

GEOWATER: Economical, Efficient and Effective Water Management

SSP – A Case Study

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Narmada River Basin and Main Dam



Narmada River Basin and Main Dam



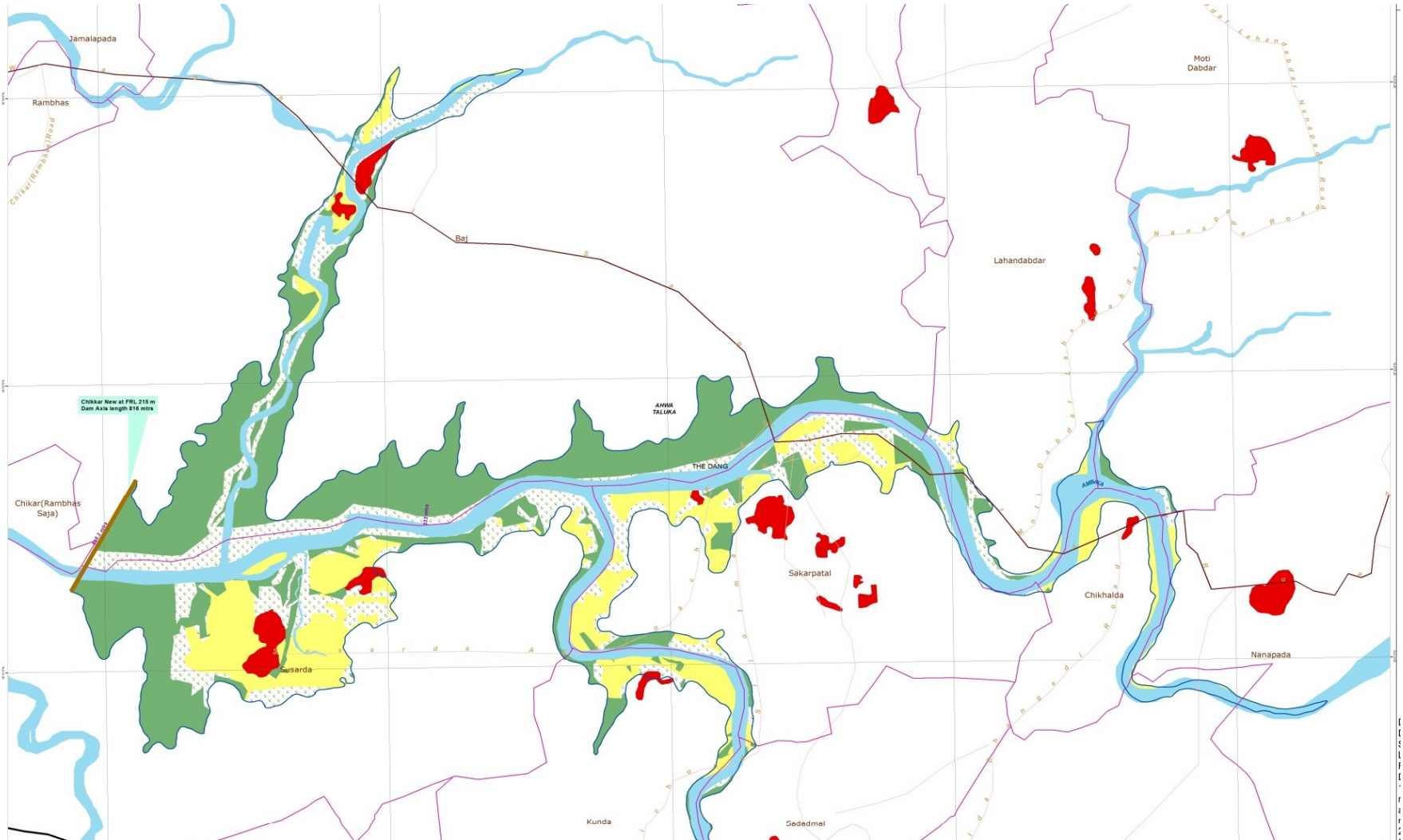
Rainfall – Runoff Relationship

Narmada River Basin and Main Dam

Reservoir Level – Discharge Relationship
Extent of Submergence



Narmada River Basin and Main Dam



Extent of Submergence

Narmada River Basin and Main Dam



