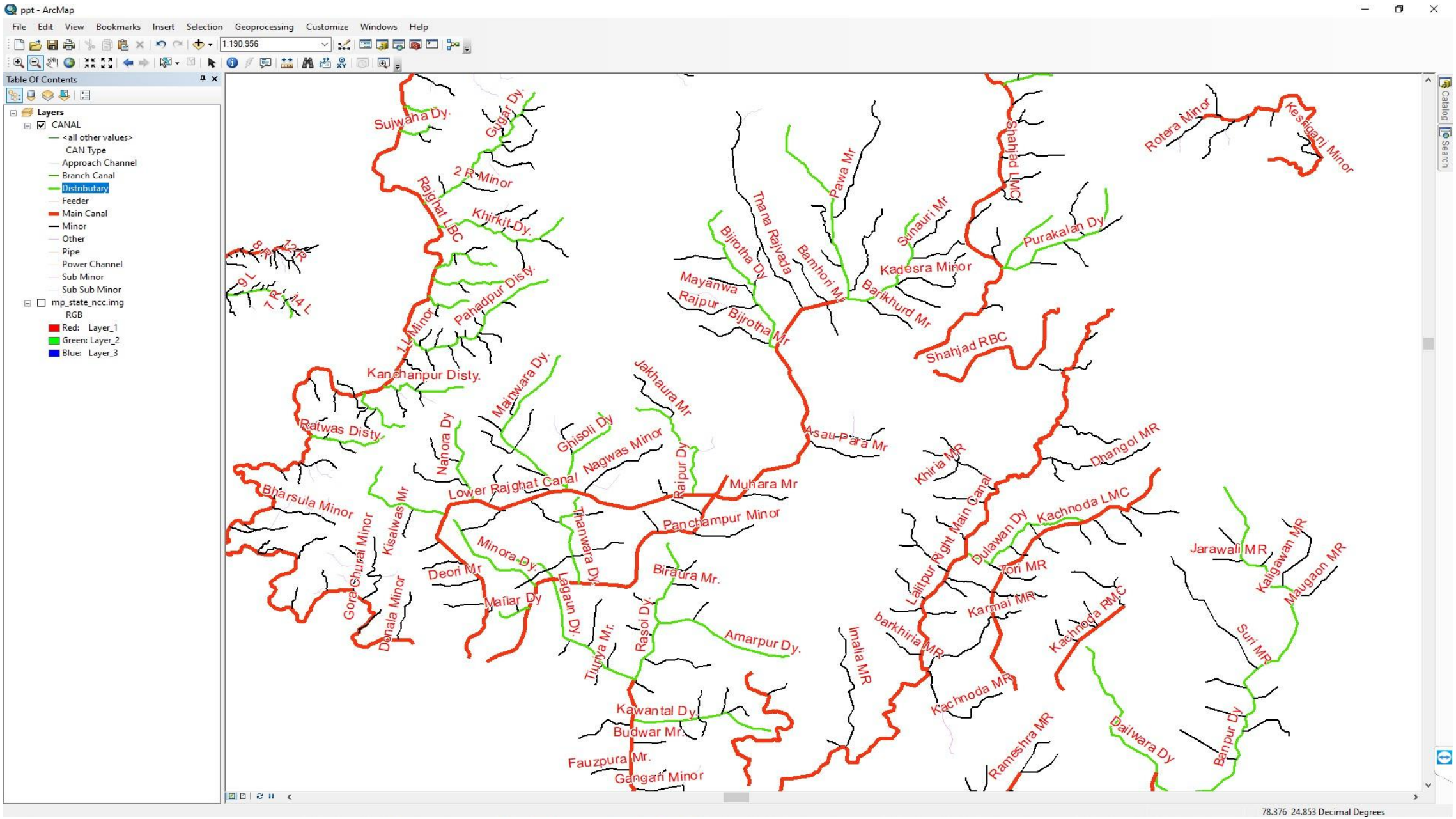
Feature identifications (canals)



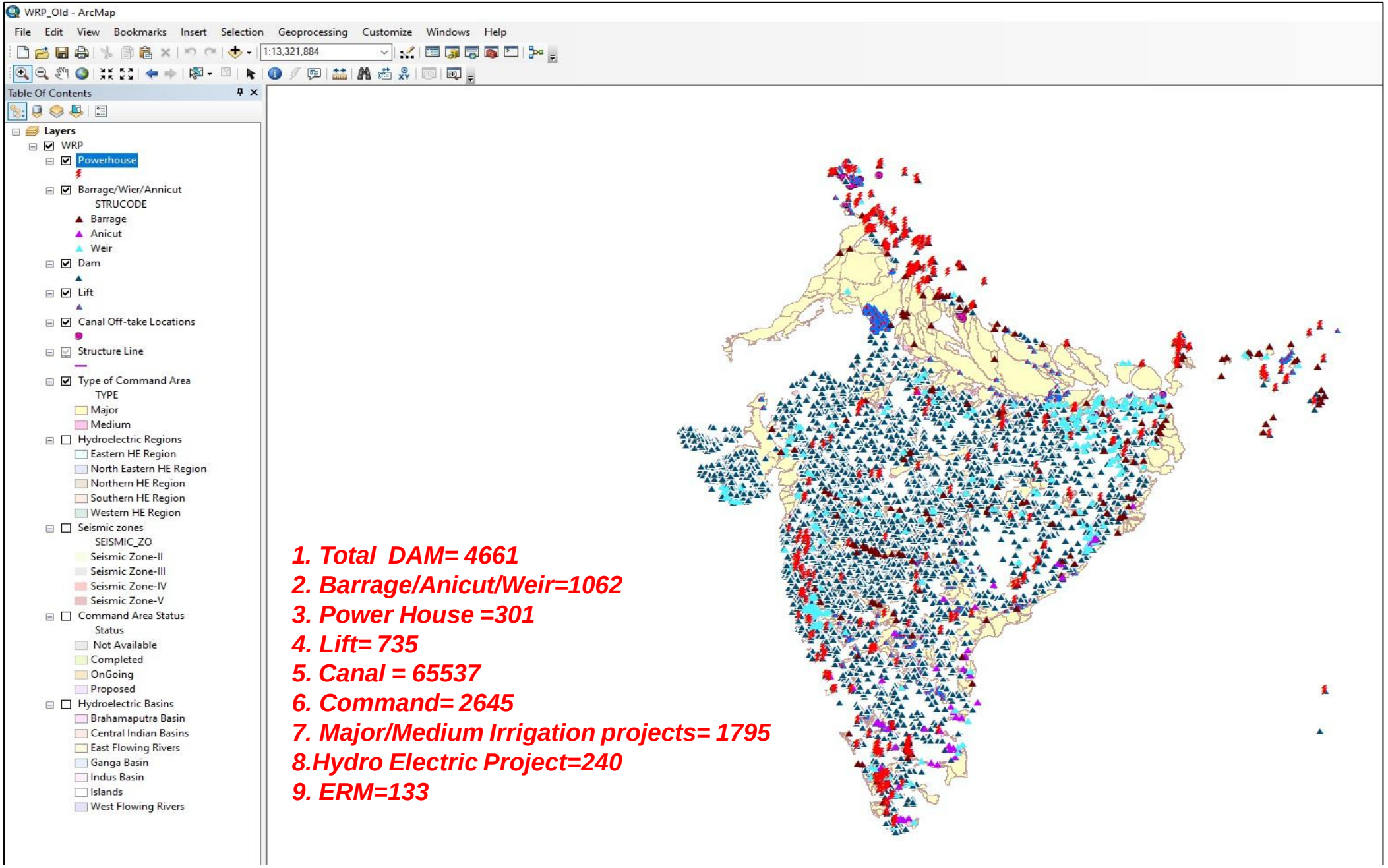
Feature extraction/ onscreen digitization of the canals



Complete digitalization and layer generation through visual interpretation in GIS environment

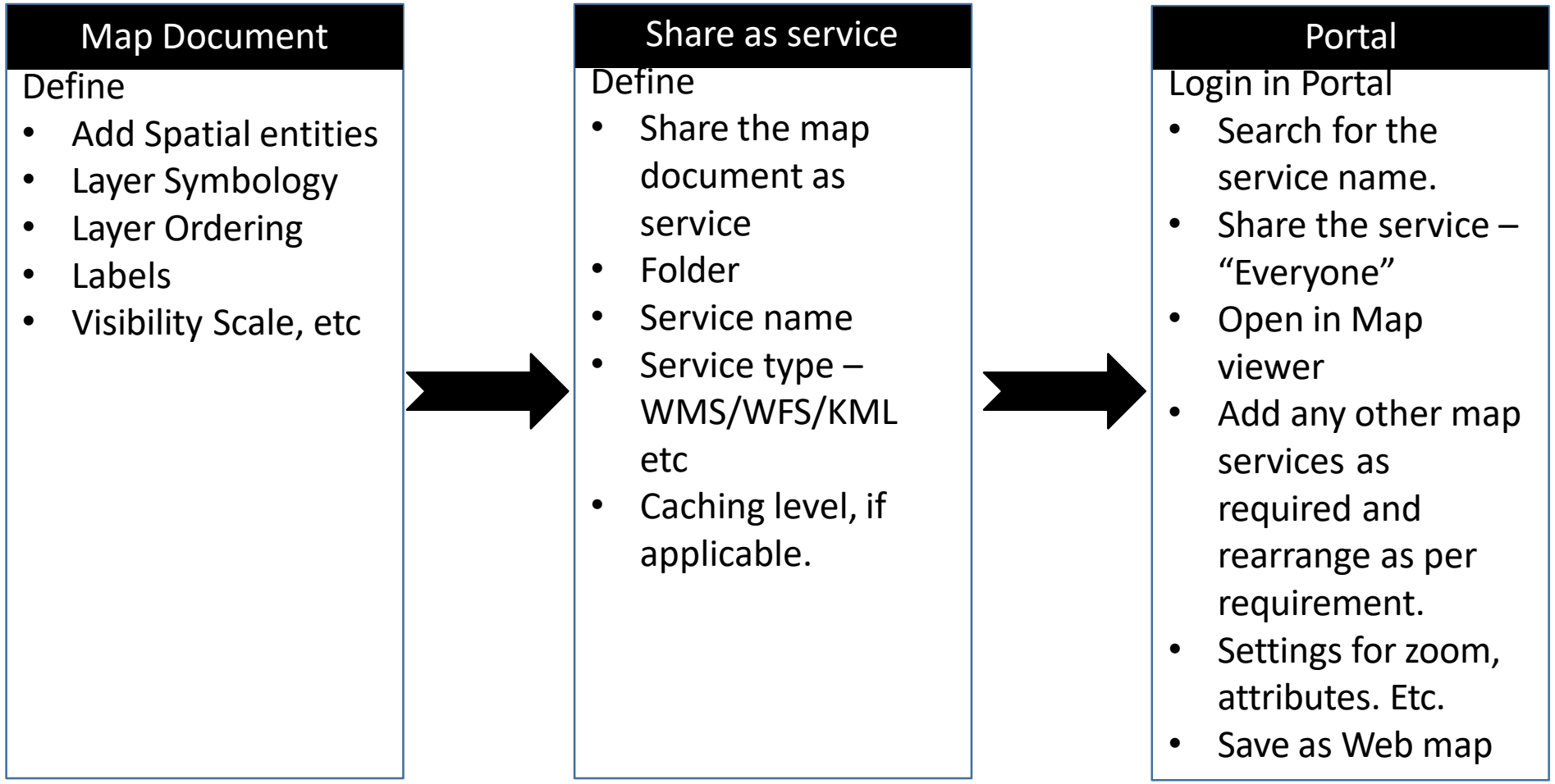


WRP layer generated in GIS and available to publish in Web GIS

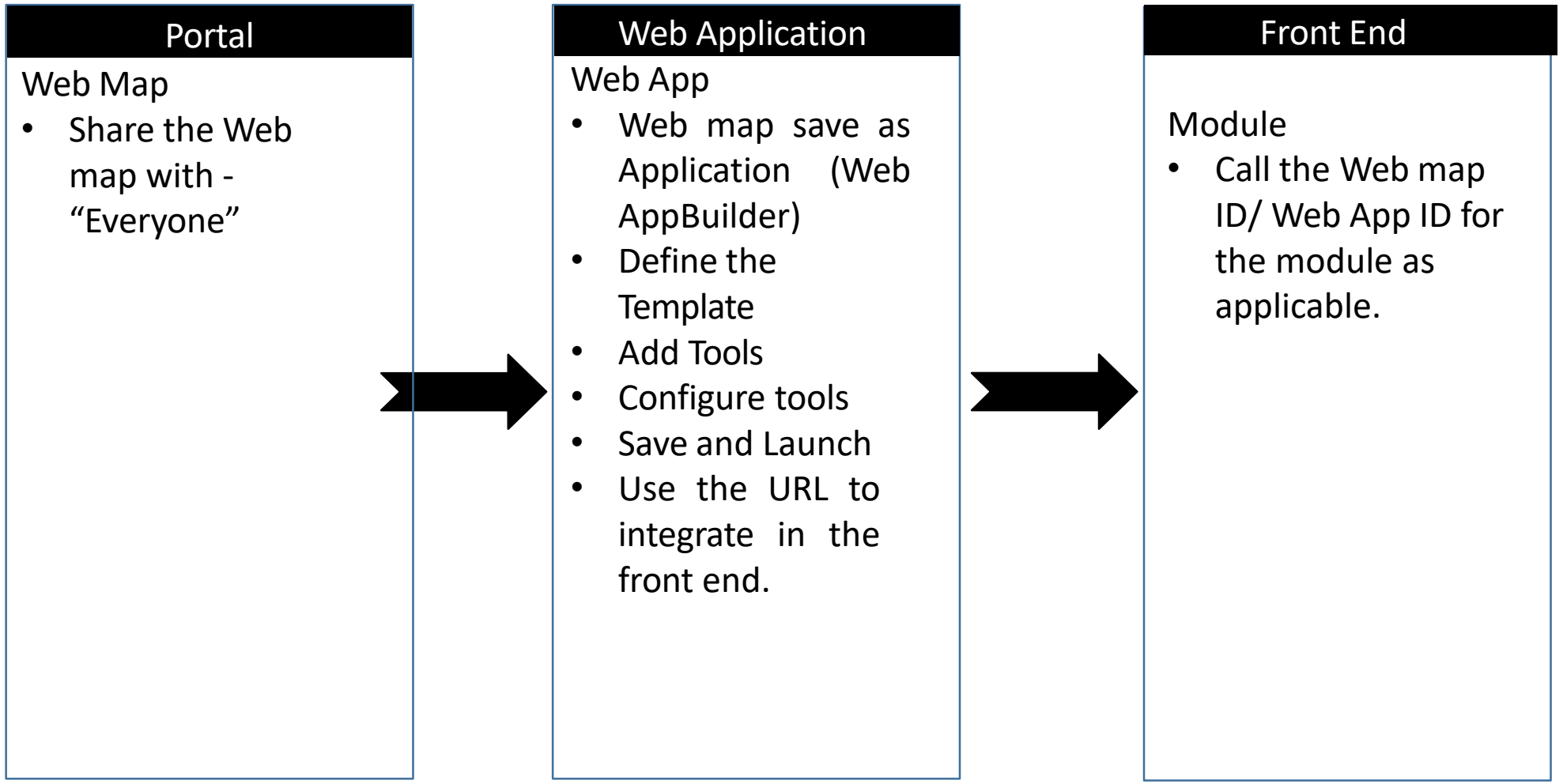


1. Total DAM= 4661
2. Barrage/Anicut/Weir=1062
3. Power House =301
4. Lift= 735
5. Canal = 65537
6. Command= 2645
7. Major/Medium Irrigation projects= 1795
8. Hydro Electric Project=240
9. ERM=133

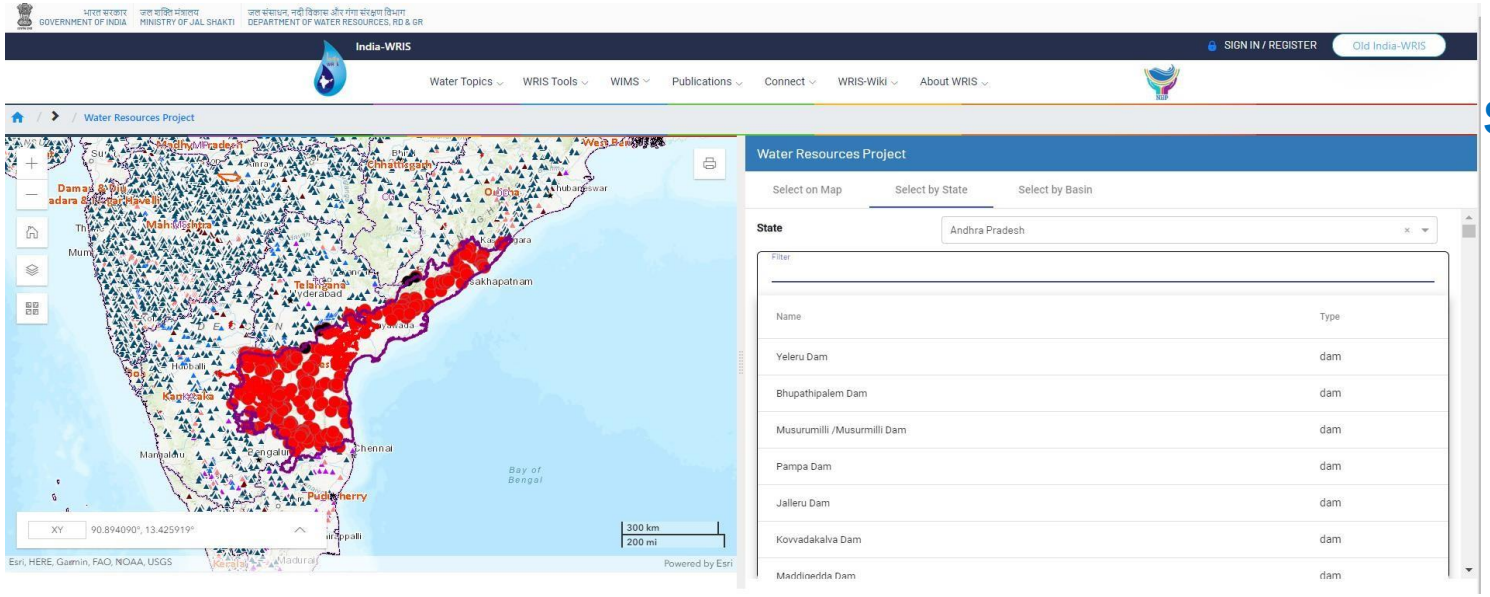
Publishing Map Service and Portal View



Web Map >>> Web Application >>> Front End

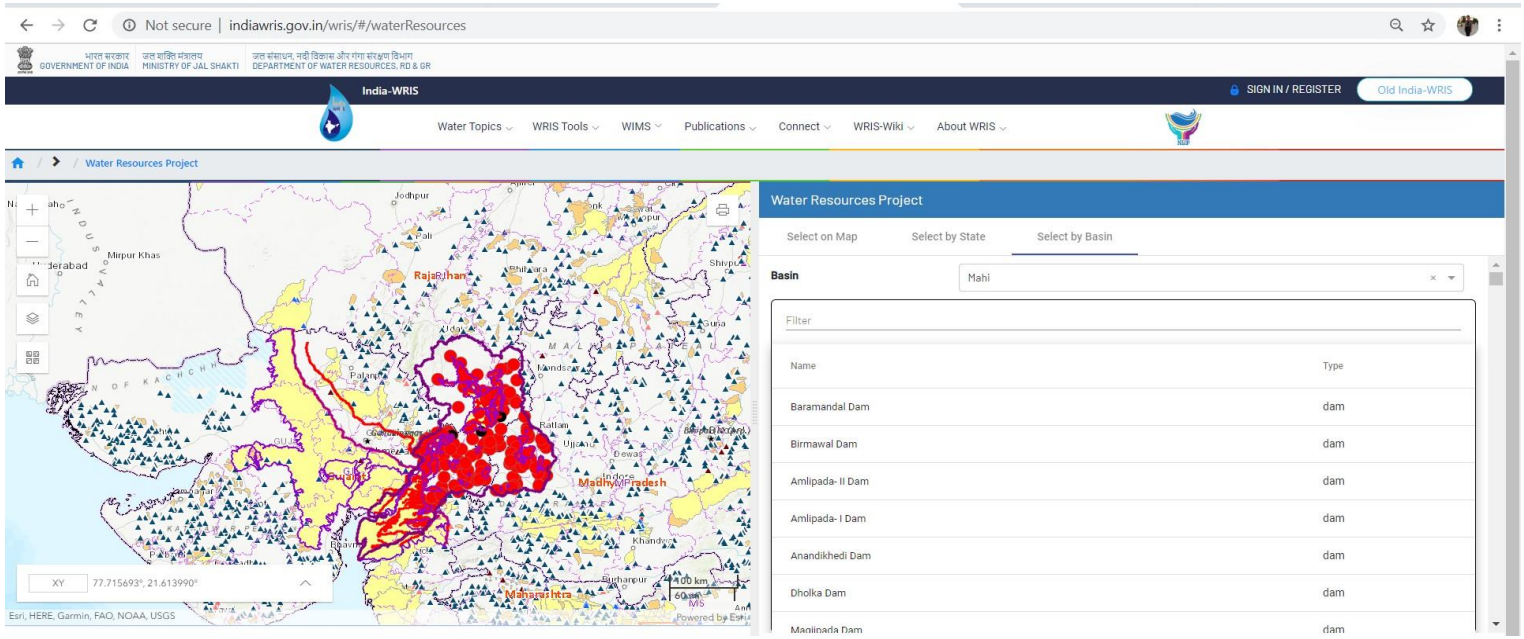


Water Resources Project



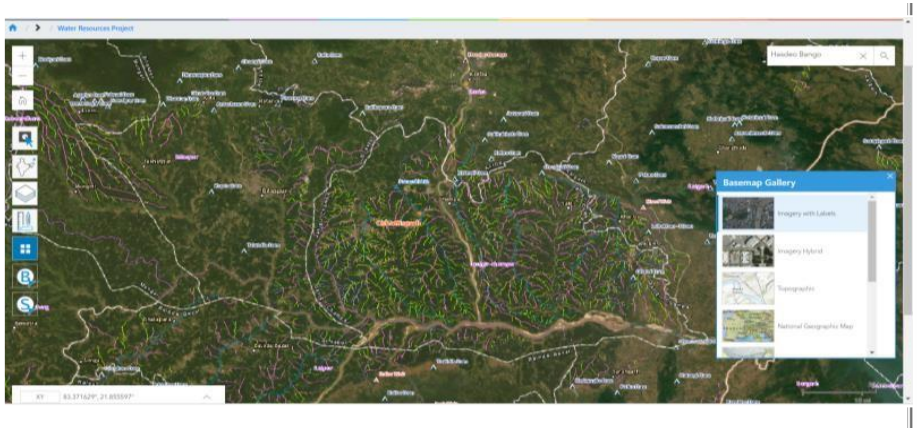
Select by State

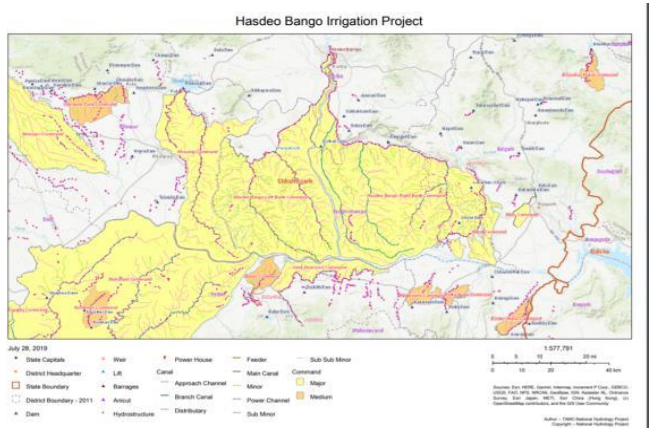
Select by Basin



Water Resources Projects
India-WRIS

Live Modules





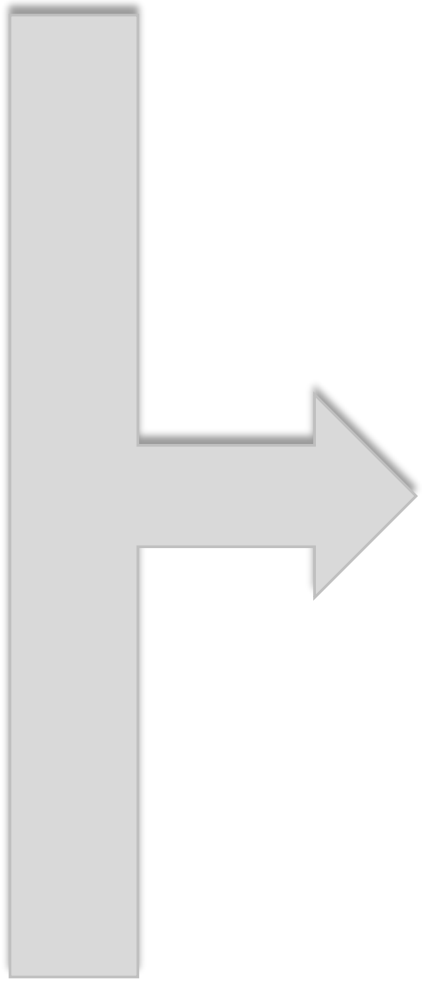
Water Resources Projects

- Information of all Major and Medium Projects of India
- Generation of online maps in different formats and sizes
- Selection of Features by State or Basin
- Download the Salient features