Narmada River Basin and Main Dam



Environmental Management

Manmade Perennial Rivers



World's largest canal network to convey 11.7 BCM of water every year

SSP Based Drinking Water Supply Schemes

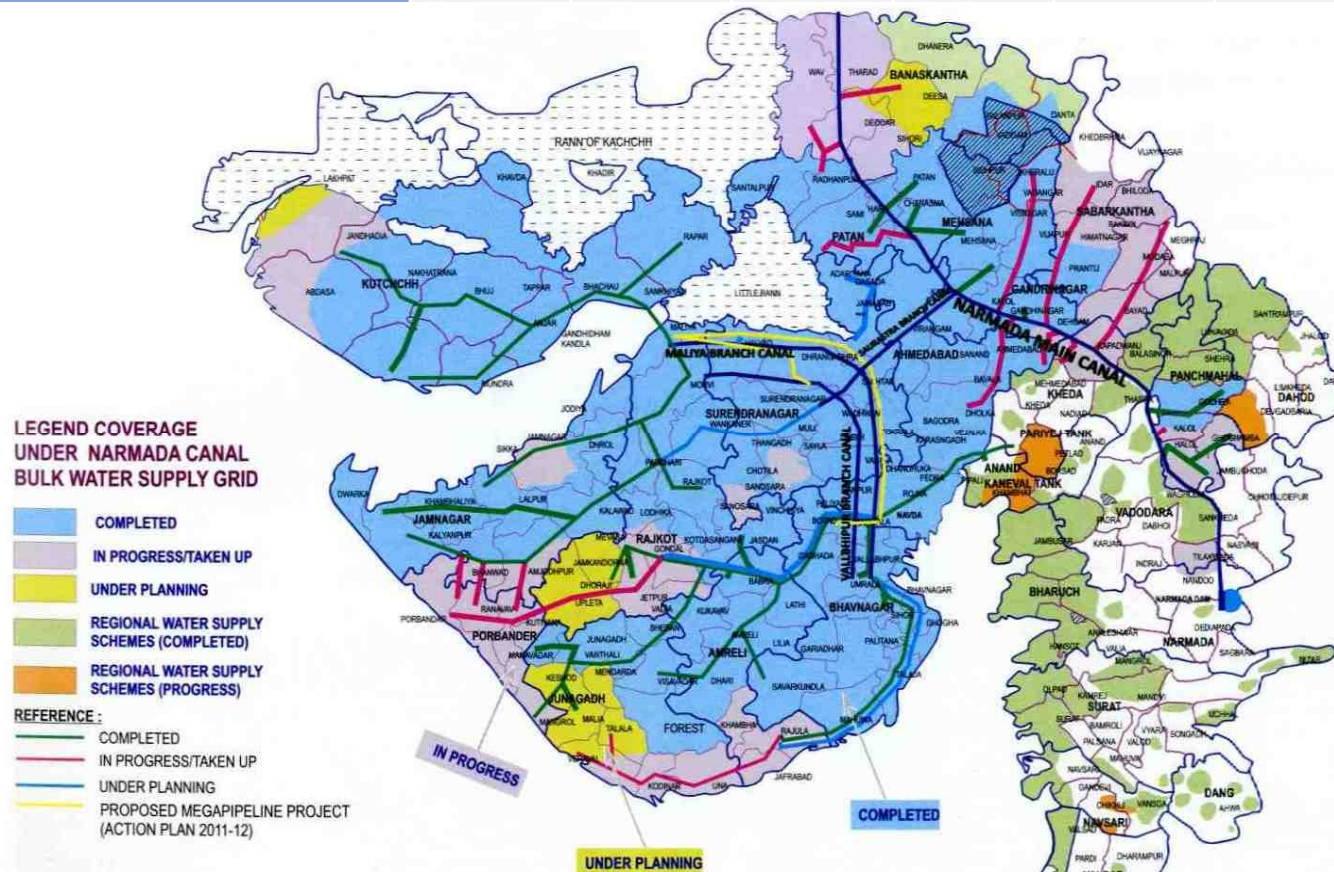
	Planned		Completed		In progress	
	Villages	Towns	Villages	Towns	Villages	Towns
Sardar Sarovar Canal Based Drinking Water Supply Projects	9633	131	7693	118	1525	7
Rural Regional Water Supply Schemes	5376	14	3852	14	738	0
Total	15009	145	11545	132	2263	7

Bulk Transmission
58 Schemes
Total 3241 km
Comp. 2684 km

Distribution
321 Groups

Total Cost of Sardar Sarovar Based Water Grid
Rs. 15402 Cr

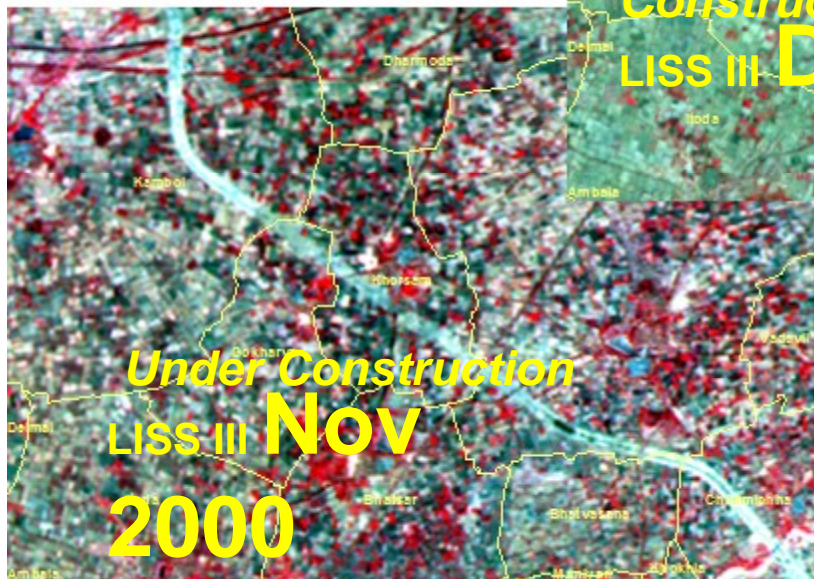
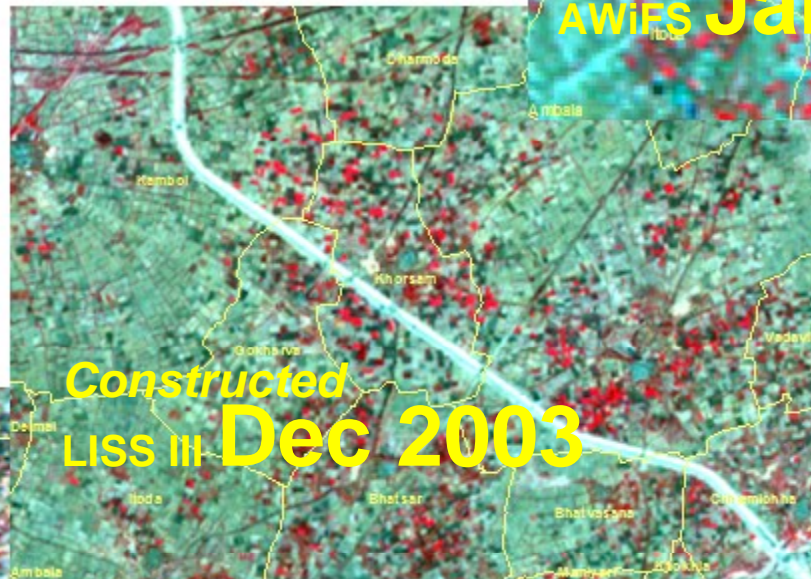
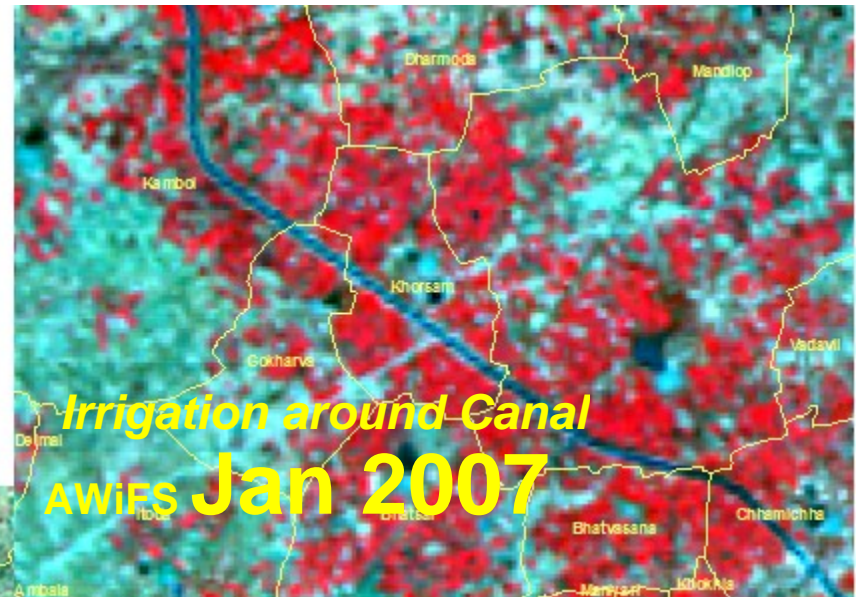
Expenditure incurred
Rs. 9133 Cr