1. Total DAM= 4661
2. Barrage/Anicut /Weir=1062
3. Power House =301
4. Lift= 735
5. Canal = 65537
6. Command= 2645
7. Major/Medium Irrigation projects= 1795
8. Hydro Electric Project=240 9. ERM=133

Hydrology Layers of Basins

Ganga Basin
Sabarmati Basin
Mahi Basin
Narmada Basin
Tapi Basin
Godavari Basin
Mahanadi Basin
Brahmani and Baitarni Basin
Subernarekha Basin
Pennar Basin
East flowing rivers between Pennar and Kanyakumari basin
Krishna Basin
East flowing rivers between Mahanadi and Pennar Basin
West flowing rivers from Tadri to Kanyakumari Basin
West flowing rivers from Tapi to Tadri Basin
West flowing rivers of Kutch and Saurashtra including Luni Basin
Cauvery Basin
Barak and others Basin

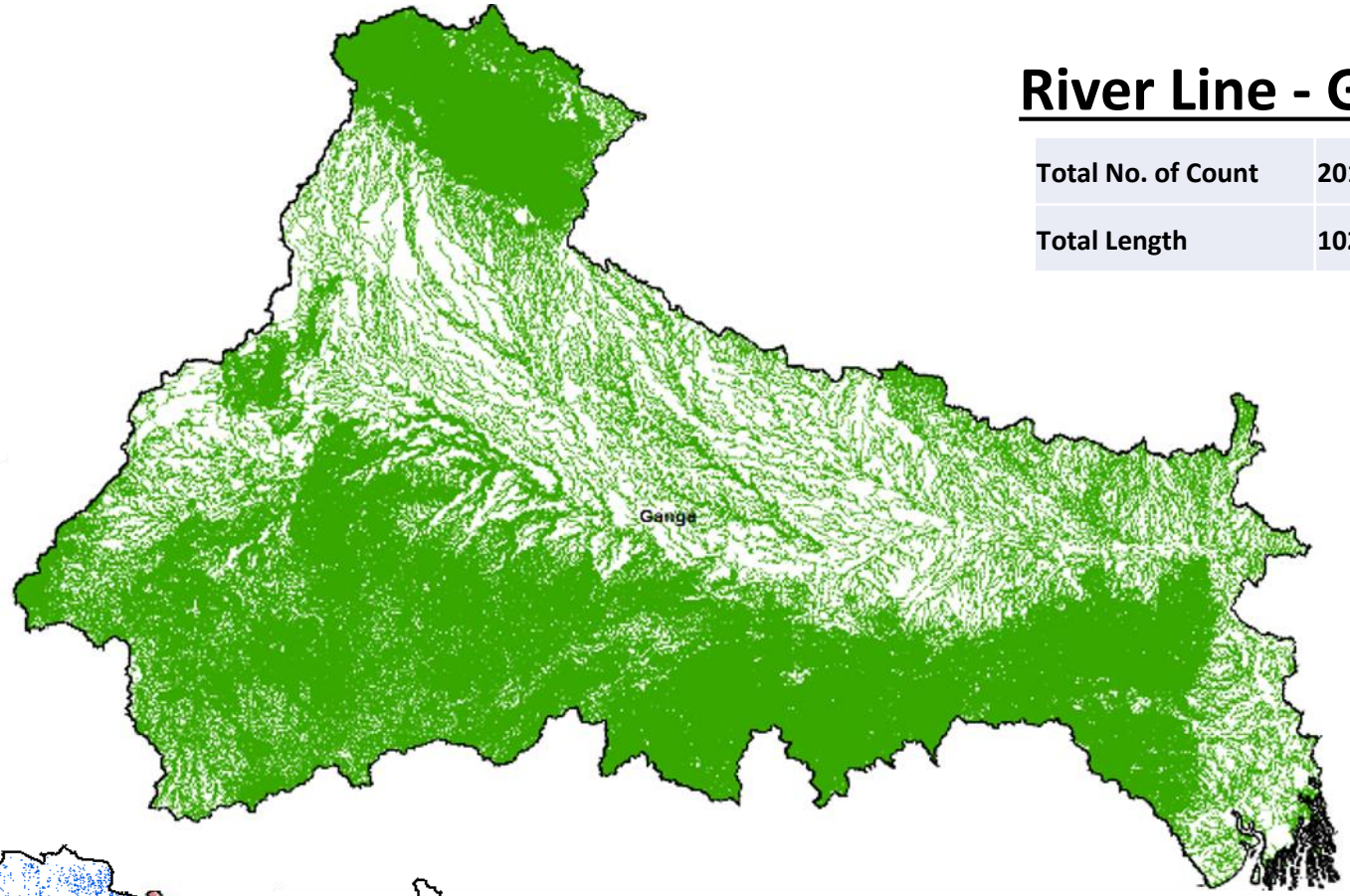


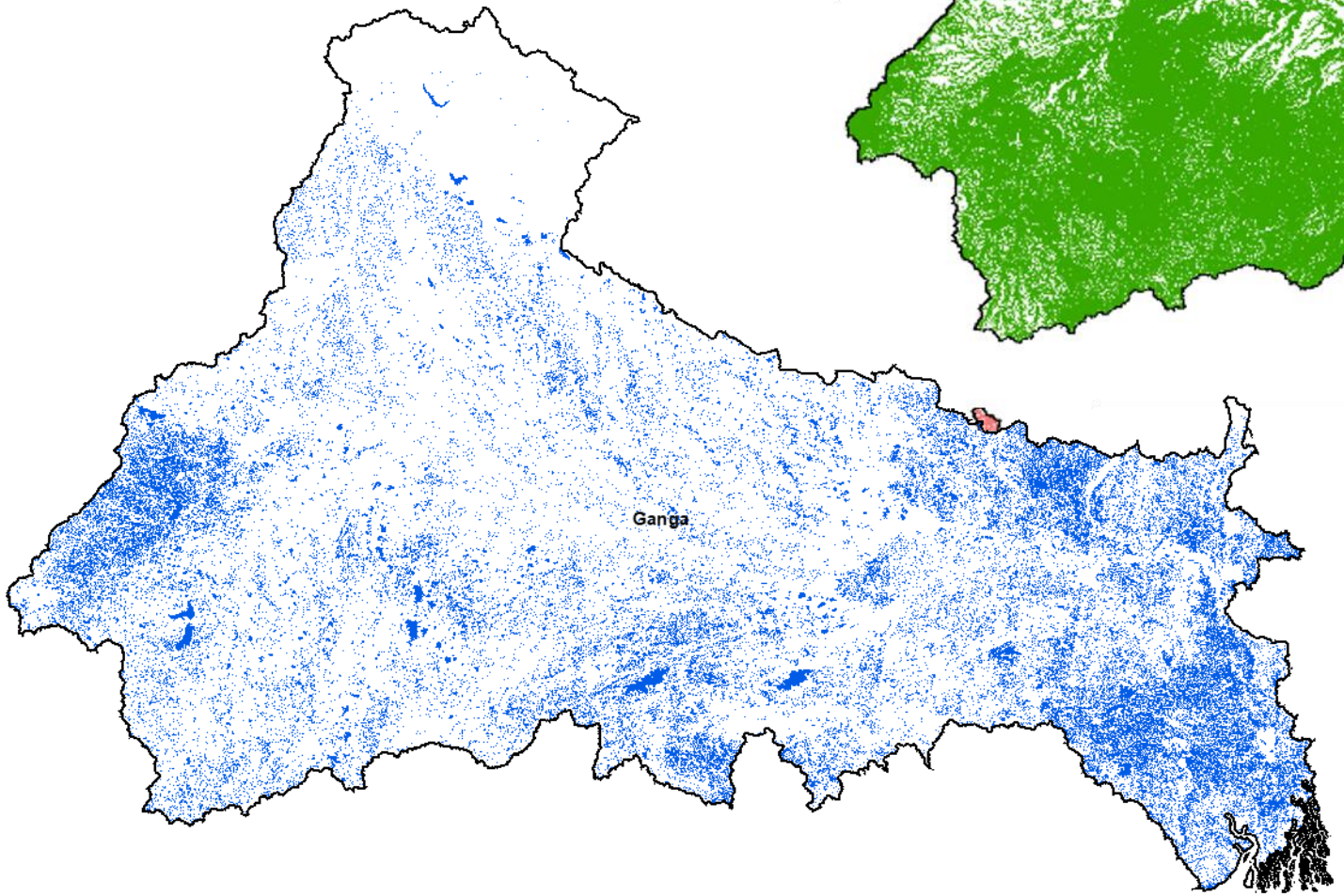
Layer Name

1. River Name
2. River Line
3. Waterbody
4. River Polygon

River Line - Ganga

Total No. of Count	2017110
Total Length	1025205.26 km



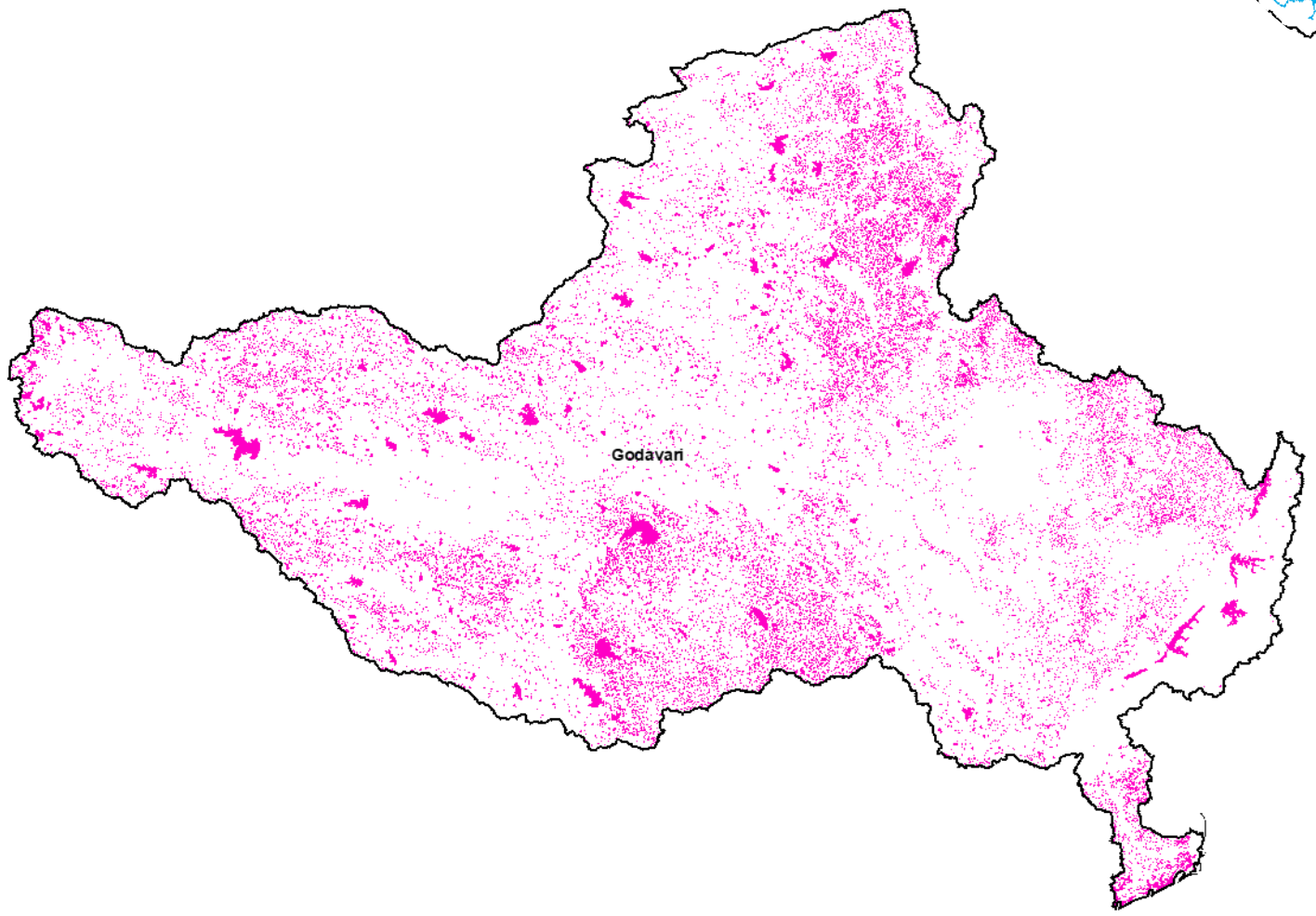


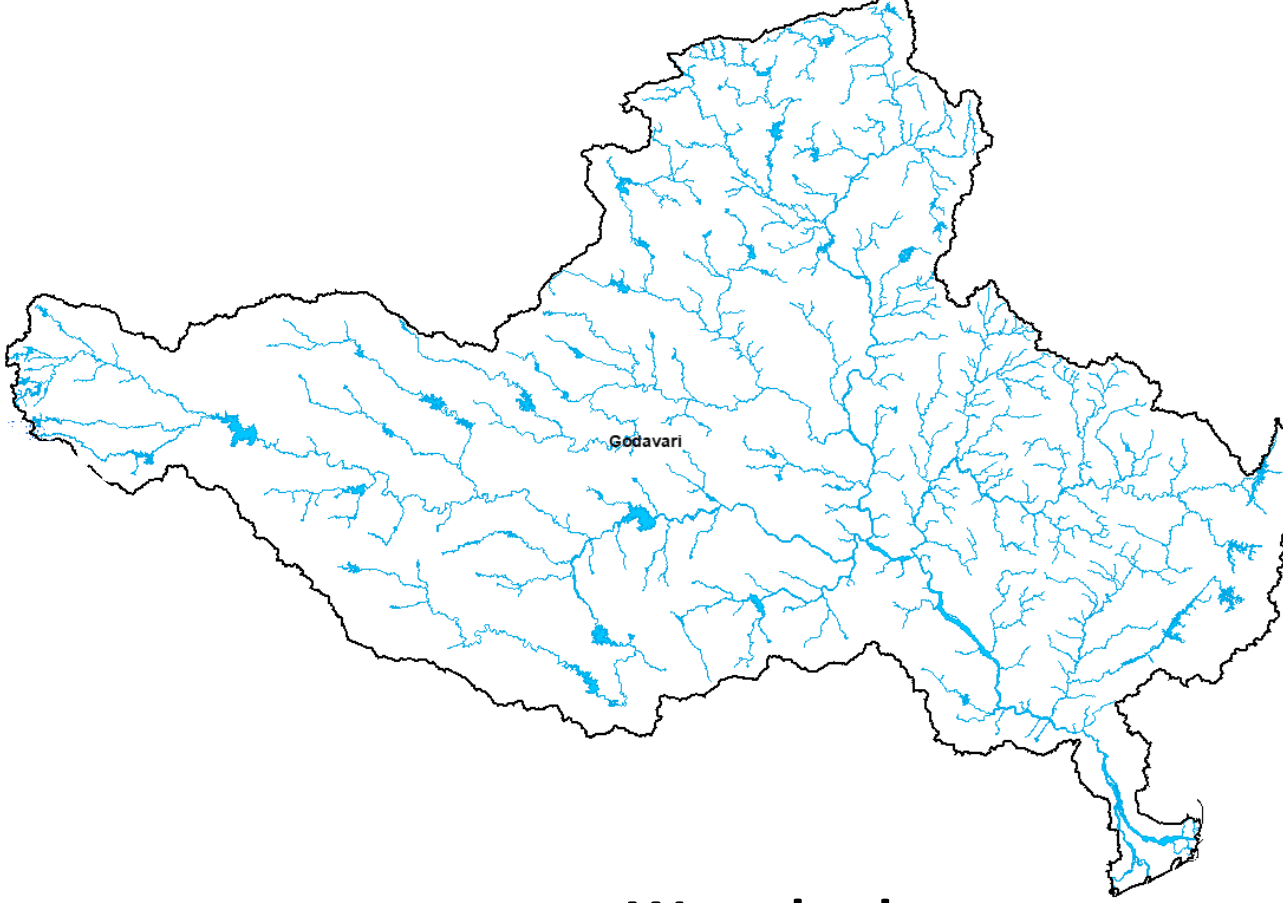
Waterbody

Total No. of Count	239356
Total Area	876389.26 ha

River Polygon - Godavari

Total No. of Count	578
Total Area	5993.84 Sq. km





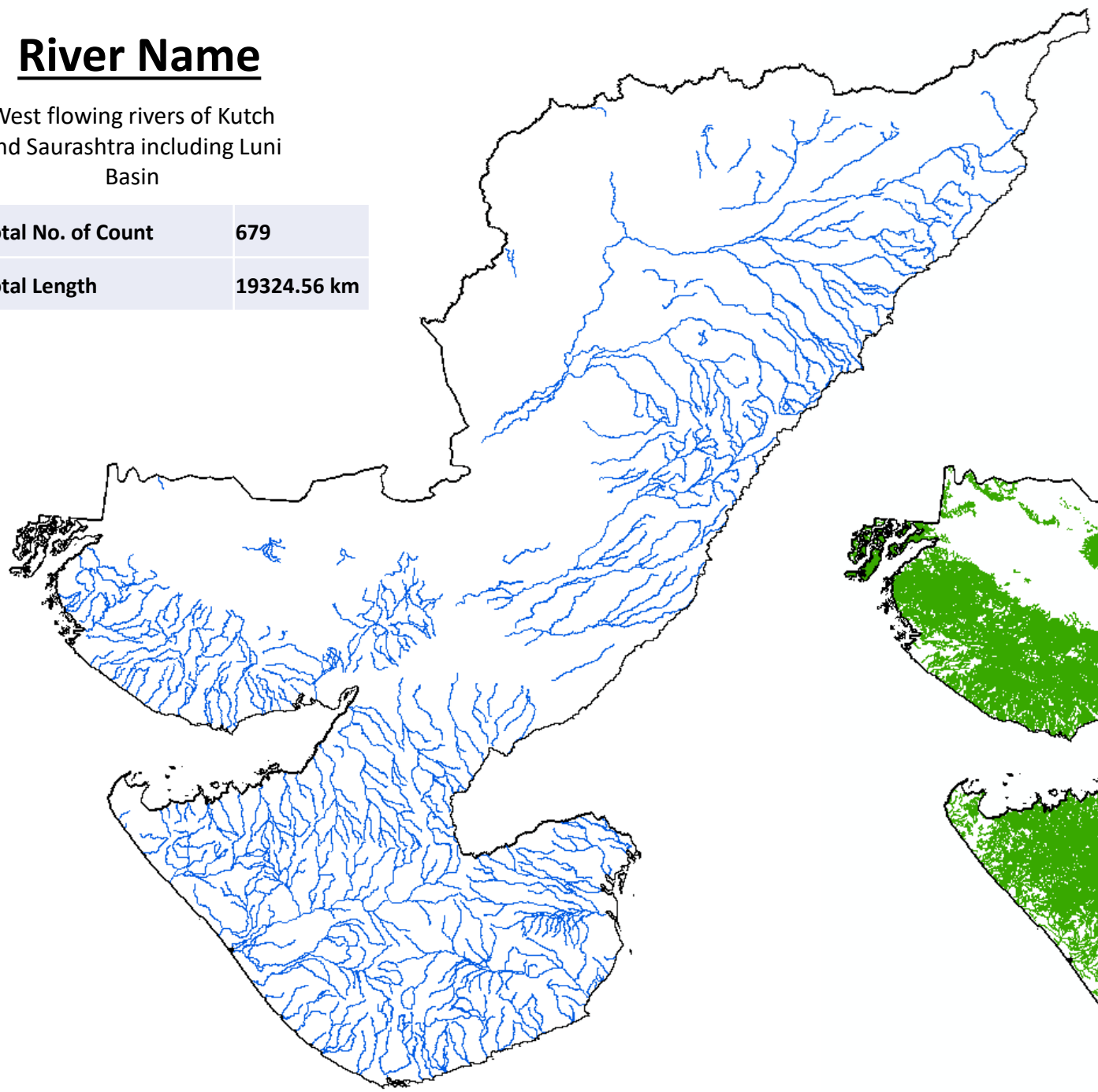
Waterbody

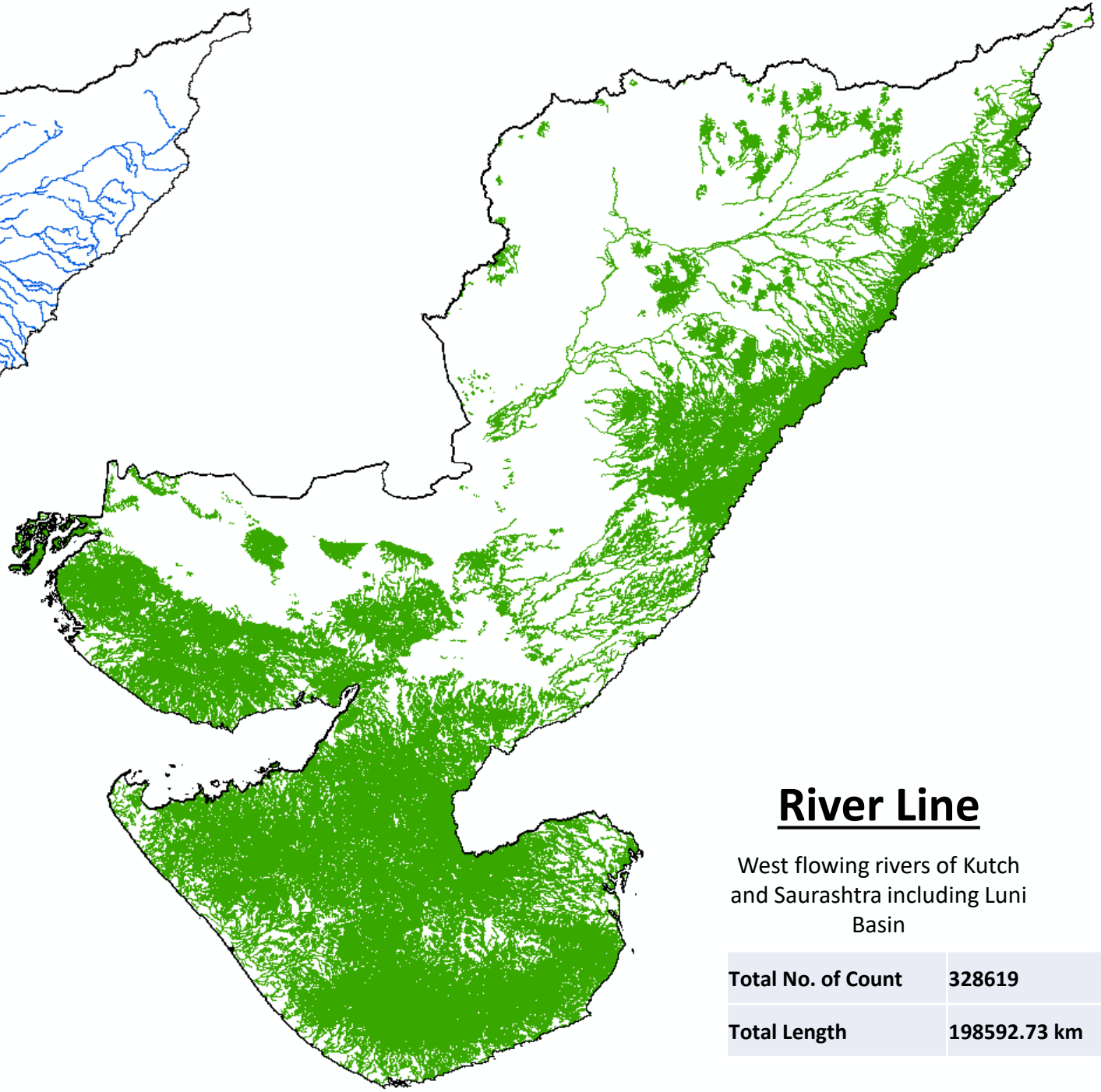
Total No. of Count	61555
Total Area	571939.79 ha

River Name

West flowing rivers of Kutch and Saurashtra including Luni Basin

Total No. of Count	**679**
Total Length	**19324.56 km**

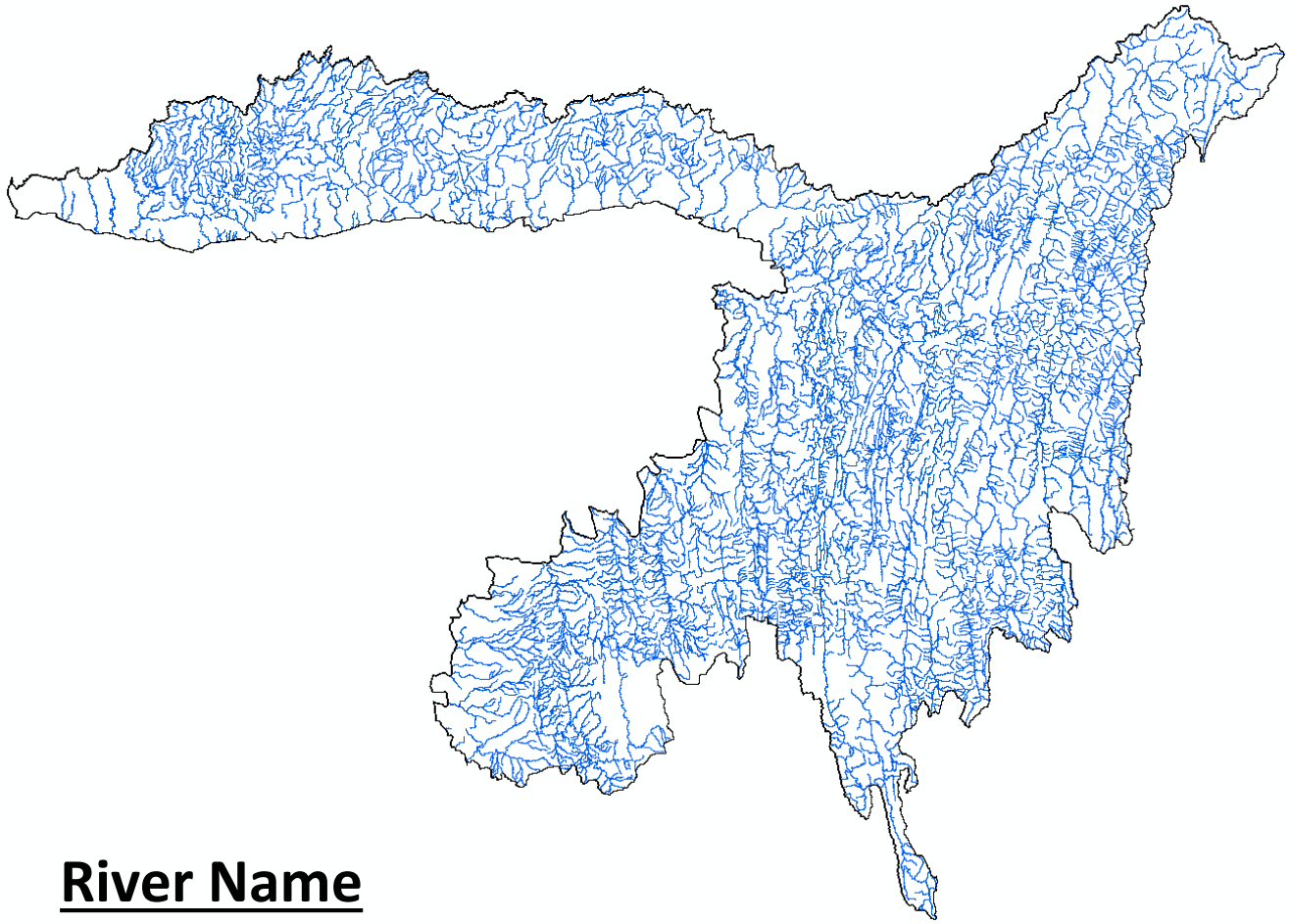




River Line

West flowing rivers of Kutch and Saurashtra including Luni Basin

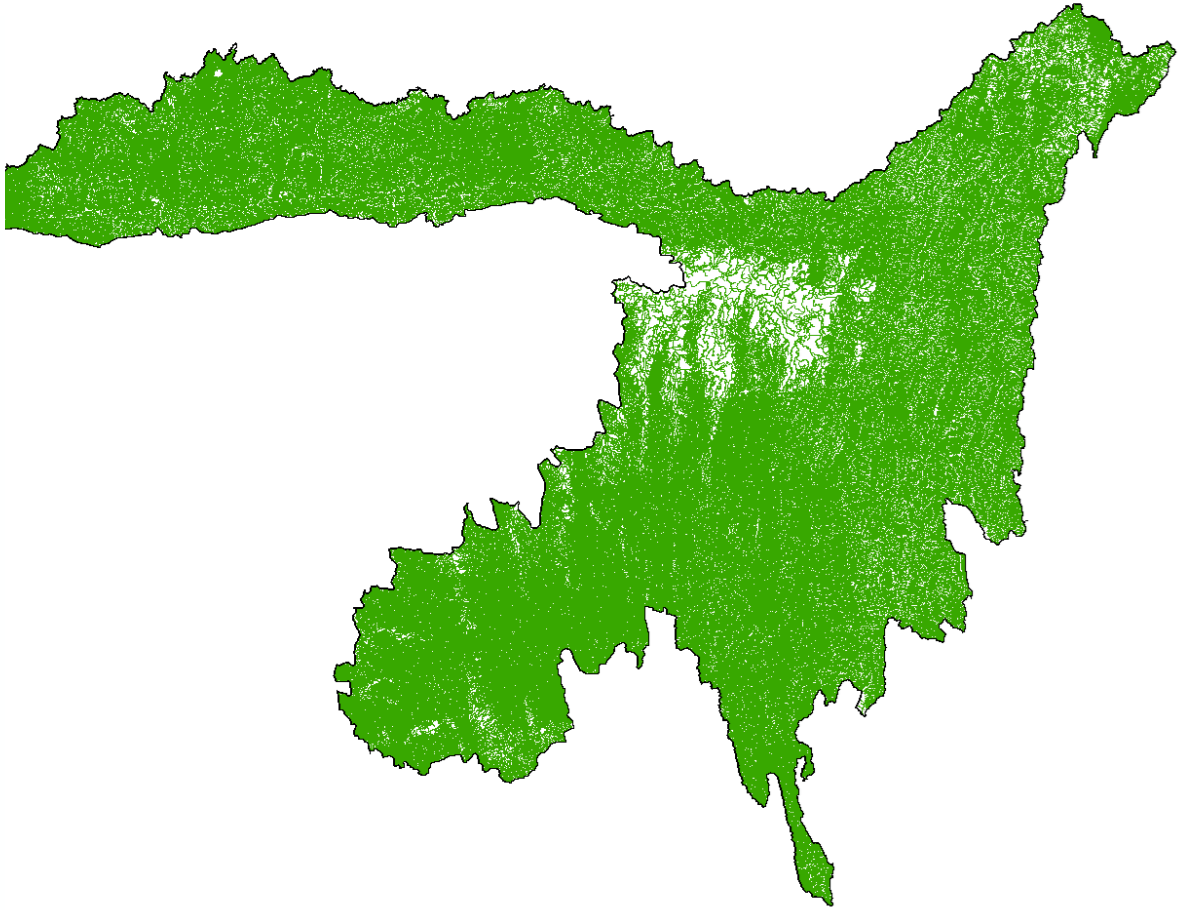
Total No. of Count	**328619**
Total Length	**198592.73 km**



River Name

Barak and others Basin

Total No. of Count	**3094**
Total Length	**25672.58 km**



River Line

Barak and others Basin

Total No. of Count	**406596**
Total Length	**122864.38 km**

Basin Name	River Name	River line	Waterbody	River Polygon
	Updated Length in km	Updated Length in km	Updated Area in ha	Updated Area in Sq. km
Ganga Basin	153104.11	1025205.26	876389.26	19028.66
Sabarmati Basin	4368.5	47021.93	62486.61	481.56
Mahi Basin	7226.18	101602.73	84874.81	754.12
Narmada Basin	26748.93	220051.7	181203.1	2498.36
Tapi Basin	17011.21	159994.2	103281.81	1172.37
Godavari Basin	61962.06	559271.28	571939.79	5993.84
Mahanadi Basin	33582.92	230932.25	338202.25	4985.89
Brahmani and Baitarni Basin	15518.52	97321.58	70594.48	1446.45
Subernarekha Basin	6221.47	43728.61	32777.04	494.61
Pennar Basin	8045.57	84932.58	157080.63	792.29
East flowing rivers between Pennar and Kanyakumari basin	14494.15	146382.79	758408.53	2201.38
Krishna Basin	31539.41	414961.02	578682.66	5449.4
East flowing rivers between Mahanadi and Pennar Basin	12717.59	106354.65	267496.77	581.4
West flowing rivers from Tadri to Kanyakumari Basin	13997.54	113475.48	130100.39	1521.92
West flowing rivers from Tapi to Tadri Basin	12145.32	151555.69	75543.8	1681.17
West flowing rivers of Kutch and Saurashtra including Luni Basin	19324.56	198592.73	1017196.46	1868.74
Cauvery Basin	17975.64	122864.38	239121.25	1721.39
Barak and others Basin	25672.58	122864.38	18067.48	353.87

Basin Name	River Name	River line	Waterbody	River Polygon
	Updated Data Count	Updated Data Count	Updated Data Count	Updated Data Count
Ganga Basin	7552	2017110	239356	13960
Sabarmati Basin	101	97117	3228	139
Mahi Basin	214	259224	5046	118
Narmada Basin	1160	537122	13798	2873
Tapi Basin	695	358361	5573	463
Godavari Basin	2632	985755	61555	578
Mahanadi Basin	1450	404854	123855	10027
Brahmani and Baitarni Basin	843	171261	26533	642
Subernarekha Basin	250	66818	22518	410
Pennar Basin	334	113632	9266	128
East flowing rivers between Pennar and Kanyakumari basin	567	190140	58225	888
Krishna Basin	1153	613608	39396	3229
East flowing rivers between Mahanadi and Pennar Basin	487	137369	29419	737
West flowing rivers from Tadri to Kanyakumari Basin	727	194791	14791	2664
West flowing rivers from Tapi to Tadri Basin	556	321991	5510	1170
West flowing rivers of Kutch and Saurashtra including Luni Basin	679	328619	19838	252
Cauvery Basin	1087	157225	42836	1568
Barak and others Basin	3094	406596	3034	741

Hydrological Layers

Sl. No	Sub-Group	Layers List	Geometry	Source
				Ad
1	Administrative Boundaries	International Boundary	Polygon	Survey of India (SOI), Govt. of India
2		State Boundaries	Polygon	Survey of India (SOI), Govt. of India
3		District Boundaries - 2011	Polygon	Survey of India (SOI), Govt. of India
4		Tehsil	Polygon	SOI/Census of India
5		Block	Polygon	CGWB
6		Village Boundary	Polygon	Census of India/ SOI
7		Settlement Extent (Town, Village, Hamlet)	Polygon	IRS LISS IV + Cartosat merged Satellite data (NRSC) and Topo sheets (SOI)

Hydrological Layers

Group	Layer Name	Feature Type	Source
Hydrological Boundaries	Water Resource Region	Point	Delineated from SRTM
	Basin WRIS	Polygon	Delineated from SRTM 90m DEM version 4 (http://srtm.csi.cgiar.org)
	Sub Basin WRIS	Polygon	SRTM 90m DEM version 4 (http://srtm.csi.cgiar.org), Carto DEM and Satellite data (NRSC) and Topo sheets (SOI)
	Watershed	Polygon	SRTM 90m DEM version 4 (http://srtm.csi.cgiar.org), Carto DEM and Satellite data (NRSC) and Topo sheets (SOI)
	Basin CWC	Polygon	CWC (Central Water Commission)
	Sub-Basin CWC	Polygon	CWC (Central Water Commission)
	Basin CGWB	Polygon	Central Ground Water Board, CGWB (digitized from A4 size map)
	Basin AISLUS	Polygon	All India Soil and Land Use Survey
	Basin NCIWRDP	Polygon	NCIWRDP

Hydrological Layers

Group	Layer Name	Feature Type	Source
Hydrological Layers	Surface Water Bodies	Polygon	Digitized using IRS LISS IV + Cartosat merged Satellite data and Topo sheets (SOI) (2011-2013 imagery)
	River line	Polyline	IRS LISS IV + Cartosat merged Satellite data (NRSC) and Topo sheets (SOI)
	Major Rivers	Polyline	CWC (Central Water Commission) / Inhouse
	River Polygon	Polygon	IRS LISS IV + Cartosat merged Satellite data (NRSC) and Topo sheets (SOI)
	River Name	Polyline	IRS LISS IV + Cartosat merged Satellite data (NRSC) and Topo sheets (SOI)

Water Resources Region

1. Water Resource Region

Module	Region	Area SqKm	Area Within India	Area Outside India
River Basins	Indus Drainage	552085	453932	98154
	Rivers Draining into Arabian Sea	521694	521694	
	Minor River Draining into other Basin/Country	59469	59469	
	Brahmaputra Drainage	540640	232044	308596
	Rivers Draining into Bay of Bengal	2085211	1904571	180640
	Island Drainage	7752	7752	
Total		**3766852**	**3179462**	**587390**

Water Resources Region State Wise Area

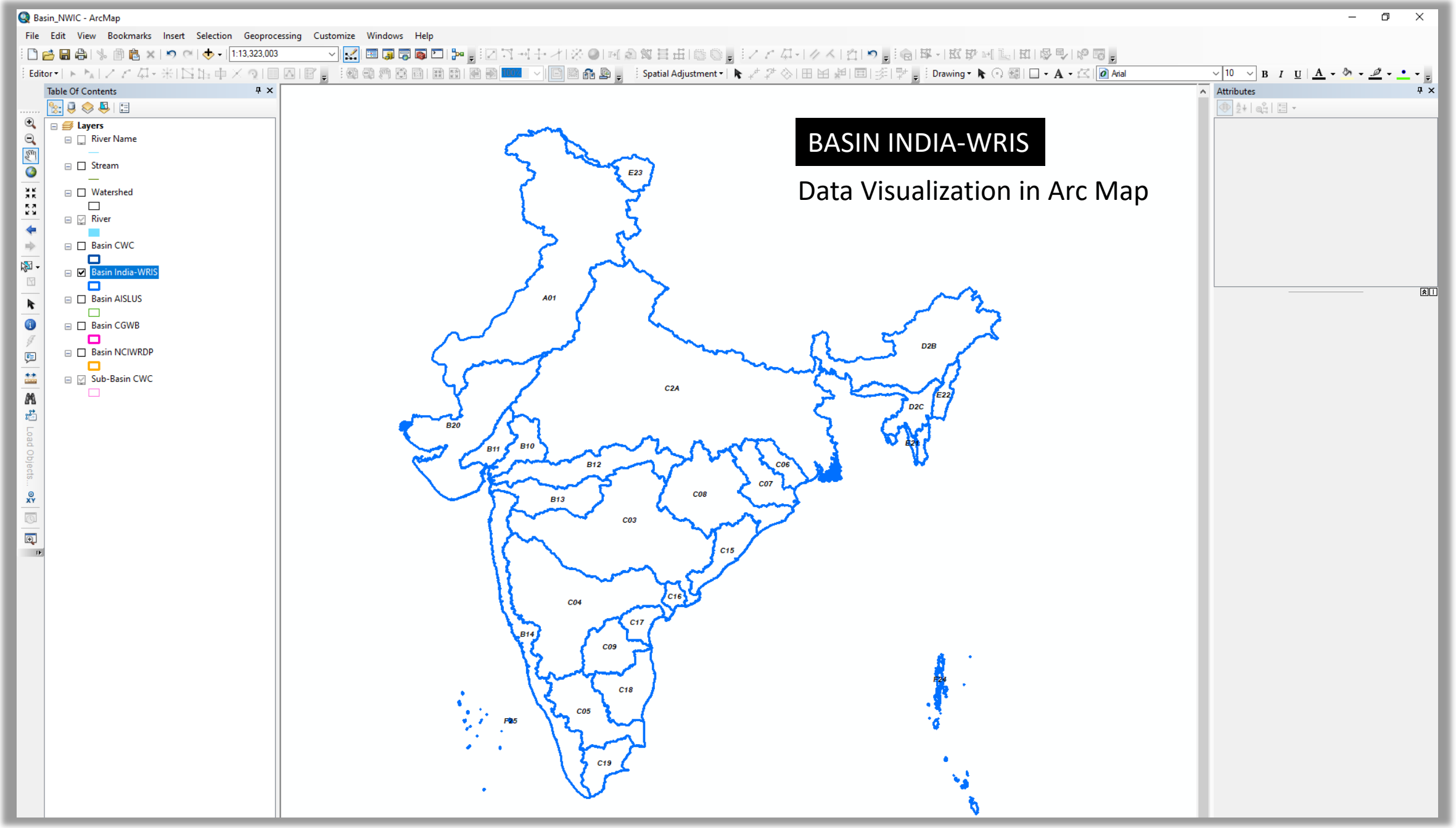
2. Water Resource Region

Module	States/Uts	Region Area in SqKm							Non Spatial Attribute
		Brahmaputra Drainage	Indus Drainage	Island Drainage	Minor River Draining into other Basin/Country	Rivers Draining into Arabian Sea	Rivers Draining into Bay of Bengal	Total	
River Basins	Andaman & Nicobar Island			7578				7578	Annexure-1
	Andhra Pradesh			21			157391	157412	
	Arunanchal Pradesh	79354						79354	
	Assam	75592						75592	
	Bihar						90571	90571	
	Chattisgarh					676	129729	130405	
	Chandigarh		115					115	
	Daman & Diu			32		73		105	
	Delhi & NCR						1456	1456	
	Dadara & Nagar Havelli					478		478	
	Goa			0		3567		3568	
	Gujarat			144		178345		178489	
	Himachal Pradesh		48589				6023	54612	
	Haryana		29555				13228	42783	
	Jharkhand						76819	76819	
	Jammu & Kashmir		53052					53052	
	Karnataka			14		24836	164436	189286	
	Kerala					36404	3007	39412	
	Lakshadweep			670				670	
	Ladakh		139275		29238			168513	
	Maharashtra			1		83027	214795	297823	
	Meghalaya	21598						21598	
	Manipur	9372			12082			21453	
	Madhya pradesh					98043	198341	296384	
	Mizoram	8546			11744			20290	
	Nagaland	11307			4673			15980	
	Odisha			36			150288	150324	
	Punjab		49169					49169	
	Puducherry					10	493	503	
	Rajasthan		134163			91756	104224	330143	
	Sikkim	6887					0	6887	
	Tamil Nadu			117		4477	126712	131306	
	Tripura	8354			1684			10037	
	Telengana						111573	111573	
	Uttarakhand		16				52229	52244	
	Uttar Pradesh						232221	232221	
	West Bengal	11029		3			71034	82066	
	Out Side India	308602	98152	3	48	0	180641	587447	
	Total	**540640**	**552085**	**8619**	**59469**	**521694**	**2085211**	**3767718**	

Basin India-WRIS

5. Basin India-WRIS

Module	Basin Name	Basin Area in SqKm	Non Spatial Attribute
River Basins	Godavari Basin	302063	Annexure-4
	Krishna Basin	254750	
	Cauvery Basin	85626	
	Subernarekha Basin	25792	
	Brahmani and Baitarni Basin	51897	
	Mahanadi Basin	139651	
	Pennar Basin	54243	
	Indus (Up to border) Basin	453930	
	Mahi Basin	38052	
	Sabarmati Basin	30679	
	Narmada Basin	93494	
	Tapi Basin	63432	
	West flowing rivers South of Tapi Basin	111629	
	East flowing rivers between Mahanadi and Godavari Basin	46243	
	East flowing rivers between Godavari and Krishna Basin	10342	
	East flowing rivers between Krishna and Pennar Basin	23335	
	East flowing rivers between Pennar and Cauvery Basin	63642	
	East flowing rivers South of Cauvery Basin	38646	
	West flowing rivers of Kutch and Saurashtra including Luni Basin	184866	
	Minor rivers draining into Bangladesh Basin	5453	
	Minor rivers draining into Myanmar Basin	24731	
	Area of North Ladakha not draining into Indus Basin	29239	
	Drainage Area of Andaman and Nicobar Islands Basin	7578	
	Drainage Area of Lakshadweep Islands Basin	670	
	Ganga Basin	808337	
	Brahmaputra Basin	186365	
	Barak and others Basin	45622	
	Total	**3180307**	


Basin_NWIC - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
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Basin CGWB
Basin NCIWRDP
Sub-Basin CWC
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BASIN INDIA-WRIS
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E25

Non Spatial attributes stored in Arc Map Environment

Table

Basin India-WRIS

Basin Full Code	Basin Code	Region Code	STATE
C03	Godavari Basin	Drainage flowing into Bay of Bengal	Maharashtra, Telangana, Andhra Pradesh, Madhya Pradesh, Odisha, Karnataka, Puducherry and Chhattisgarh
C04	Krishna Basin	Drainage flowing into Bay of Bengal	Karnataka, Telangana, Andhra Pradesh and Maharashtra
C05	Cauvery Basin	Drainage flowing into Bay of Bengal	Tamil Nadu, Puducherry, Karnataka and Kerala
C06	Subernarekha Basin	Drainage flowing into Bay of Bengal	Odisha, Jharkhand and West Bengal
C07	Brahmani and Baitarni Basin	Drainage flowing into Bay of Bengal	Odisha, Jharkhand and Chhattisgarh
C08	Mahanadi Basin	Drainage flowing into Bay of Bengal	Madhya Pradesh, Chhattisgarh, Odisha, Jharkhand and Maharashtra
C09	Pennar Basin	Drainage flowing into Bay of Bengal	Andhra Pradesh and Karnataka
A01	Indus (Up to border) Basin	Indus Drainage	Jammu and Kashmir, Himachal Pradesh, Punjab, Rajasthan, Haryana,Union Territory of Chandigarh
B10	Mahi Basin	Drainage flowing into Arabian sea	Rajasthan, Gujarat and Madhya Pradesh
B11	Sabarmati Basin	Drainage flowing into Arabian sea	Gujarat and Rajasthan
B12	Narmada Basin	Drainage flowing into Arabian sea	Madhya Pradesh, Chhattisgarh, Gujarat and Maharashtra
B13	Tapi Basin	Drainage flowing into Arabian sea	Maharashtra, Madhya Pradesh and Gujarat
B14	West flowing rivers South of Tapi Basin	Drainage flowing into Arabian sea	Gujarat, Maharashtra, Dadara & Nagar Haveli, Goa, Daman & Diu, Kerala, Tamil Nadu, Puducherry and Karnataka
C15	East flowing rivers between Mahanadi and Godavari Basin	Drainage flowing into Bay of Bengal	Andhra Pradesh and Odisha
C16	East flowing rivers between Godavari and Krishna Basin	Drainage flowing into Bay of Bengal	Andhra Pradesh
C17	East flowing rivers between Krishna and Pennar Basin	Drainage flowing into Bay of Bengal	Andhra Pradesh
C18	East flowing rivers between Pennar and Cauvery Basin	Drainage flowing into Bay of Bengal	Karnataka, Andhra Pradesh, Tamil Nadu and Puducherry
C19	East flowing rivers South of Cauvery Basin	Drainage flowing into Bay of Bengal	Tamil Nadu
B20	West flowing rivers of Kutch and Saurashtra including Luni Basin	Drainage flowing into Arabian sea	Rajasthan, Gujrat and Diu
E21	Minor rivers draining into Bangladesh Basin	Rivers draining into other basins/countries (Myanmar, Bangladesh and China	Mizoram and Tripura
E22	Minor rivers draining into Myanmar Basin	Rivers draining into other basins/countries (Myanmar, Bangladesh and China	Manipur, Mizoram and Nagaland
E23	Area of North Ladakha not draining into Indus Basin	Rivers draining into other basins/countries (Myanmar, Bangladesh and China	Jammu and Kashmir
F24	Drainage Area of Andaman and Nicobar Islands Basin	Island drainage (Andamans, Nicobar & Lakshadweep islands)	Andaman and Nicobar Islands
F25	Drainage Area of Lakshadweep Islands Basin	Island drainage (Andamans, Nicobar & Lakshadweep islands)	Lakshadweep Islands
C2A	Ganga Basin	Drainage flowing into Bay of Bengal	Uttaranchal, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand, Rajasthan, West Bengal, Haryana, Himachal Pradesh,Union Territory of Delhi
D2B	Brahmaputra Basin	Brahmaputra Drainage	Arunachal Pradesh, Assam, Nagaland, Meghalaya, West Bengal and Sikkim
D2C	Barak and others Basin	Brahmaputra Drainage	Meghalaya, Manipur, Mizoram, Assam, Tripura and Nagaland

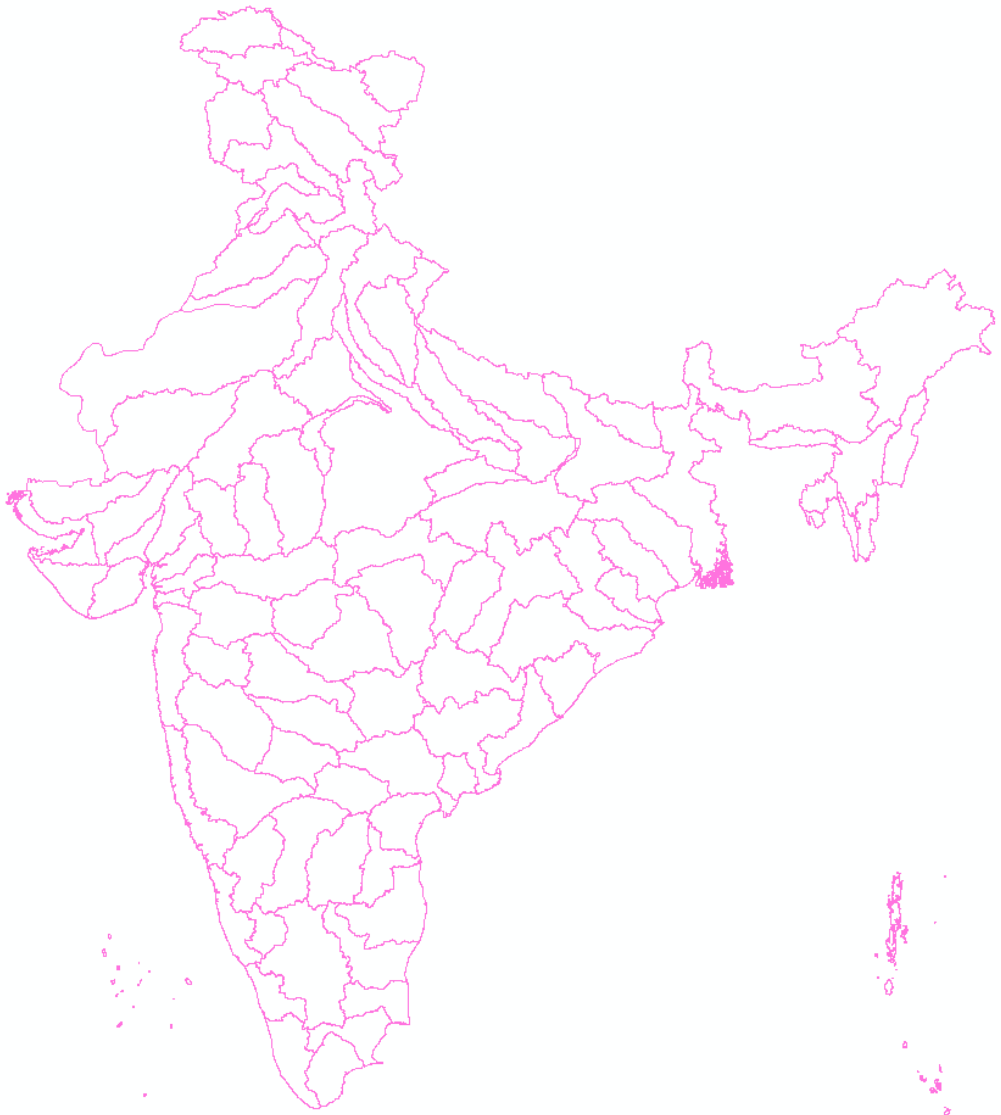
1 (0 out of 27 Selected)

Basin India-WRIS

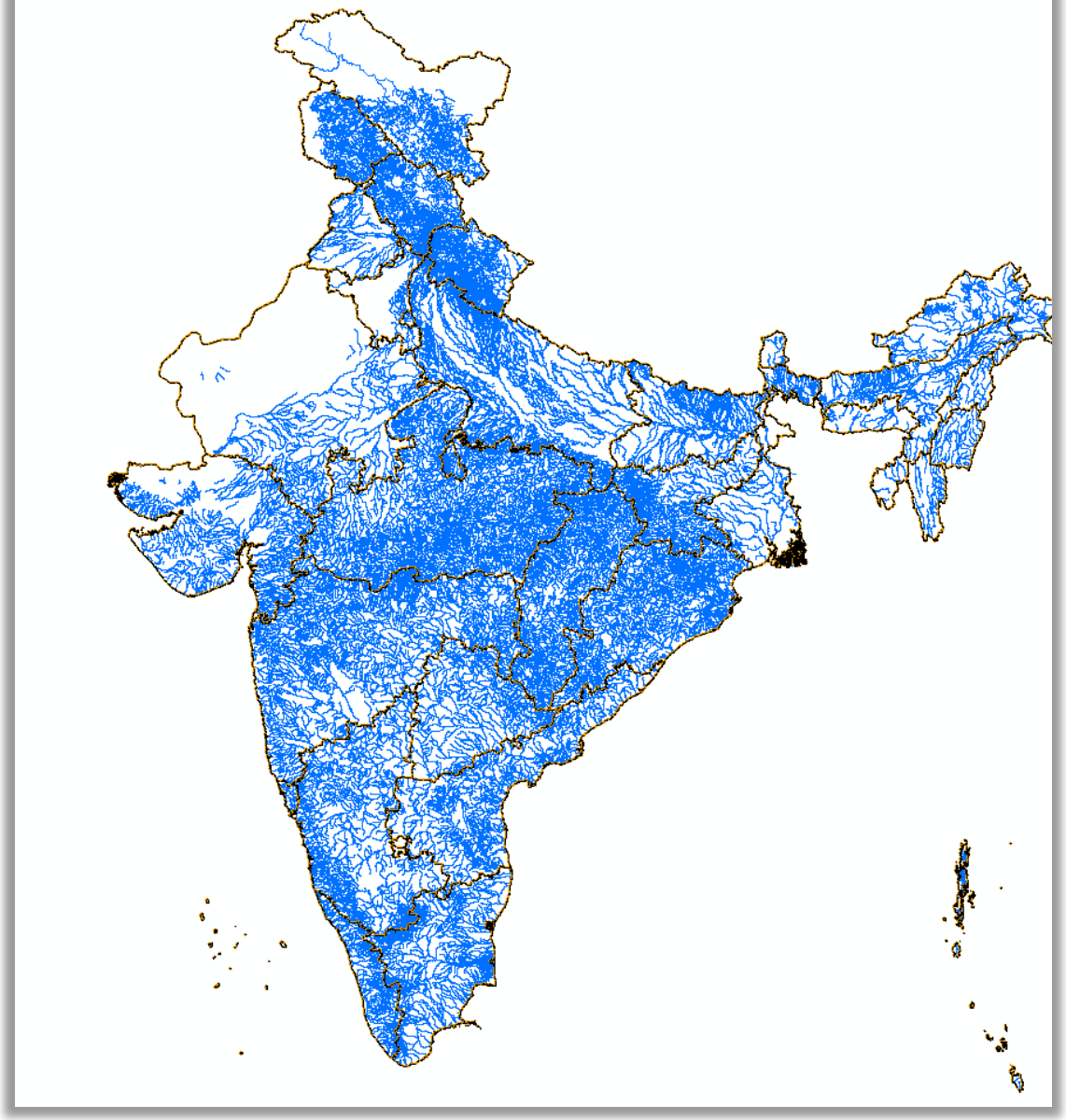
Basin India-CWC

4. Basin CWC											
Module	Basin Name	Average Annual Runoff (BCM)	Average Annual Water Potential (BCM)	Utilisable SW Resources (BCM)	No of Hydrological Observation Station	Storage Completed Live	Storage Under Construction Live	Storage Under Consideration Live	Total Live Storage	Area in Sqkm	Non Spatial Attribute
River Basins	Area of Inland drainage in Rajasthan	0	0	0	0	0	0	0	0		Annexure-3
	Barak and others	48.36	48.36	0	37	0.322	8.988	0	9.31	41723	
	Brahamaputra	537.24	537.24	24	122	1.71	0.69	41.263	2.4	194413	
	Brahmani and Baitarni	28.48	28.48	18.3	12	5.07	0.465	8.721	5.535	51822	
	Cauvery	21.36	21.36	19	34	8.978	0.015	0.262	8.993	81155	
	East flowing rivers between Mahanadi and Pennar	22.52	22.52	13.1	13	2.821	1.165	0.945	3.986	86643	
	East flowing rivers between Pennar and Kanyakumari	16.46	16.46	16.5	17	1.602	1.703	0	3.305	100139	
	Ganga	525.02	525.02	250	291	48.748	7.703	30.593	56.451	861452	
	Godavari	110.54	110.54	76.3	67	35.434	8.228	5.841	43.662	312812	
	Indus (Up to border)	73.31	73.31	46	34	16.222	0.1	2.576	16.322	321289	
	Krishna	78.12	78.12	58	56	50.117	4.287	1.128	54.404	258948	
	Mahanadi	66.88	66.88	50	37	12.779	1.465	10.094	14.244	141589	
	Mahi	11.02	11.02	3.1	12	5.015	0.16	0.012	5.175	34842	
	Minor rivers draining into Myanmar and Bangladesh	31	31	0	1	0.405	0.184	0.001	0.589	36202	
	Narmada	45.64	45.64	34.5	25	17.806	6.835	0.466	24.641	98796	
	Pennar	6.32	6.32	6.9	8	2.809	0.44	0	3.249	55213	
	Sabarmati	3.81	3.81	1.9	13	1.567	0.11	0.099	1.677	21674	
	Subernarekha	12.37	12.37	6.8	12	0.764	2.388	1.381	3.152	29196	
	Tapi	14.88	14.88	14.5	18	9.088	1.555	0.287	10.643	65145	
	West flowing rivers from Tadri to Kanyakumari	115.53	113.53	24.3	0	11.013	1.418	1.453	1.431	56177	
	West flowing rivers from Tapi to Tadri	87.41	87.41	11.9	0	14.267	2.329	0.082	16.596	55940	
	West flowing rivers of Kutch and Saurashtra including Luni	15.1	15.1	15	15	6.825	0.509	2.849	7.334	321851	
	Total	**1871.37**	**1869.37**	**690.1**	**824**	**253.362**	**50.737**	**108.053**	**293.099**	**3227021**	

Sub-Basin



River Name



River Name

Non Spatial attributes

rivname	origin	length	major_tributary	
Chambal	Vindhya Range Near Mhow In The Indore District Of Madhya Pradesh	988.130602	Banas, Bageri, Chamla R, Maleni, Sipra, Sau, Rupniya Nadi, Khokhi, Kali Sind	Polyline
Sind	Vidisha District Of Madhya Pradesh	525.177065	Pahuj, Kunwari, Vaisali, Mahuar,	Polyline
Mayurakshi N	Trikut hill, Deoghar in Jharkhand	218.038375	<Null>	Polyline
Godavari	Trambakeshwar, Nashik District In Maharashtra	1425.467562	Manjra, Pranhitha, Indravati, Purna, Sabari Kolab, Pravara, Sindphana, Kinna	Polyline
Tons	Tamaskund, In Kaimur Range In Satna District Of Madhya Pradesh	338.512009	<Null>	Polyline
Kanhar	Surguja District Of Chhattisgarh	257.381862	<Null>	Polyline
Rihand	Surguja District Of Chhattisgarh	85.847928	<Null>	Polyline
Hooghly	Splits from Ganga at Farakka Barrage	277.560992	<Null>	Polyline
Hindan	Southern Slopes Of Siwaliks In The Saharanpur District Of Uttar Pradesh	290.14285	<Null>	Polyline
Hathmati	South West Foot Hills Of Rajasthan Range In Gujarat State	115.466113	<Null>	Polyline
Son	Sonbhadra In The Maikala Ranges In Madhya Pradesh	572.235314	<Null>	Polyline
Burhi Gandak	Someshwar Hills In Champaran District	401.218428	<Null>	Polyline
Indravati	Rises On The Western Slopes Of Eastern Ghats In The Kalahandi District	640.106695	Paralkot, Bande, Pamlagotam, Bavardhig, Dantewara, Narangi, Bhaskel	Polyline
Bhogeshwar	Rises in the western ghats near village Bhogeshwari, District Raighad of Maharashtra	42.388771	<Null>	Polyline
Nira	Rises in the Easern slope of the Western Ghats	235.861955	Karha	Polyline
Manjra	Rises In The Balaghat Range	746.164368	Manar, Lendi, Tirna, Karanja	Polyline
Purna	Rises In The Ajanta Range	382.194872	Dudhana	Polyline
North Koel	Ranchi District Of Bihar	256.830466	<Null>	Polyline
Aran	Origion In Washim District In Maharashtra	226.397303	<Null>	Polyline
Penganga	Origion In Buldhana District In Maharashtra	685.425536	Aran	Polyline
Kaliyar Puzha	Originating from East of Erattupetta Village	34.596748	<Null>	Polyline
Pazhayar	Originating-Mahendragiri Hills, Altitude-800M	35.42166	<Null>	Polyline
Chaliyar	Originating-Elambalari Hills, Altitude-2067M	55.658418	<Null>	Polyline
Sita	Originates from the Western Ghats	74.316024	<Null>	Polyline
Gurpur R	originates from the high mountains of the Western Ghats	52.319049	<Null>	Polyline
Kuttyadi	Originate from South Wayanad	49.785311	<Null>	Polyline
Chalakudi	Originate from Sivagiri peak (80KM south of Devikulam)	82.523625	<Null>	Polyline
Periyar	Originate from Sivagiri peak	26.203402	<Null>	Polyline
Bharathapuzha Or Pulantod	Originate from Anamalai hills, Altitude-2250M above M	17.24047	<Null>	Polyline
Cauvery	Originate at Talakaveri in Coorg District of Karnataka in Brahmagiri Range of Western Ghats	847.537738	Hemavati, Kabini, Bhavani, Noyil, Amaravati, Shimsha, Arkavati	Polyline
Wainganga	Origin In Baitul District In Madhya Pradesh	636.276875	Penganga, Vena	Polyline
Wardha	Origin In Baitul District In Madhya Pradesh	533.600124	Penganga, Vena	Polyline
Gandak	North-East Of Dhaulagiri In Nepal	550.635102	<Null>	Polyline
Gomati	Near Manikot East Of Pillibhit District Of Uttar Pradesh	932.080041	<Null>	Polyline
Nagavali	Near Lakhbahal village in Thuamul Rampur block of Kalahandi District	249.555212	Suvarnamukhi, Jhanjabati	Polyline
Betwa	Near Khumra Village In Bhopal District Of Madhya Pradesh	656.674401	Dhasan, Birma, Jamni, Narain, Kethanm,	Polyline
Ajay	Near Deoghar in the Santhal Parganas District of Jharkhand	299.606428	<Null>	Polyline
Chandan R	Near Deoghar In The Santhal Parganas District In Bihar	120.478007	<Null>	Polyline
Mahanadi	Mandla District Of Madhya Pradesh	233.209705	<Null>	Polyline
Mahananda	Mahaldiran hills of Himalayas	273.22771	<Null>	Polyline
Krishna	Mahableshwar,Satara district in Maharashtra	1341.126212	Koyna, Varna, Panchaganga, Dudhganga, Ghatprabha, Malprabha, Bhima, T	Polyline
Rapti	Lower Ranges Of Himalayas In Nepal	536.25437	<Null>	Polyline
Ramganga	Lower Himalayas Near The Village Of Lohba In The Garhwal District Of Uttarakhand	482.379515	Gangan, Kosi, Baigul	Polyline
Sipra Or Kshipra	Kakri Bardi Hills Vindhya Range	204.387149	<Null>	Polyline
Damodar	Hills of the Chottanagpur Plateau, Bihar	559.257188	Barakar, Jamuniya N, Konar N, Gowai N	Polyline

Basin AISLUS

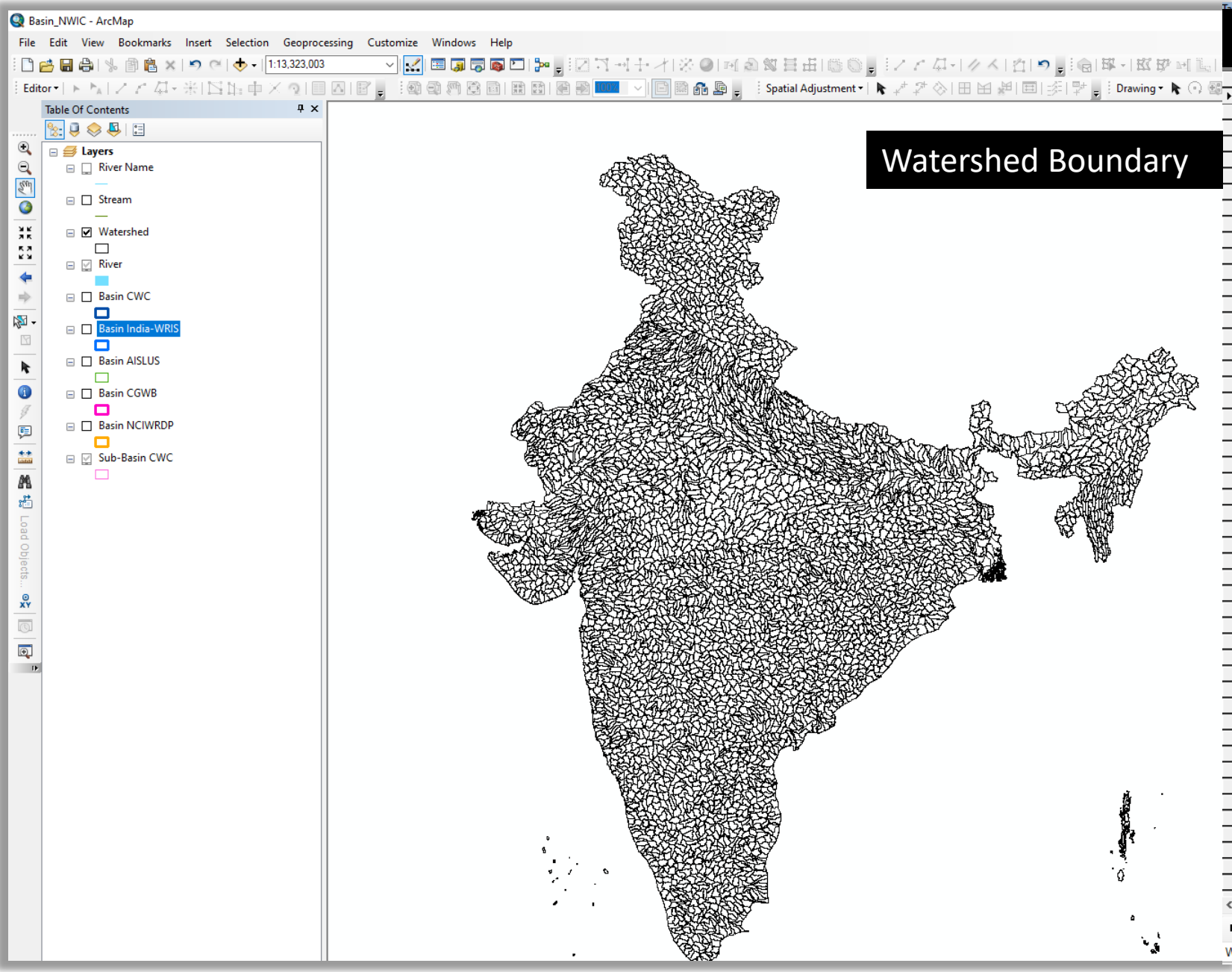
6. Basin AISLUS (All India Soil and Land Use Survey)			
Module	Basin Name	Basin Area in SqKm	Non Spatial Attribute
River Basins	Beas	20187	Annexure-5
	Between Cauvey and Krishna	143845	
	Between Godavari and Mahanadi	53949	
	Brahmaputra right bank upto Lohit confluence	105416	
	Brahmaputra tributaries that flow into Bangladesh	56093	
	Cape Comorin to Cauvery	37564	
	Cape Comorin to Sheravati	54771	
	Cauvery	84654	
	Chambal	136593	
	Chenab	29945	
	Draining into gulf of Kutch	58257	
	Eastern parts Manipur and Mizoram draining into Chidwim(Burma)	28320	
	Ephemeral incipient drainge not flowing into Indus	28676	
	From luni to Jaisalmer	58489	
	Godavari	315076	
	Indus	138613	
	Jaisalmer and Bikaner	69697	
	Jhelum	29513	
	Krishna	271444	
	Left bank ok of Brahmaputra	107133	
	Lower Ganges	296614	
	Luni and other drainage into Rann of Kutch	92518	
	Mahanadi	141875	
	Mahanadi to Ganges water resource region	84326	
	Mahi	39712	
	Narmada	95879	
	Ravi	13626	
	Rohtali to Ambala on east and Ganganagr in west	52582	
	Sabarmati	26967	
	Sharavati to Tapi	58146	
	Southern Kathiawar	39322	
	Sutlej	53108	
	Tapi	66652	
	Upper Ganges above confluence with Ghaghra	207557	
	Yamuna	212829	
	Total	**3309948**	

BASIN CGWB

7. Basin CGWB			
Module	Basin Name	Basin Area in SqKm	Non Spatial Attribute
River Basins	Barmer	58163	Annexure-6
	Beas	19562	
	Bhadar	36502	
	Bhatsol	54878	
	Brahmani	79815	
	Brahmputra	186873	
	Cauvery	85457	
	Chambal	130665	
	Chenab	29937	
	Churu	66316	
	Ghaghar	51438	
	Godavari	301888	
	Imphal	24476	
	Indus	137655	
	Jhelum	29231	
	Krishna	265505	
	Kutch	52880	
	Lower Ganga	249661	
	Luni	87393	
	Mahanadi	133665	
	Mahi	3870	
	Narmada	93398	
	Pennar	139463	
	Periyar	54580	
	Qura-qush	29683	
	Ravi	13230	
	Sabarmati	24995	
	Surma	50278	
	Sutlej	54458	
	Tapi	63347	
	Upper Ganga	231127	
	Vaippar	38565	
	Vamsadhara	50792	
	Yamuna	203641	
	Total	**3133387**	

Basin NCIWRDP

8. Basin NCIWRDP (National Commission for Integrated Water			
Module	Basin Name	Basin Area in SqKm	Non Spatial Attribute
River Basins	Area of North Ladakh Not draining into Indus	28478	Annexure-7
	Brahmani-Baitarani	51822	
	Cauvery	87900	
	Drainage Area of Andaman and Nicobar and Lakshadweep	8280	
	East Flowing Rivers between Godavari and Krishna	12289	
	East Flowing Rivers between Krishna and Pennar	24649	
	East Flowing Rivers between Mahanadi and Godavari	49570	
	East Flowing Rivers between Pennar and Cauvery	64751	
	East Flowing Rivers South of Cauvery	35026	
	Ganga-Brahmaputra-Meghna	1101242	
	Godavari	312812	
	Indus	321289	
	Krishna	258948	
	Mahanadi	141589	
	Mahi	34842	
	Narmada	98796	
	Pennar	55213	
	Rivers draining into Bangladesh	10031	
	Rivers draining into Myanmar	26271	
	Sabarmati	21674	
	Subarnarekha	29196	
	Tapi	65145	
	West Flowing Rivers of Kutch and Saurashtra Including Luni	334390	
	West Flowing Rivers South of Tapi	113057	
	Total	**3287260**	



Non Spatial attributes

Sub-Basin Code	Basin Code	Watershed full Code	Watershed Code	Area in Sq_km
Weinganga	Godavari Basin	C03WEI05	05	902.154393
Weinganga	Godavari Basin	C03WEI02	02	437.338383
Weinganga	Godavari Basin	C03WEI01	01	610.998975
Weinganga	Godavari Basin	C03WEI08	08	423.654877
Weinganga	Godavari Basin	C03WEI11	11	626.384976
Weinganga	Godavari Basin	C03WEI34	34	472.184511
Weinganga	Godavari Basin	C03WEI36	36	591.230331
Weinganga	Godavari Basin	C03WEI35	35	617.024334
Weinganga	Godavari Basin	C03WEI42	42	825.050115
Weinganga	Godavari Basin	C03WEI43	43	499.36883
Weinganga	Godavari Basin	C03WEI22	22	631.066648
Weinganga	Godavari Basin	C03WEI37	37	492.117273
Weinganga	Godavari Basin	C03WEI20	20	755.315659
Weinganga	Godavari Basin	C03WEI21	21	709.339175
Weinganga	Godavari Basin	C03WEI19	19	781.276618
Weinganga	Godavari Basin	C03WEI15	15	482.20329
Weinganga	Godavari Basin	C03WEI44	44	584.882207
Weinganga	Godavari Basin	C03WEI24	24	940.994419
Wardha	Godavari Basin	C03WAR35	35	393.00364
Wardha	Godavari Basin	C03WAR34	34	590.767161
Weinganga	Godavari Basin	C03WEI28	28	891.859836
Wardha	Godavari Basin	C03WAR38	38	569.143384
Weinganga	Godavari Basin	C03WEI47	47	493.584028
Weinganga	Godavari Basin	C03WEI46	46	576.973951
Weinganga	Godavari Basin	C03WEI29	29	539.838833
Weinganga	Godavari Basin	C03WEI45	45	783.985663
Weinganga	Godavari Basin	C03WEI48	48	492.078051
Weinganga	Godavari Basin	C03WEI30	30	437.0707
Weinganga	Godavari Basin	C03WEI49	49	886.801711
Weinganga	Godavari Basin	C03WEI55	55	412.197528
Weinganga	Godavari Basin	C03WEI57	57	494.83543
Weinganga	Godavari Basin	C03WEI50	50	761.693153
Weinganga	Godavari Basin	C03WEI51	51	735.116519
Weinganga	Godavari Basin	C03WEI56	56	401.813083
Weinganga	Godavari Basin	C03WEI52	52	818.470776
Wardha	Godavari Basin	C03WAR51	51	361.21578
Wardha	Godavari Basin	C03WAR54	54	562.136395
Weinganga	Godavari Basin	C03WEI58	58	708.339247
Weinganga	Godavari Basin	C03WEI53	53	718.298647
Weinganga	Godavari Basin	C03WEI54	54	306.081628
Wardha	Godavari Basin	C03WAR55	55	487.927982
Wardha	Godavari Basin	C03WAR52	52	635.019921
Wardha	Godavari Basin	C03WAR56	56	945.706146
Weinganga	Godavari Basin	C03WEI59	59	481.246726
Weinganga	Godavari Basin	C03WEI60	60	420.75963
Wardha	Godavari Basin	C03WAR48	48	712.429922
Wardha	Godavari Basin	C03WAR49	49	784.547786
Wardha	Godavari Basin	C03WAR50	50	811.140958
Wardha	Godavari Basin	C03WAR58	58	716.012521
Weinganga	Godavari Basin	C03WEI73	73	898.114579

1 (0 out of 4569 Selected)

Watershed

Sub-Basin CWC

9. Sub-Basin CWC

Module	Basin Name	Sub Basin Count	Non Spatial Attribute
River Basins	Area of Inland drainage in Rajasthan Basin	1	Annexure-8
	Barak and Others Basin	3	
	Brahamaputra Basin	2	
	Brahmani and Baitarni Basin	2	
	Cauvery Basin	3	
	East flowing rivers between Mahanadi and Pennar Basin	4	
	East flowing rivers between Pennar and Kanyakumari Basin	4	
	Ganga Basin	19	
	Godavari Basin	8	
	Indus (Up to border) Basin	11	
	Krishna Basin	7	
	Mahanadi Basin	3	
	Mahi Basin	2	
	Minor rivers draining into Myanmar and Bangladesh Basin	4	
	Narmada Basin	3	
	Pennar Basin	2	
	Sabarmati Basin	2	
	Subernarekha Basin	1	
	Tapi Basin	3	
	West flowing rivers from Tadri to Kanyakumari Basin	3	
	West flowing rivers from Tapi to Tadri Basin	2	
	West flowing rivers of Kutch and Saurashtra including Luni Basin	6	
	Total	**95**	

Watershed

3. Watershed

Module	Basin Name	Watershed Area in Sqkm	Watershed Count	Non Spatial Attribute
River Basins	Area of North Ladakha not draining into Indus Basin	29239	42	Annexure-2
	Barak and others Basin	45622	77	
	Brahmani and Baitarni Basin	51897	79	
	Brahmaputra Basin	186365	180	
	Cauvery Basin	85626	132	
	Drainage Area of Andaman and Nicobar Islands Basin	7578	16	
	Drainage Area of Lakshadweep Islands Basin	670	1	
	East flowing rivers between Godavari and Krishna Basin	10342	16	
	East flowing rivers between Krishna and Pennar Basin	23335	41	
	East flowing rivers between Mahanadi and Godavari Basin	46243	75	
	East flowing rivers between Pennar and Cauvery Basin	63642	102	
	East flowing rivers South of Cauvery Basin	38646	63	
	Ganga Basin	808337	980	
	Godavari Basin	302063	466	
	Indus (Up to border) Basin	453930	669	
	Krishna Basin	254750	391	
	Mahanadi Basin	139651	227	
	Mahi Basin	38337	63	
	Minor rivers draining into Bangladesh Basin	5453	9	
	Minor rivers draining into Myanmar Basin	24731	45	
	Narmada Basin	92672	150	
	Pennar Basin	54243	90	
	Sabarmati Basin	30679	51	
	Subernarekha Basin	25792	45	
	Tapi Basin	63386	99	
	West flowing rivers of Kutch and Saurashtra including Luni Basin	184585	268	
	West flowing rivers South of Tapi Basin	112411	190	
	Total	**3180225**	**4567**	

ATTRIBUTRES

Annexure-1: Water Resource Region

SL. No.	Non Spatial Attribute	Unit
1	Region Name	
2	Region ID	
3	Area	SqKm
4	Area Within India	
5	Area Outside India	
6	WD ID	

Annexure-2: Watershed

SL. No.	Non Spatial Attribute	Unit
1	Sub-Basin Code	
2	Basin Code	
3	Watershed full Code	
4	Watershed Code	
5	Area	SqKm

Annexure-3: Basin CWC

SL. No.	Non Spatial Attribute	Unit
1	Basin Code	
2	Average Annual Runoff	
3	Average Annual Water Potential	
4	Utilisable SW Resources	
5	No of Hydrological Observation Station	
6	Storage Completed Live	
7	Storage Under Construction Live	
8	Storage Under Consideration Live	
9	Area	SqKm
10	State	
11	Basin Name	
12	Total Live Storage	

Annexure-4: Basin India-WRIS

SL. No.	Non Spatial Attribute	Unit
1	Basin Full Code	
2	Basin Code	
3	Region Code	
4	State Name	
5	Basin Name	

Annexure-5:Basin AISLUS

SL. No.	Non Spatial Attribute	Unit
1	Basin ID	
2	Basin Name	
3	Area	SqKm

Annexure-6: Basin CGWB

SL. No.	Non Spatial Attribute	Unit
1	Basin ID	
2	Basin Name	
3	Area	SqKm

Annexure-7: Basin NCIWRDP

SL. No.	Non Spatial Attribute	Unit
1	Basin ID	
2	Basin Name	
3	Area	SqKm

Annexure-8: Sub-Basin CWC

SL. No.	Non Spatial Attribute	Unit
1	Basin Code	
2	Basin Name	
3	Sub Basin Name	

Ground Water Resources Estimation Module

Group	Layer Name	Feature Type	Source	Total No./Length/Area	Data Year	Mapping Scale	Developed & Managed by
GW Exploration (Aquifer 2D)	Aquifer Informations (Principal & Major Aquifers)	Polygon	Central Ground Water Board (CGWB)	Principal-14, Major- 42	2012	1:50000	CGWB
	Aquifer Depth	Raster	Central Ground Water Board (CGWB)	6 states data (Punjab, Haryana, Madhya Pradesh, West Bengal, Kerala, Tamilnadu)	2013	Raster	CGWB/ Inhouse
	Aquifer Thickness	Raster	Central Ground Water Board (CGWB)	6 states data (Punjab, Haryana, Madhya Pradesh, West Bengal, Kerala, Tamilnadu)	2013	Raster	CGWB/ Inhouse
	Aquifer Material	Polygon	Central Ground Water Board (CGWB)	6 states data (Punjab, Haryana, Madhya Pradesh, West Bengal, Kerala, Tamilnadu)	2012	Raster	CGWB/ Inhouse
GW Exploration (Exploration details/Litholog)	Litholog well location	Point	Central Ground Water Board (CGWB)	8177	1996-2018	Plotted location point	CGWB
Groundwater Resources Estimation	State Boundary (GWR 2011, 2013,2017)	Polygon	Central Ground Water Board (CGWB)	36	2011, 2013, 2017	1:10K - 1:50K	CGWB
	District Boundary (GWR 2011,2013, 2017)	Polygon	Central Ground Water Board (CGWB)	642 (2011) 697 (2013) 701 (2017)	2013	1:10K - 1:50K	CGWB
	Block/Assessment Unit-2011, 2013, 2017 (Categorization of Blocks/Talukas/Mandals)	Polygon	Central Ground Water Board (CGWB)	6552 (2011) 6471 (2013) 6861 (2017)	2011, 2013, 2017	1:10K - 1:50K	CGWB
Groundwater Prospects	Grid (RGDWM Sheets 250K & 50K)	Polygon	CWC/NRSC (Rajiv Gandhi National Drinking Water Mission (RGNDWM) project)	2328 Grid of 50K scale out of 5104 Grids	1999-2010	1: 50,000	SOI

Ground Water Resources Estimation Module

Group	Layer Name	Feature Type	Source	Total No./Length/Area	Data Year	Mapping Scale	Developed & Managed by
Ground Water Observation Sites	GW Stations (GW Level)	Point	CGWB and State Agency (11 state data)	151124	Agency Wise Year Varies	Plotted location point	Respective agency
Ground Water Quality Sites	GW Stations (GW Quality)-17 parameters	Point	CGWB	27494	2000-2018	Plotted location point	Respective agency
Artificial Recharge Structure	Artificial Recharge Structure	Point	Inhouse schema	-	-	-	-

List of attributes of Layers of Groundwater Resources Estimation

Annexure-3: State 2013

SL. No.	Non Spatial Attribute	Unit
1	State Name	
2	State Census Code 2011	
3	Rep_Area	
4	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Rainfall	BCM
5	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Other Sources	
6	Annual Replenishable Ground Water Resource Non-Monsoon Season Recharge from Rainfall	
7	Annual Replenishable Ground Water Resource Non-monsoon Season Recharge from Other Sources	
8	Annual Replenishable Ground Water Resource Total	
9	Natural Discharge During Non-Monsoon Season	
10	Net Annual Ground Water Availability	
11	Annual Ground Water Draft Irrigation	
12	Annual Ground Water Draft Domestic and industrial uses	
13	Annual Ground Water Draft Total	
14	Projected Demand for Domestic and Industrial Uses up to 2025	
15	Ground Water Availability for Future Irrigation Use	
16	Stage of Ground Water Development (%)	
17	Year	

Annexure-6: State 2011

SL. No.	Non Spatial Attribute	Unit
1	State Name	
2	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Rainfall	BCM
3	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Other Sources	
4	Annual Replenishable Ground Water Resource Non-Monsoon Season Recharge from Rainfall	
5	Annual Replenishable Ground Water Resource Non-monsoon Season Recharge from Other Sources	
6	Annual Replenishable Ground Water Resource Total	
7	Natural Discharge During Non-Monsoon Season	
8	Net Annual Ground Water Availability	
9	Annual Ground Water Draft Irrigation	
10	Annual Ground Water Draft Domestic and industrial uses	
11	Annual Ground Water Draft Total	
12	Projected Demand for Domestic and Industrial Uses up to 2025	
13	Ground Water Availability for Future Irrigation Use	
14	Stage of Ground Water Development (%)	
15	Year	

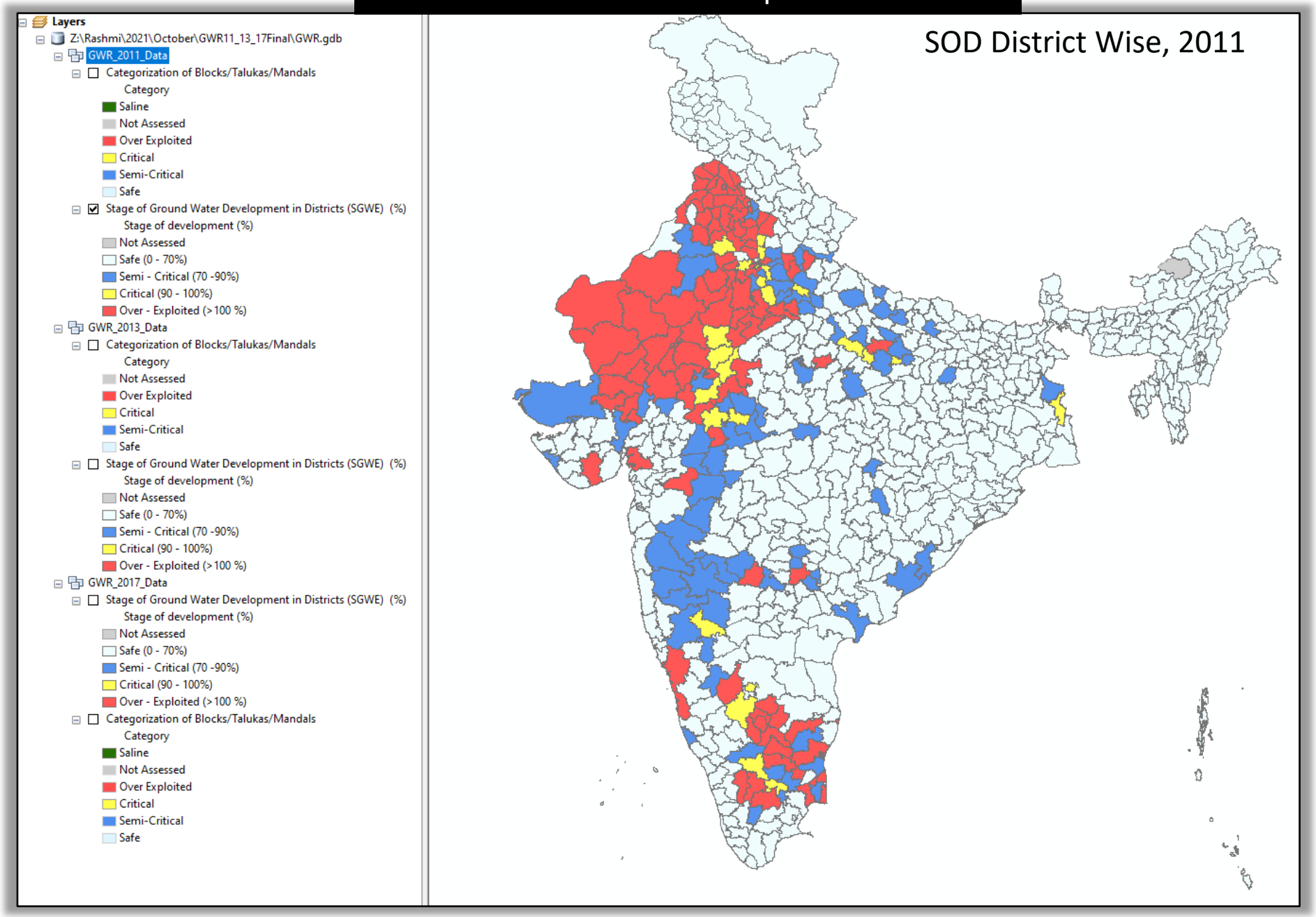
Annexure-7: State 2009

SL. No.	Non Spatial Attribute	Unit
1	State Name	
2	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Rainfall	BCM
3	Annual Replenishable Ground Water Resource Monsoon Season Recharge from Other Sources	
4	Annual Replenishable Ground Water Resource Non-Monsoon Season Recharge from Rainfall	
5	Annual Replenishable Ground Water Resource Non-monsoon Season Recharge from Other Sources	
6	Annual Replenishable Ground Water Resource Total	
7	Natural Discharge During Non-Monsoon Season	
8	Net Annual Ground Water Availability	
9	Annual Ground Water Draft Irrigation	
10	Annual Ground Water Draft Domestic and industrial uses	
11	Annual Ground Water Draft Total	
12	Projected Demand for Domestic and Industrial Uses up to 2025	
13	Ground Water Availability for Future Irrigation Use	
14	Stage of Ground Water Development (%)	
15	Year	

Annexure-2: Assessment Unit 2013(Block)

SL. No.	Non Spatial Attribute	Unit
1	Block	
2	Tehsil	
3	District	
4	Ground Water Resource 2011	
5	Code	
6	Class	
7	Net Annual Ground Water Availability	ham
8	Annual Ground Water Draft Irrigation	
9	Stage of Ground Water Development (%)	
10	Annual Ground Water Draft Domestic and industrial uses	
11	Annual Ground Water Draft Total	
12	Annual Replenishable Ground Water Resource Total	
13	Natural Annual Discharge During Non Mansoon Season	
14	State Name	

State of Groundwater Development in Districts



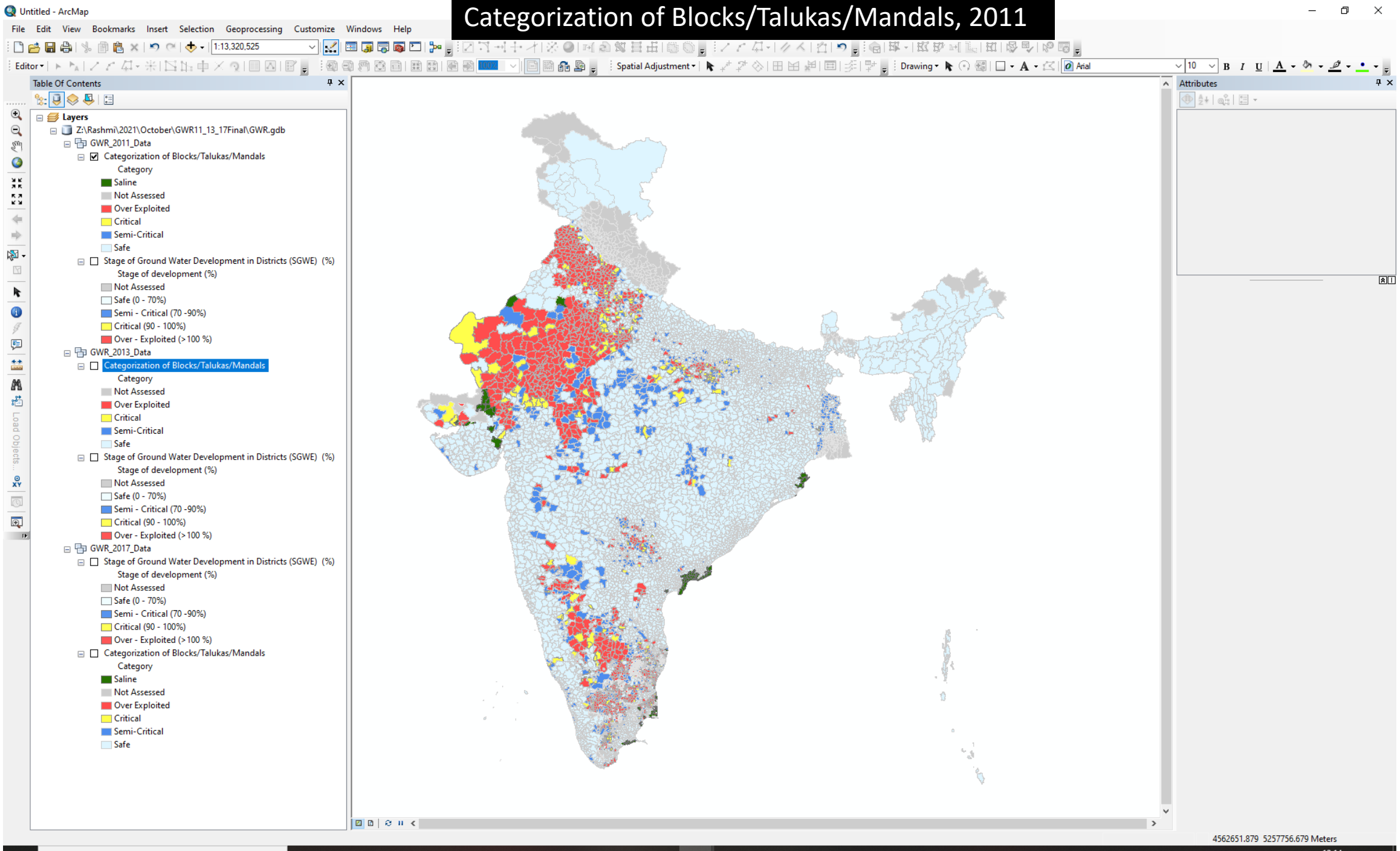
Table

Non Spatial attributes stored in Arc Map Environment

Stage of Ground Water Development in Districts (SGWE) (%)

State	District	Stage of development (%)	Annual Ground Water Draft Domestic and Industri	Annual Ground Water Draft Total	Annual Replenishable Groundwater Resource	Natural Discharge during non-monsoon season	Projected demand for Domestic and Industrial uses upto 2025
Andaman & Nicobar Island	Nicobars	4.436987	1208.07	1271.09	30803.86	2156.27	
Andaman & Nicobar Island	North & Middle An	4.436987	1208.07	1271.09	30803.86	2156.27	
Andaman & Nicobar Island	South Andaman	6.02	-9999	-9999	-9999	-9999	
Andhra Pradesh	Anantapur	62	8159	108898	193906	18138	
Andhra Pradesh	Chittoor	19	838	17022	99454	9407	
Andhra Pradesh	East Godavari	25	4451	37097	161415	14536	
Andhra Pradesh	Guntur	36	8552	55229	171178	15819	
Andhra Pradesh	Krishna	83	3066	99039	131662	12994	
Andhra Pradesh	Kurnool	64	4602	113286	195376	18097	
Andhra Pradesh	Prakasam	29	6206	58182	22127	18738	
Andhra Pradesh	Sri Potti Sriramulu	27	5080	67655	272471	25583	
Andhra Pradesh	Srikakulam	19	4451	34930	200306	19729	
Andhra Pradesh	Visakhapatnam	71	16033	119797	186430	18064	
Andhra Pradesh	Vizianagaram	79	9585	114182	159296	15140	
Andhra Pradesh	West Godavari	45	4502	73542	181299	17958	
Andhra Pradesh	Y.s.r.	27	5080	67655	272471	25583	
Arunachal Pradesh	Anjaw	0	-9999	-9999	-9999	-9999	
Arunachal Pradesh	Changlang	0.101087	0	25.5	28028.57	2802.86	
Arunachal Pradesh	Dibang Valley	0	0	0	0	0	
Arunachal Pradesh	East Kameng	0.101859	0	15	16362.5	1636.25	
Arunachal Pradesh	East Siang	0.191961	44	128.1	74147.02	7414.7	
Arunachal Pradesh	Kurung Kumey	-9999	-9999	-9999	-9999	-9999	
Arunachal Pradesh	Lohit	0.003014	0	5.3	195360	19536	
Arunachal Pradesh	Lower Dibang Vall	0.04	-9999	-9999	-9999	-9999	
Arunachal Pradesh	Lower Subansiri	0.216694	0	5	2563.78	256.378	
Arunachal Pradesh	Papum Pare	0.943394	56	113.5	13367.81	1336.78	
Arunachal Pradesh	Tawang	0	0	0	0	0	
Arunachal Pradesh	Tirap	0.028282	0	2.8	11000.17	1100.02	
Arunachal Pradesh	Upper Siang	0	0	0	0	0	
Arunachal Pradesh	Upper Subansiri	0	0	0	332.72	33.272	
Arunachal Pradesh	West Kameng	0	0	0	2350.72	235.072	
Arunachal Pradesh	West Siang	0	0	0	6098.66	609.866	
Assam	Baksa	5	1886	3282	74809	7481	
Assam	Barpeta	48	3410	39451	91228	9123	
Assam	Bongaigaon	18	1494	14774	90411	9041	
Assam	Cachar	5	3578	3589	87282	8728	
Assam	Chirang	6	2453	2591	47269	4727	
Assam	Darrang	26	1817	21538	91241	9124	
Assam	Dhemaji	3	1380	5522	185124	18512	
Assam	Dhubri	46	3940	51875	126414	12641	
Assam	Dibrugarh	12	2737	16766	156329	15633	
Assam	Dima Hasao	13	451	451	3796	380	
Assam	Goalpara	16	2057	16569	115128	11513	
Assam	Golaghat	6	2135	7349	140734	14073	
Assam	Hailakandi	6	1323	1323	26289	2629	
Assam	Jorhat	7	2259	8684	147998	14800	
Assam	Kamrup	23	3060	27780	131808	13181	
Assam	Kamrup Metropolit	22	2999	4871	24589	2459	
Assam	Karbi Anglong	6	1959	2063	37829	3783	
Assam	Karimganj	4	1775	5783	159585	15959	
Assam	Kokrajhar	4	1775	5783	1595850	15959	
Assam	Lakhimpur	5	2096	5845	130597	13060	
Assam	Marigaon	25	1924	16517	72937	7294	
Assam	Nagaon	23	5751	39506	192394	19269	
Assam	Nalbari	40	1558	13885	38507	3851	
Assam	Sivasagar	7	2321	9484	143125	14313	
Assam	Sonitpur	6	3880	10465	197363	19736	
Assam	Tinsukia	7	2725	10425	167628	8381	
Assam	Udalguri	8	1660	5777	73279	3664	
Bihar	Araria	33.677368	4786.322783	27217.875167	89509.99	8690.51	6707
Bihar	Arwal	50	1096	105087	23083	1846	

Categorization of Blocks/Talukas/Mandals, 2011



State Boundary

Non Spatial attributes

Table

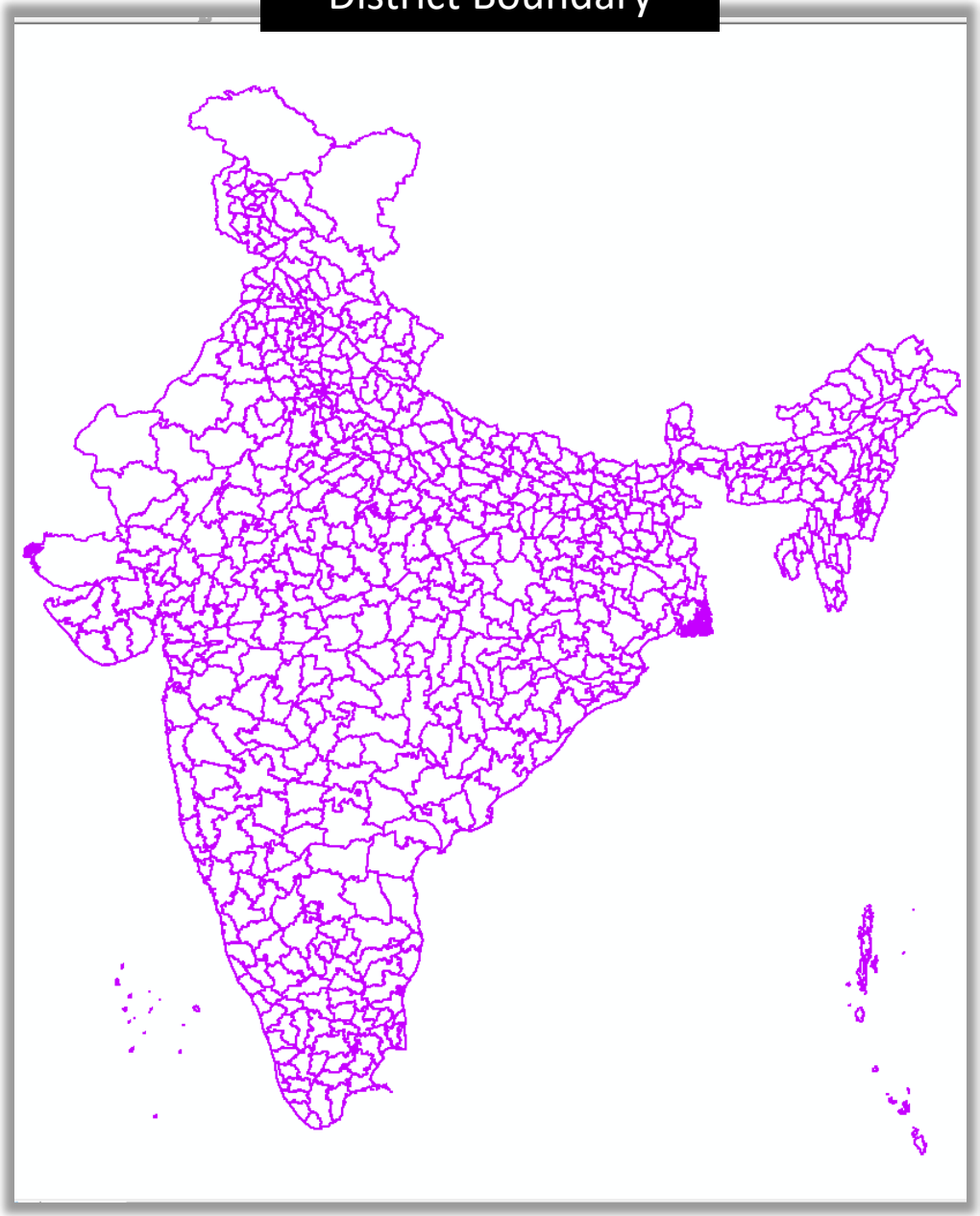
STATE_Boundary

objectid *	State Name	State Census Code 2011
1	Andaman & Nicobar Island	35
2	Andhra Pradesh	28
3	Arunanchal Pradesh	12
4	Assam	18
5	Bihar	10
6	Chhattisgarh	22
7	Chandigarh	04
8	Daman & Diu	25
9	Delhi & NCR	07
10	Dadara & Nagar Havelli	26
11	Goa	30
12	Gujarat	24
13	Himachal Pradesh	02
14	Haryana	06
15	Jharkhand	20
16	Ladakh	37
17	Karnataka	29
18	Kerala	32
19	Lakshadweep	31
20	Meghalaya	17
21	Manipur	14
22	Madhya Pradesh	23
23	Maharashtra	27
24	Mizoram	15
25	Nagaland	13
26	Odisha	21
27	Punjab	03
28	Puducherry	34
29	Rajasthan	08
30	Sikkim	11
31	Telangana	36
32	Tamil Nadu	33
33	Tripura	16
34	Uttarakhand	05
35	Uttar Pradesh	09
36	West Bengal	19
37	Jammu & Kashmir	01

1 (0 out of 37 Selected)

STATE_Boundary

District Boundary



Non Spatial attributes

Table

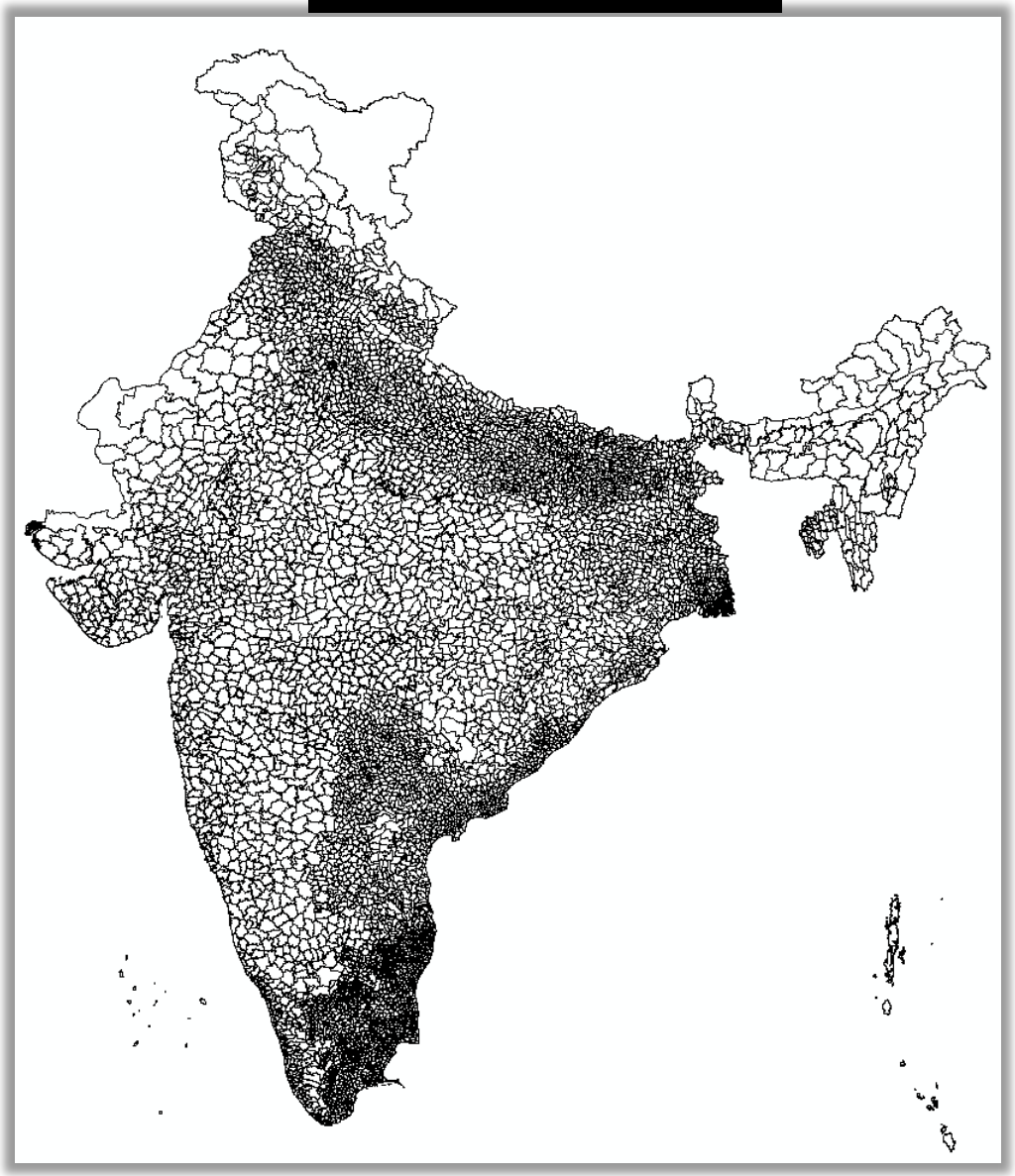
DISTRICT_Boundary_2011

objectid *	State Census Code 2011	state	district	dist_censu
1	01	Jammu & Kashmir	Kupwara	0101
2	01	Jammu & Kashmir	Badgam	0102
3	01	Ladakh	Leh (Ladakh)	0103
4	01	Ladakh	Kargil	0104
5	01	Jammu & Kashmir	Punch	0105
6	01	Jammu & Kashmir	Rajouri	0106
7	01	Jammu & Kashmir	Kathua	0107
8	01	Jammu & Kashmir	Baramula	0108
9	01	Jammu & Kashmir	Bandipore	0109
10	01	Jammu & Kashmir	Srinagar	0110
11	01	Jammu & Kashmir	Ganderbal	0111
12	01	Jammu & Kashmir	Pulwama	0112
13	01	Jammu & Kashmir	Shupiyan	0113
14	01	Jammu & Kashmir	Anantnag	0114
15	01	Jammu & Kashmir	Kulgam	0115
16	01	Jammu & Kashmir	Doda	0116
17	01	Jammu & Kashmir	Ramban	0117
18	01	Jammu & Kashmir	Kishtwar	0118
19	01	Jammu & Kashmir	Udhampur	0119
20	01	Jammu & Kashmir	Reasi	0120
21	01	Jammu & Kashmir	Jammu	0121
22	01	Jammu & Kashmir	Samba	0122
23	02	Himachal Pradesh	Chamba	0201
24	02	Himachal Pradesh	Kangra	0202
25	02	Himachal Pradesh	Lahul & Spiti	0203
26	02	Himachal Pradesh	Kullu	0204
27	02	Himachal Pradesh	Mandi	0205
28	02	Himachal Pradesh	Hamirpur	0206
29	02	Himachal Pradesh	Una	0207
30	02	Himachal Pradesh	Bilaspur	0208
31	02	Himachal Pradesh	Solan	0209
32	02	Himachal Pradesh	Sirmaur	0210
33	02	Himachal Pradesh	Shimla	0211
34	02	Himachal Pradesh	Kinnaur	0212
35	03	Punjab	Gurdaspur	0301
36	03	Punjab	Kapurthala	0302
37	03	Punjab	Jalandhar	0303
38	03	Punjab	Hoshiarpur	0304
39	03	Punjab	Shahid Bhagat Singh Nagar	0305
40	03	Punjab	Fatehgarh Sahib	0306
41	03	Punjab	Ludhiana	0307

1 (0 out of 644 Selected)

DISTRICT_Boundary_2011

Block Boundary



Non Spatial attributes

Table

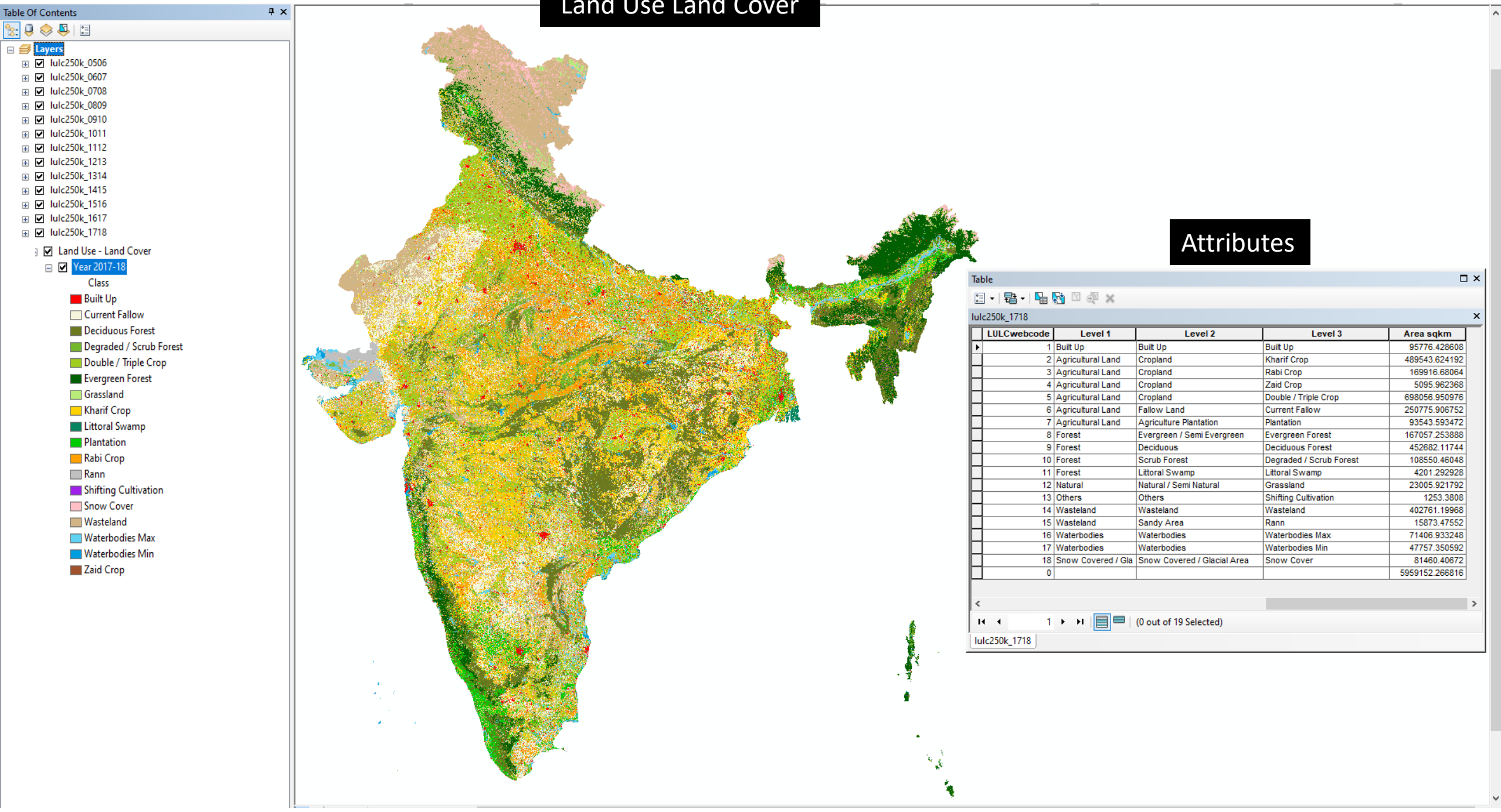
Block

OBJECTID_1 *	OBJECTID	BLOCK	TEHSIL	DISTRICT	STATE
1	1	Thirumanur	ARIYALUR	Ariyalur	TAMIL NADU
2	2	Thirumanur	ARIYALUR	Ariyalur	TAMIL NADU
3	3	Thirumanur	ARIYALUR	Ariyalur	TAMIL NADU
4	4	Ariyalur	ARIYALUR	Ariyalur	TAMIL NADU
5	5	T.palur	UDAYARPALAYAM	Ariyalur	TAMIL NADU
6	6	T.palur	UDAYARPALAYAM	Ariyalur	TAMIL NADU
7	7	Jayankondam	UDAYARPALAYAM	Ariyalur	TAMIL NADU
8	8	Ariyalur	ARIYALUR	Ariyalur	TAMIL NADU
9	9	Jayankondam	UDAYARPALAYAM	Ariyalur	TAMIL NADU
10	10	Sendurai	SENDURAI	Ariyalur	TAMIL NADU
11	11	Jayankondam	UDAYARPALAYAM	Ariyalur	TAMIL NADU
12	12	Sendurai	SENDURAI	Ariyalur	TAMIL NADU
13	13	Andimadam	UDAYARPALAYAM	Ariyalur	TAMIL NADU
14	14	Sendurai	SENDURAI	Ariyalur	TAMIL NADU
15	15	Sendurai	SENDURAI	Ariyalur	TAMIL NADU
16	16	Chennai		Chennai	TAMIL NADU
17	17	Chennai		Chennai	TAMIL NADU
18	18	Chennai		Chennai	TAMIL NADU
19	19	Chennai		Chennai	TAMIL NADU
20	20	Chennai		Chennai	TAMIL NADU
21	21	Chennai		Chennai	TAMIL NADU
22	22	Chennai		Chennai	TAMIL NADU
23	23	Chennai		Chennai	TAMIL NADU
24	24	Chennai		Chennai	TAMIL NADU
25	25	Chennai		Chennai	TAMIL NADU
26	26	Chennai		Chennai	TAMIL NADU
27	27	Chennai		Chennai	TAMIL NADU
28	28	Chennai		Chennai	TAMIL NADU
29	29	Chennai		Chennai	TAMIL NADU
30	30	Chennai		Chennai	TAMIL NADU
31	31	Chennai		Chennai	TAMIL NADU
32	32	Chennai		Chennai	TAMIL NADU
33	33	Valparai	VALPARAI	Coimbatore	TAMIL NADU
34	34	Valparai	VALPARAI	Coimbatore	TAMIL NADU
35	35	Valparai	VALPARAI	Coimbatore	TAMIL NADU
36	36	Valparai	VALPARAI	Coimbatore	TAMIL NADU
37	37	Valparai	VALPARAI	Coimbatore	TAMIL NADU
38	38	Pollachi	POLLACHI	Coimbatore	TAMIL NADU
39	39	Pollachi	POLLACHI	Coimbatore	TAMIL NADU
40	40	Anaimalai	POLLACHI	Coimbatore	TAMIL NADU
41	41	Pollachi South	POLLACHI	Coimbatore	TAMIL NADU

1 (0 out of 7150 Selected)

Block

Land Use Land Cover



Attributes

Table

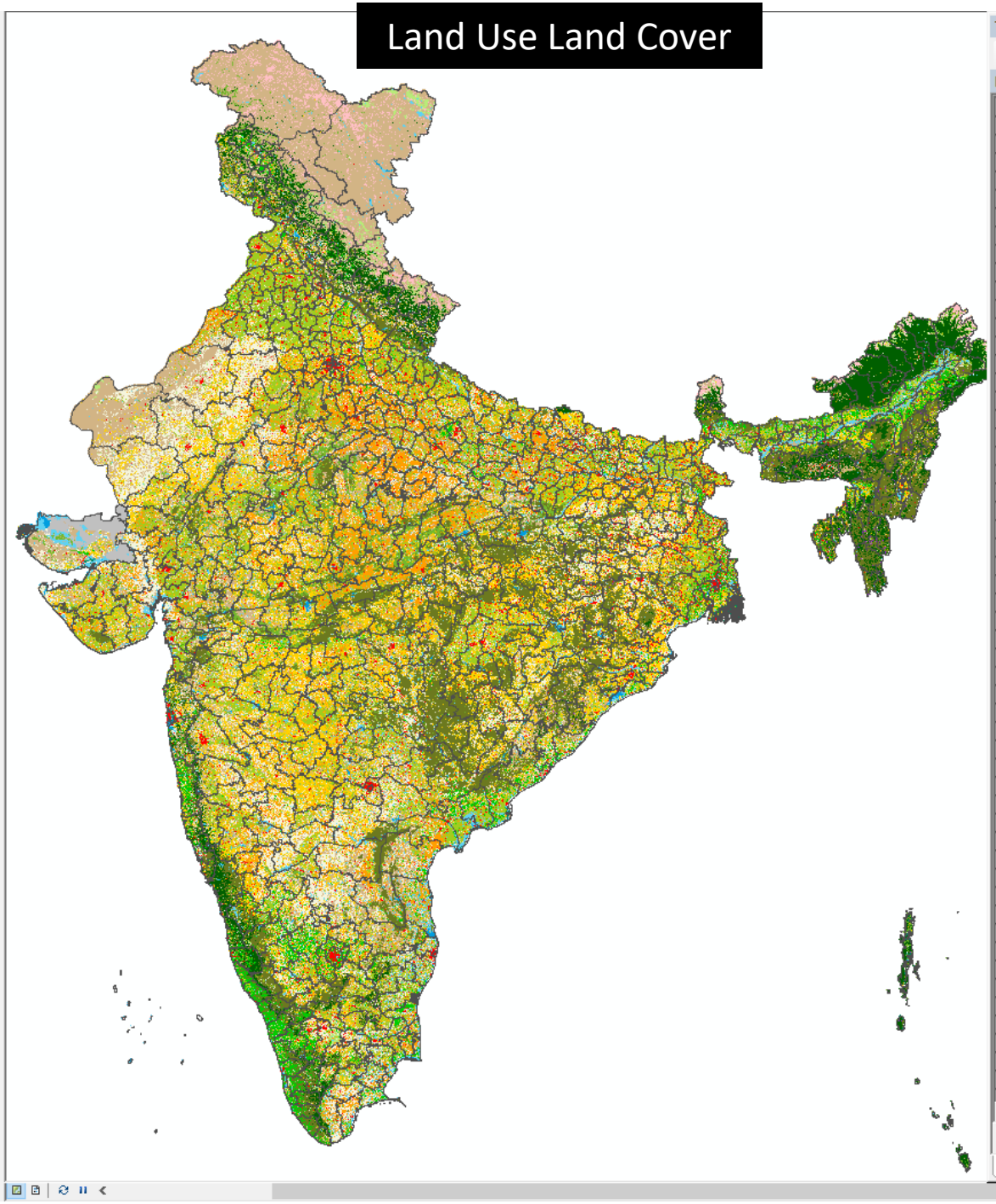
lulc250k_1718

LULCwebcode	Level 1	Level 2	Level 3	Area sqkm
1	Built Up	Built Up	Built Up	95776.428608
2	Agricultural Land	Cropland	Kharif Crop	489543.624192
3	Agricultural Land	Cropland	Rabi Crop	169916.68064
4	Agricultural Land	Cropland	Zaid Crop	5095.962368
5	Agricultural Land	Cropland	Double / Triple Crop	698056.950976
6	Agricultural Land	Fallow Land	Current Fallow	250775.906752
7	Agricultural Land	Agriculture Plantation	Plantation	93543.593472
8	Forest	Evergreen / Semi Evergreen	Evergreen Forest	167057.253888
9	Forest	Deciduous	Deciduous Forest	452682.11744
10	Forest	Scrub Forest	Degraded / Scrub Forest	108550.46048
11	Forest	Littoral Swamp	Littoral Swamp	4201.292928
12	Natural	Natural / Semi Natural	Grassland	23005.921792
13	Others	Others	Shifting Cultivation	1253.3808
14	Wasteland	Wasteland	Wasteland	402761.19968
15	Wasteland	Sandy Area	Rann	15873.47552
16	Waterbodies	Waterbodies	Waterbodies Max	71406.933248
17	Waterbodies	Waterbodies	Waterbodies Min	47757.350592
18	Snow Covered / Gla	Snow Covered / Glacial Area	Snow Cover	81460.40672
0				5959152.266816

1 (0 out of 19 Selected)

lulc250k_1718

Land Use Land Cover



Attributes

Table

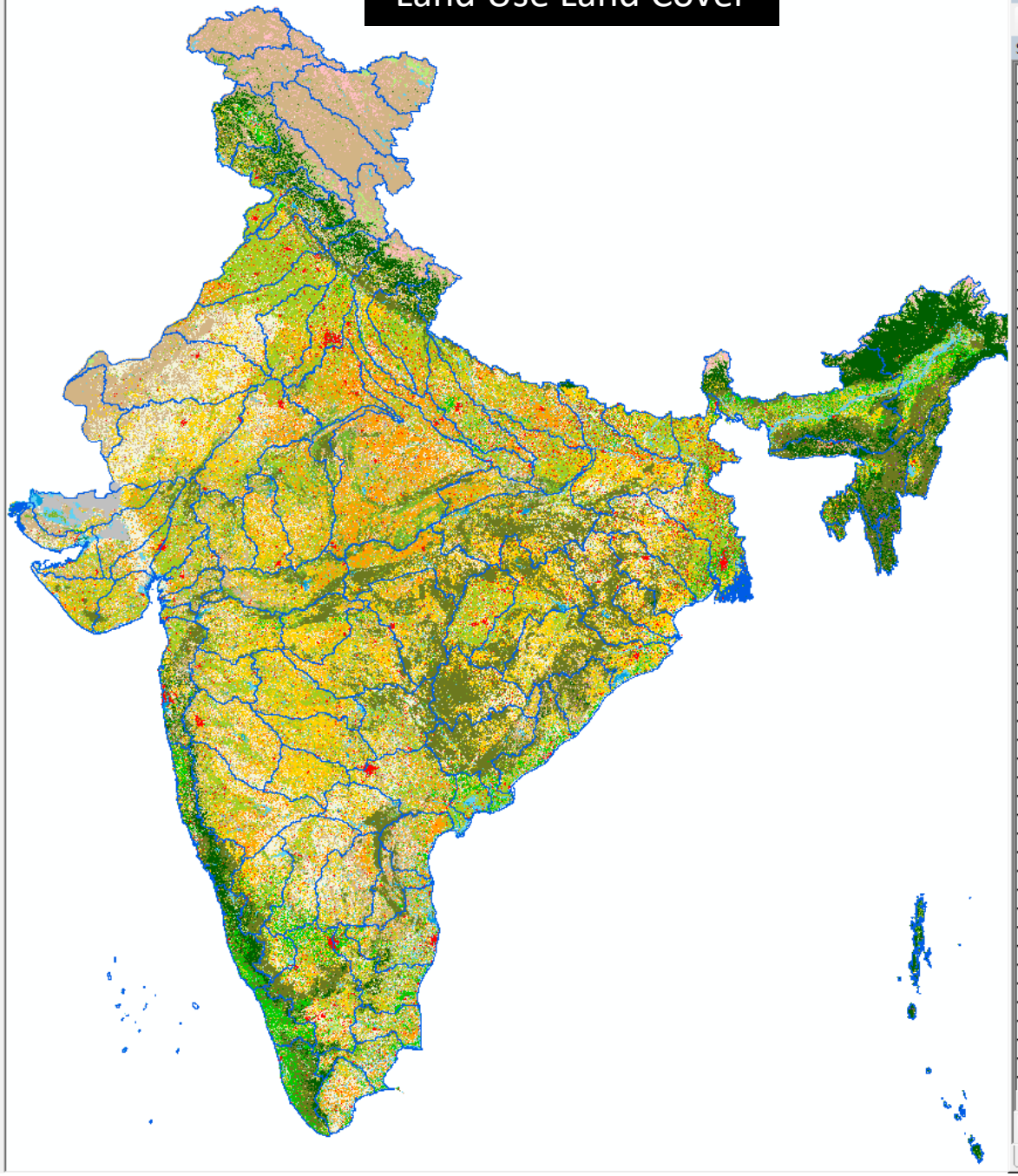
District

OBJECTID *	District	State	Year	Built Up	Kharif Crop	Rabi
1	Kupwara	Jammu & Kashmir	2005	3.126592	86.033024	4.
2	Badgam	Jammu & Kashmir	2005	26.307904	40.865216	34.
3	Leh (Ladakh)	Ladakh	2005	33.953472	10.72512	
4	Kargil	Ladakh	2005	12.870144	7.476224	
5	Punch	Jammu & Kashmir	2005	4.926656	68.08256	33.
6	Rajouri	Jammu & Kashmir	2005	3.992128	221.51136	40.
7	Kathua	Jammu & Kashmir	2005	42.019264	81.545408	36.
8	Baramula	Jammu & Kashmir	2005	20.754048	84.973056	15.
9	Bandipore	Jammu & Kashmir	2005	2.64992	26.220096	8.
10	Srinagar	Jammu & Kashmir	2005	26.191872	5.124224	12.
11	Ganderbal	Jammu & Kashmir	2005	8.489152	17.222912	4.
12	Pulwama	Jammu & Kashmir	2005	5.86432	8.156736	67.
13	Shupiyan	Jammu & Kashmir	2005	0.900032	8.015616	3.
14	Anantnag	Jammu & Kashmir	2005	7.811776	28.418432	49.
15	Kulgam	Jammu & Kashmir	2005	0.263424	12.819968	17.
16	Doda	Jammu & Kashmir	2005	6.654592	70.475328	
17	Ramban	Jammu & Kashmir	2005	2.83808	50.235584	2.
18	Kishtwar	Jammu & Kashmir	2005	6.331584	21.879872	
19	Udhampur	Jammu & Kashmir	2005	14.59808	94.274432	
20	Reasi	Jammu & Kashmir	2005	2.631104	82.354496	10.
21	Jammu	Jammu & Kashmir	2005	160.773312	152.858048	5
22	Samba	Jammu & Kashmir	2005	31.654784	56.576576	1
23	Chamba	Himachal Pradesh	2005	6.880384	48.67072	17.
24	Kangra	Himachal Pradesh	2005	116.48672	208.21472	106.
25	Lahul & Spiti	Himachal Pradesh	2005	0	0.153664	
26	Kullu	Himachal Pradesh	2005	9.43936	40.739776	5.
27	Mandi	Himachal Pradesh	2005	55.372352	109.9168	46.
28	Hamirpur	Himachal Pradesh	2005	34.122816	48.745984	41.
29	Una	Himachal Pradesh	2005	57.479744	85.418368	23.
30	Bilaspur	Himachal Pradesh	2005	22.146432	60.167296	
31	Solan	Himachal Pradesh	2005	70.064512	59.48992	7.
32	Sirmaur	Himachal Pradesh	2005	39.570048	114.012416	8.
33	Shimla	Himachal Pradesh	2005	38.735872	53.851392	11.
34	Kinnaur	Himachal Pradesh	2005	8.5456	2.003904	
35	Gurdaspur	Punjab	2005	159.27744	289.4528	188.
36	Kapurthala	Punjab	2005	81.162816	137.174912	20
37	Jalandhar	Punjab	2005	214.521216	253.429568	22
38	Hoshiarpur	Punjab	2005	114.282112	433.533184	199.
39	Shahid Bhagat Singh Nagar	Punjab	2005	53.90784	114.884224	56.
40	Fatehgarh Sahib	Punjab	2005	42.150976	57.956416	30.
41	Ludhiana	Punjab	2005	375.040512	160.57888	109.
42	Moga	Punjab	2005	113.281728	73.94688	9
43	Firozpur	Punjab	2005	206.61536	179.981312	326.
44	Muktsar	Punjab	2005	117.935552	86.293312	53.
45	Faridkot	Punjab	2005	85.154944	65.288384	81.
46	Bathinda	Punjab	2005	256.622016	112.7392	30.
47	Mansa	Punjab	2005	111.51616	72.987264	11.
48	Patiala	Punjab	2005	214.546304	191.932608	
49	Amritsar	Punjab	2005	220.087616	112.243712	348.
50	Tarn Taran	Punjab	2005	104.595008	62.033216	18
51	Rupnagar	Punjab	2005	48.316352	84.65632	82.
52	Sahibzada Ajit Singh Nagar	Punjab	2005	121.140544	123.41728	14.
53	Sangrur	Punjab	2005	177.08992	121.454144	43.
54	Barnala	Punjab	2005	77.0672	39.479104	9

0 (0 out of 8346 Selected)

District

Land Use Land Cover



Attributes

Table

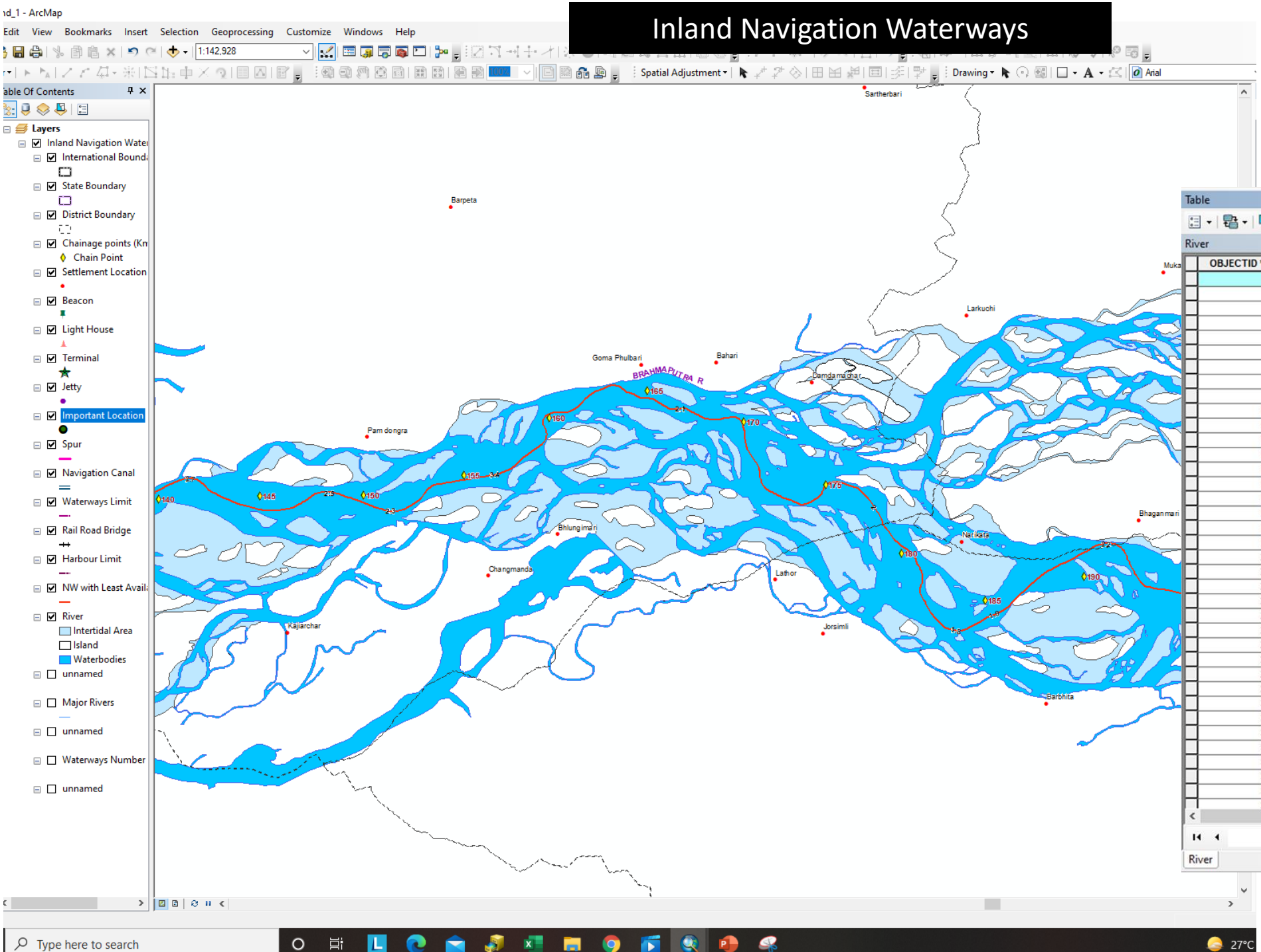
Sub_Basin

Sub Basin	Basin	Year	Built Up	Kharif Crop	Rabi Crop
Above Ramganga Confluence	Ganga Basin	2005	822.456768	2577.867264	3338.43820
Baitarni	Brahmani and Baitarni Basin	2005	819.179648	5388.9024	14.01478
Barmer	Indus (Up to border) Basin	2005	58.411136	1726.8384	48.42924
Banas	Ganga Basin	2005	1162.06048	10064.744256	8032.77932
Barak	Barak and others Basin	2005	154.711424	1317.311296	
Beas	Indus (Up to border) Basin	2005	446.73888	957.063296	656.07628
Bhadar and other west flowing rivers	West flowing rivers of Kutch	2005	348.255936	4055.487744	2101.276
Bhagirathi and others (Ganga Lower)	Ganga Basin	2005	5328.606528	13808.124736	1328.14931
Bhima Lower	Krishna Basin	2005	441.065856	9420.349568	2966.74067
Bhatsol and others	West flowing rivers South of	2005	1201.467456	2833.385408	429.72294
Bhima Upper	Krishna Basin	2005	1223.058816	10225.621056	3944.539
Brahmani	Brahmani and Baitarni Basin	2005	1289.077888	8677.333952	87.03340
Brahmaputra Lower	Brahmaputra Basin	2005	749.281344	7005.32224	69.4153
Brahmaputra Upper	Brahmaputra Basin	2005	429.218048	2206.92864	36.20198
Cauvery Lower	Cauvery Basin	2005	636.27872	968.653952	2726.06835
Cauvery Middle	Cauvery Basin	2005	2184.09856	6564.908672	4536.77907
Cauvery Upper	Cauvery Basin	2005	185.074176	1554.323904	663.78457
Chautang and others	Indus (Up to border) Basin	2005	941.502464	4389.681856	2515.18803
Chenab	Indus (Up to border) Basin	2005	228.658304	853.120576	224.8825
Chambal Lower	Ganga Basin	2005	65.802688	649.96736	1244.68467
Churu	Indus (Up to border) Basin	2005	853.512576	7395.202304	1907.77305
Chambal Upper	Ganga Basin	2005	537.563712	6323.486848	4509.9756
Damodar	Ganga Basin	2005	2875.32	9925.03232	403.5718
Gandak and others	Ganga Basin	2005	2896.98976	14617.886976	5214.84185
Godavari Lower	Godavari Basin	2005	614.135424	5402.986176	780.46572
Godavari Middle	Godavari Basin	2005	701.165696	13620.65152	2957.06611
Godavari Upper	Godavari Basin	2005	530.238016	5183.249792	1260.86643
Ghaghara	Ganga Basin	2005	1498.967232	5398.598912	12513.6278
Ghaghara Confluence to Gomti conflue	Ganga Basin	2005	1269.885568	3809.684928	4655.82790
Ghaghar and others	Indus (Up to border) Basin	2005	1655.993024	5092.293248	2108.79379
Gilgit	Indus (Up to border) Basin	2005	0	0.056448	
Gomti	Ganga Basin	2005	1178.596608	2673.3616	6489.39692
Imphal and others	Minor rivers draining into Mya	2005	178.0464	1358.377216	
Indravati	Godavari Basin	2005	664.34592	7522.90336	73.02803
Jhelum	Indus (Up to border) Basin	2005	117.016704	1100.663872	382.78956
Kali Sindh and others up to Confluence	Ganga Basin	2005	702.548672	8319.202752	7895.22182
Kosi	Ganga Basin	2005	1028.636224	3315.862144	1771.44172
Karnaphuli and Others	Minor rivers draining into Ban	2005	1.339072	35.784896	
Krishna Lower	Krishna Basin	2005	2076.790912	4313.166592	5006.41075
Krishna Middle	Krishna Basin	2005	421.120896	3858.07968	1354.0777
Krishna Upper	Krishna Basin	2005	1162.93856	9693.137664	7928.57318
Kynchiang and other south flowing riv	Barak and others Basin	2005	179.093824	259.046144	
Lower Indus	Indus (Up to border) Basin	2005	0	5.70752	
Luni Lower	West flowing rivers of Kutch	2005	154.852544	1601.229056	1200.21619
Luni Upper	West flowing rivers of Kutch	2005	969.939712	18247.85088	2249.4214
Manjra	Godavari Basin	2005	705.562368	10916.695104	2883.16313
Mahanadi Lower	Mahanadi Basin	2005	1398.916288	17914.970752	27.19225
Mahanadi Middle	Mahanadi Basin	2005	1573.81728	16768.59968	84.38348
Mangpui Lui and others	Minor rivers draining into Mya	2005	27.587392	105.93408	
Mahanadi Upper	Mahanadi Basin	2005	1648.090304	6508.73664	1012.95622
Muhury and Others	Minor rivers draining into Ban	2005	18.743872	177.70144	0.02195
Mahi Upper	Mahi Basin	2005	230.593216	5522.975808	1739.79948
Nagvati and other	East flowing rivers between	2005	723.907968	1951.59552	1372.31673
Narmada Middle	Narmada Basin	2005	437.249344	8145.00736	3951.75827

0 (0 out of 1313 Selected)

District Sub_Basin

Inland Navigation Waterways



Attributes

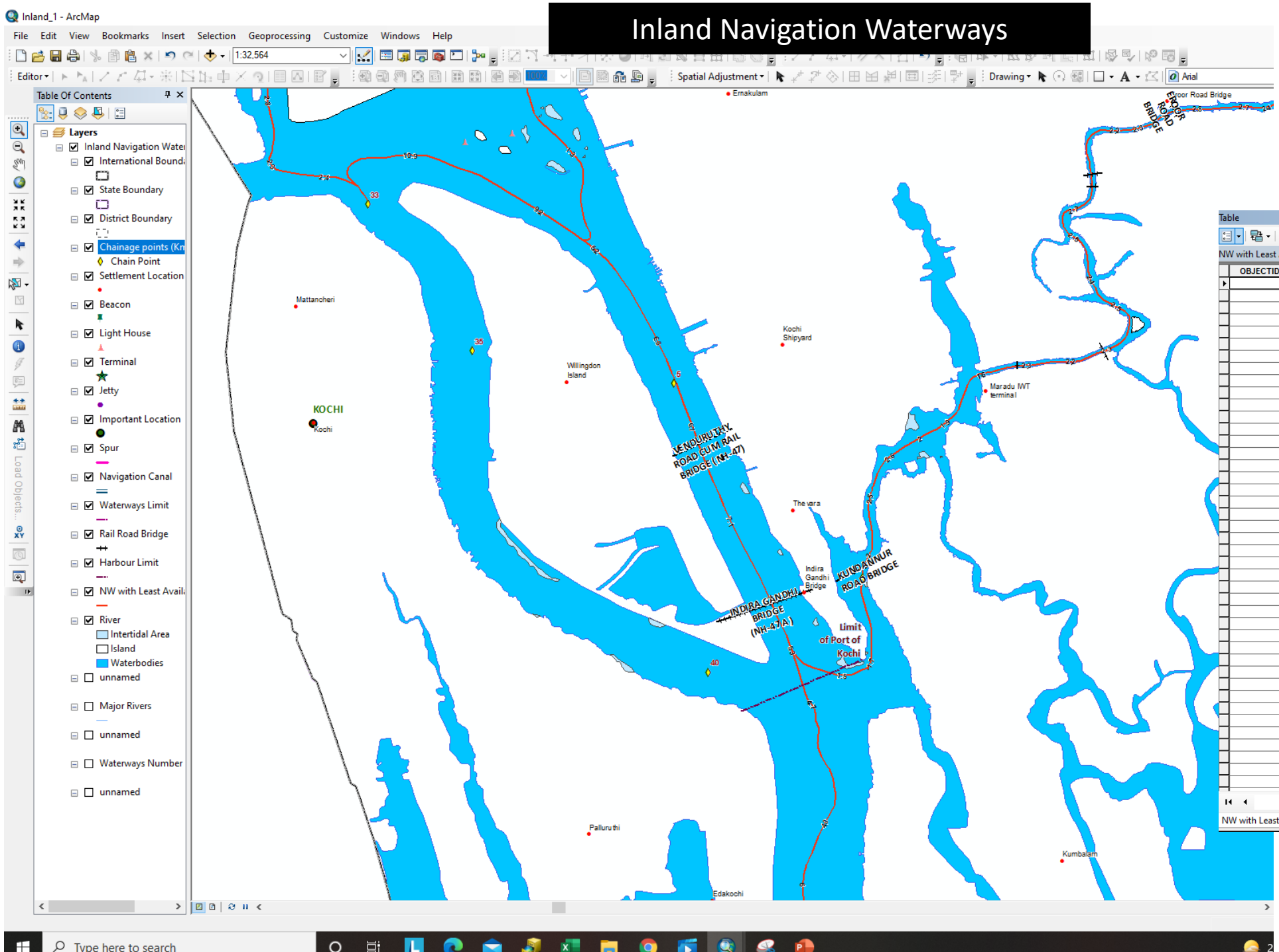
Table

River

OBJECTID *	area	NWAY	River Code	LAYERNAME
1	1627459.01309	National Waterways-2	Island	Island
2	9134732.44269	National Waterways-2	Island	Island
3	133262.1142	National Waterways-2	Island	Island
4	103390.974854	National Waterways-2	Island	Island
5	1033055.88432	National Waterways-2	Island	Island
6	1634486.04676	National Waterways-2	Island	Island
7	162340.926107	National Waterways-2	Island	Island
8	753746.216875	National Waterways-2	Island	Island
9	84746.026294	National Waterways-2	Island	Island
10	169849.953644	National Waterways-2	Island	Island
11	619459.460923	National Waterways-2	Island	Island
12	1673731.02742	National Waterways-2	Island	Island
13	1465042.67215	National Waterways-2	Island	Island
14	626990.542446	National Waterways-2	Island	Island
15	528856.510202	National Waterways-2	Island	Island
16	377524.855578	National Waterways-2	Island	Island
17	477513.356452	National Waterways-2	Island	Island
18	125056.913323	National Waterways-2	Island	Island
19	95813.978967	National Waterways-2	Island	Island
20	18667.598039	National Waterways-2	Island	Island
21	71830.868826	National Waterways-2	Island	Island
22	3771043.27915	National Waterways-2	Island	Island
23	102452.307813	National Waterways-2	Island	Island
24	677211.982625	National Waterways-2	Island	Island
25	466316.344847	National Waterways-2	Island	Island
26	403476.935705	National Waterways-2	Island	Island
27	737099.037541	National Waterways-2	Island	Island
28	1381694.43067	National Waterways-2	Island	Island
29	1107173.86839	National Waterways-2	Island	Island
30	302547.445925	National Waterways-2	Island	Island
31	356661.836016	National Waterways-2	Island	Island
32	72084.967461	National Waterways-2	Island	Island
33	125629.587375	National Waterways-2	Island	Island
34	1276487.74787	National Waterways-2	Island	Island
35	392651.005404	National Waterways-2	Island	Island
36	8904519.08165	National Waterways-2	Island	Island
37	35362.244482	National Waterways-2	Island	Island

(1 out of 5282 Selected)

Inland Navigation Waterways



Attributes

Table

NW with Least Available Depth (m)

OBJECTID *	Inland Waterways	LEAST_AVAILABLE_DEPTH	SHAPE *	shape_Length
1	NW2	3.2	Polyline	5203.179418
2	NW2	2.2	Polyline	5437.660591
3	NW2	2.2	Polyline	7023.58695
4	NW2	2.3	Polyline	4708.466548
5	NW2	2.6	Polyline	4999.176288
6	NW2	2.1	Polyline	3628.308973
7	NW2	2.3	Polyline	4437.679259
8	NW2	2.2	Polyline	4264.469875
9	NW2	2.3	Polyline	4516.387973
10	NW2	2.4	Polyline	4885.615085
11	NW2	2.7	Polyline	5224.273777
12	NW2	2.5	Polyline	6520.160746
13	NW2	2.8	Polyline	4793.983089
14	NW2	2.3	Polyline	5859.36777
15	NW2	2.1	Polyline	4808.219786
16	NW2	2.5	Polyline	5658.74587
17	NW2	2.9	Polyline	5238.008248
18	NW2	2.3	Polyline	5630.294219
19	NW2	2.4	Polyline	5384.435474
20	NW2	2.3	Polyline	5336.387299
21	NW2	3.8	Polyline	5854.780543
22	NW2	2.6	Polyline	4973.487436
23	NW2	2.6	Polyline	5276.349451
24	NW2	2	Polyline	5554.433394
25	NW2	2.3	Polyline	4742.279545
26	NW2	2.3	Polyline	5201.616468
27	NW2	2.4	Polyline	6900.137394
28	NW2	2.6	Polyline	5037.505405
29	NW2	2.7	Polyline	5508.120269
30	NW2	2.5	Polyline	5168.766375
31	NW2	2.3	Polyline	5399.395264
32	NW2	3.4	Polyline	5651.659056
33	NW2	2.1	Polyline	5331.723526
34	NW2	2.1	Polyline	5038.164175
35	NW2	2.1	Polyline	6805.066511
36	NW2	2	Polyline	5259.316674
37	NW2	1.8	Polyline	6589.446344
38	NW2	1.9	Polyline	5635.110486
39	NW2	2.2	Polyline	5875.359786
40	NW2	4.3	Polyline	4969.667054
41	NW2	5.8	Polyline	4932.229515
42	NW2	7.8	Polyline	5208.94758

(0 out of 1645 Selected)

NW with Least Available Depth (m)

Inland Navigation Waterways – Layer wise Attributes

Annexure-1: Waterways		
SL. No.	Non Spatial Attribute	Unit
1	Inland Waterways	
2	Least Available Depth	m

Annexure-1: Navigation Canal		
SL. No.	Non Spatial Attribute	Unit
1	Description	
2	Canal Name	
3	National Waterway	

Annexure-2: Segement		
SL. No.	Non Spatial Attribute	Unit
1	Chart Number	
2	Segement Name	
3	Map Scale	

Annexure-3: River		
SL. No.	Non Spatial Attribute	Unit
1	Area	SqKm
2	Type	
3	River Name	
4	Rip Code	
5	Rip CWC	
6	National Waterway	

Annexure-4: Chainage Points		
SL. No.	Non Spatial Attribute	Unit
1	Area	
2	Perimeter	
3	Chain Point Per KM	
4	Chain Point KM	
5	Chain Point Code	

Annexure-5:Settlement Location		
SL. No.	Non Spatial Attribute	Unit
1	Settlement Code	
2	Settlement Name	

Annexure-6: Beacon		
SL. No.	Non Spatial Attribute	Unit
1	Name	
2	Waterways	

Annexure-7: Light House		
SL. No.	Non Spatial Attribute	Unit
1	UTI Code	
2	Name	
3	Type	
4	National Waterways	

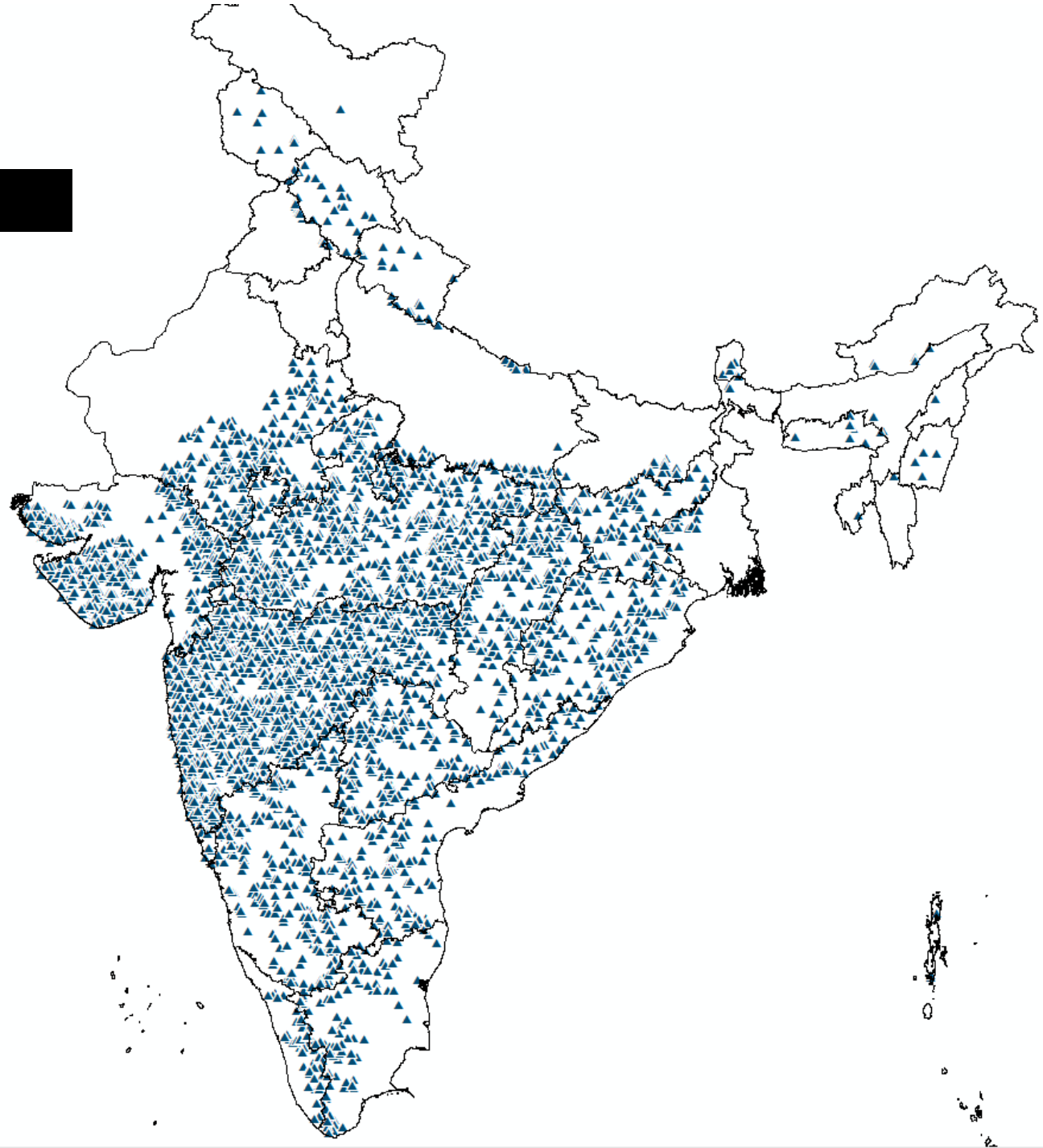
Annexure-8: Terminal		
SL. No.	Non Spatial Attribute	Unit
1	Name	
2	National Waterways	

Annexure-9: Jatty		
SL. No.	Non Spatial Attribute	Unit
1	Name	
2	National Waterways	

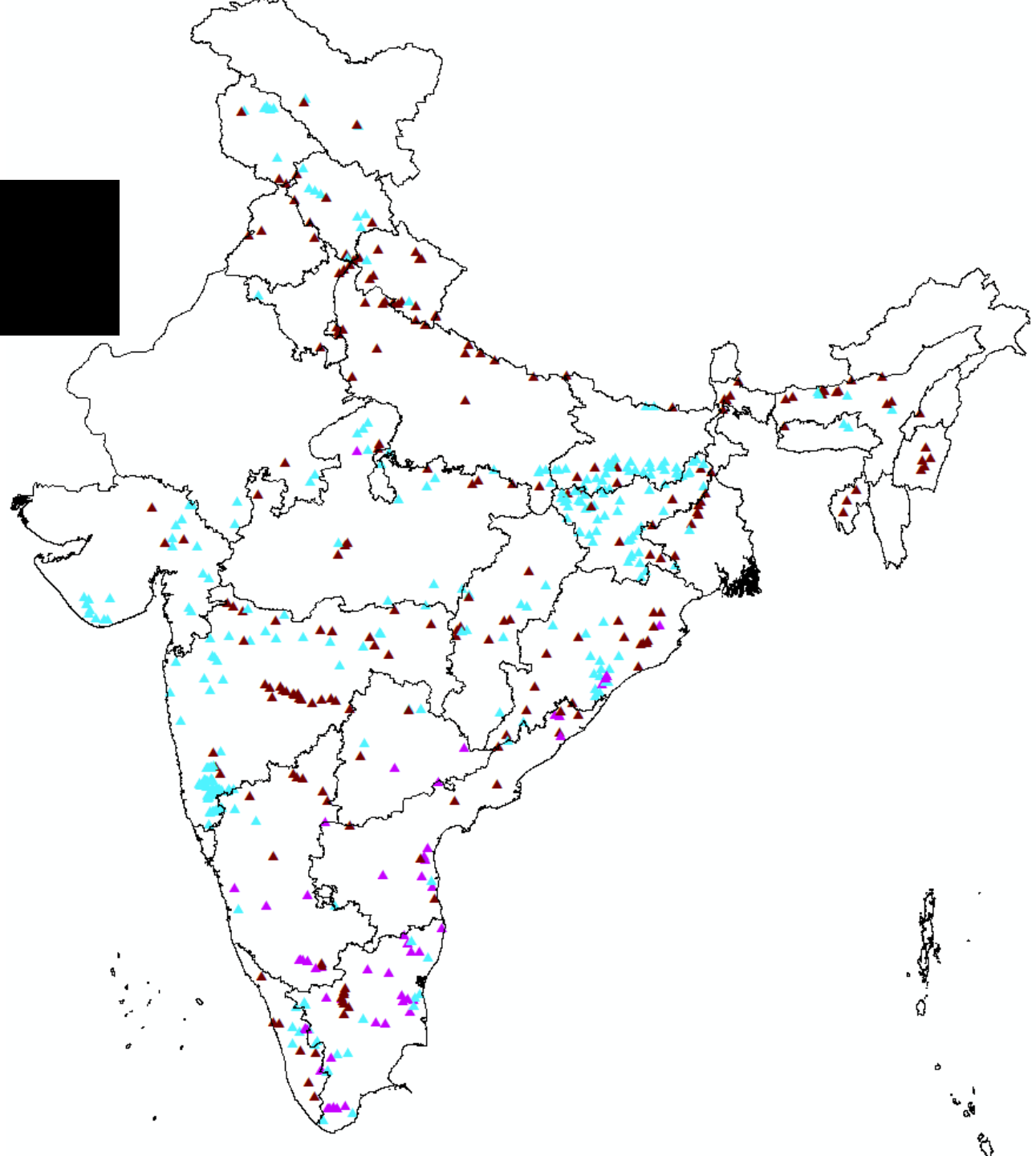
Annexure-10: Spur		
SL. No.	Non Spatial Attribute	Unit
1	Name	
2	National Waterways	
3	Spur Code	
4	Symbol	

Annexure-10: Rail Road Bridge		
SL. No.	Non Spatial Attribute	Unit
1	Rail Road Bridge Name	

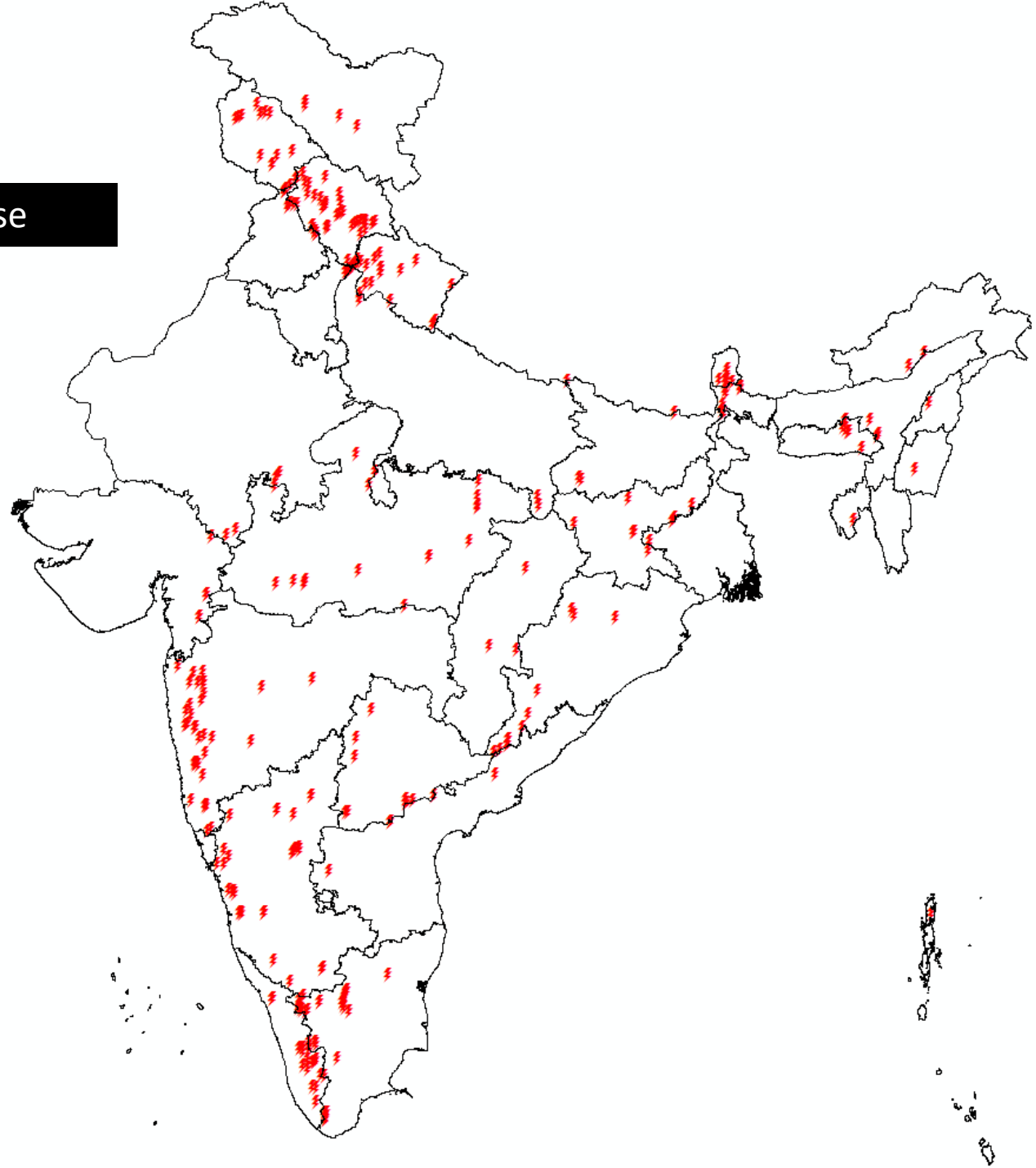
Dams



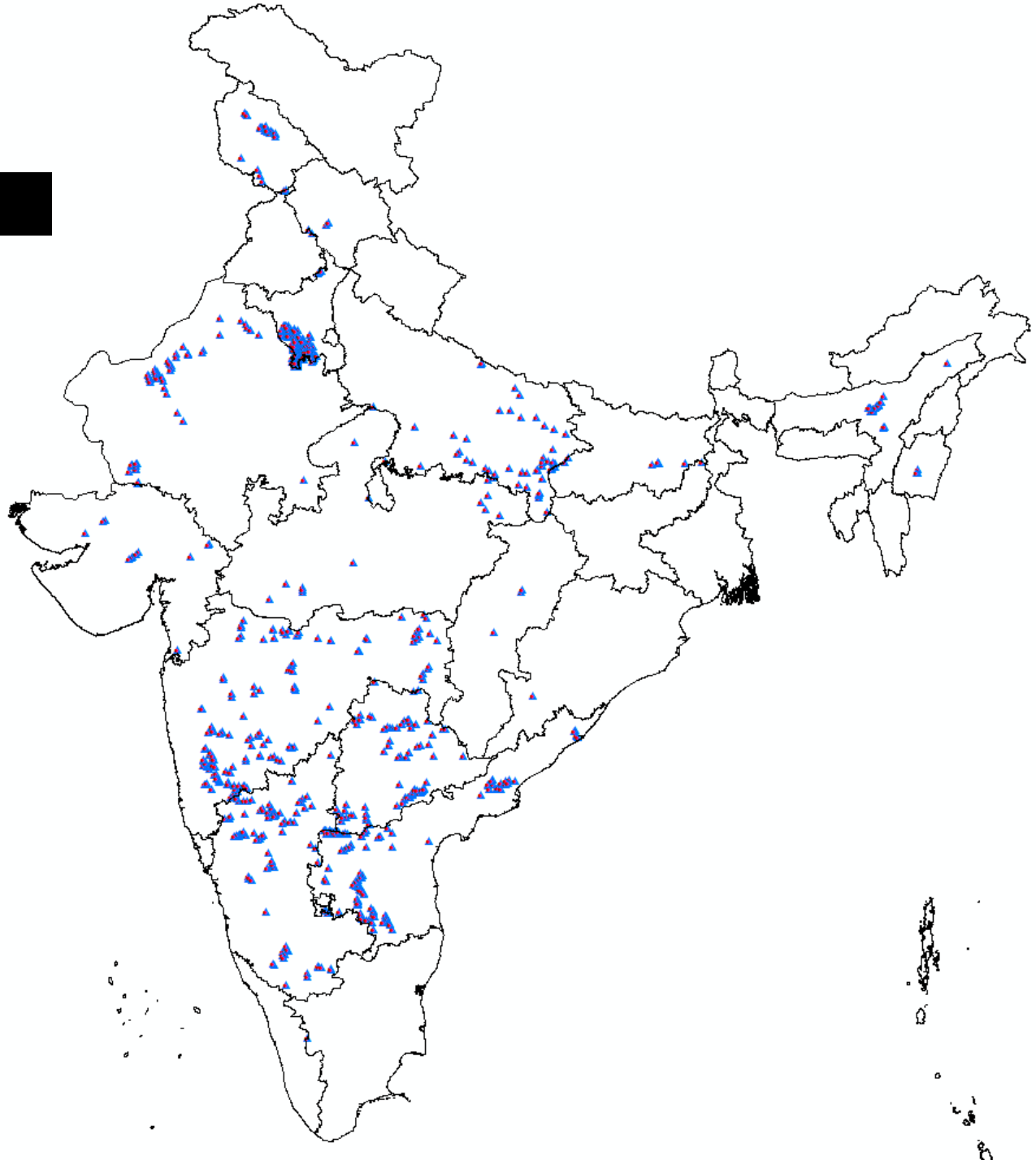
Barrages
Weirs
Anicuts



Power House



Lifts



Thank you!