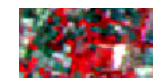
Benefitting 3 million people in 9633 Villages and 131 Towns

Narmada Main Canal

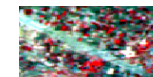
Village: Khorsam District: Patan
Taluka: Chansma



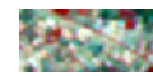
Key to Image



Irrigated Area



Canal

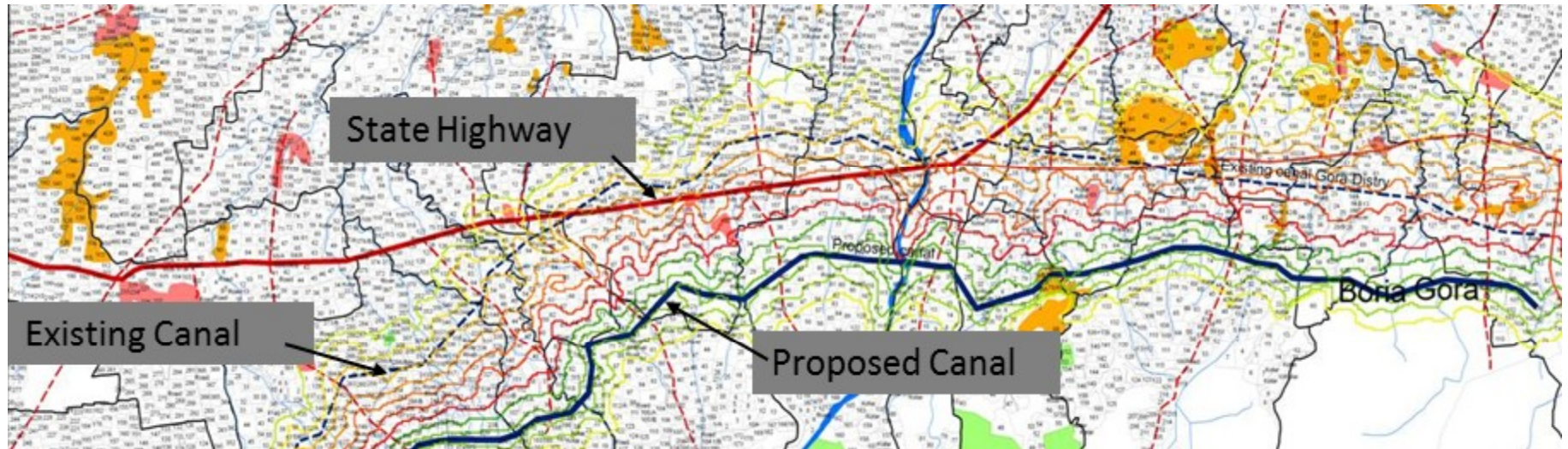


Un-Irrigated Area



Village Boundary

Canal Network Construction



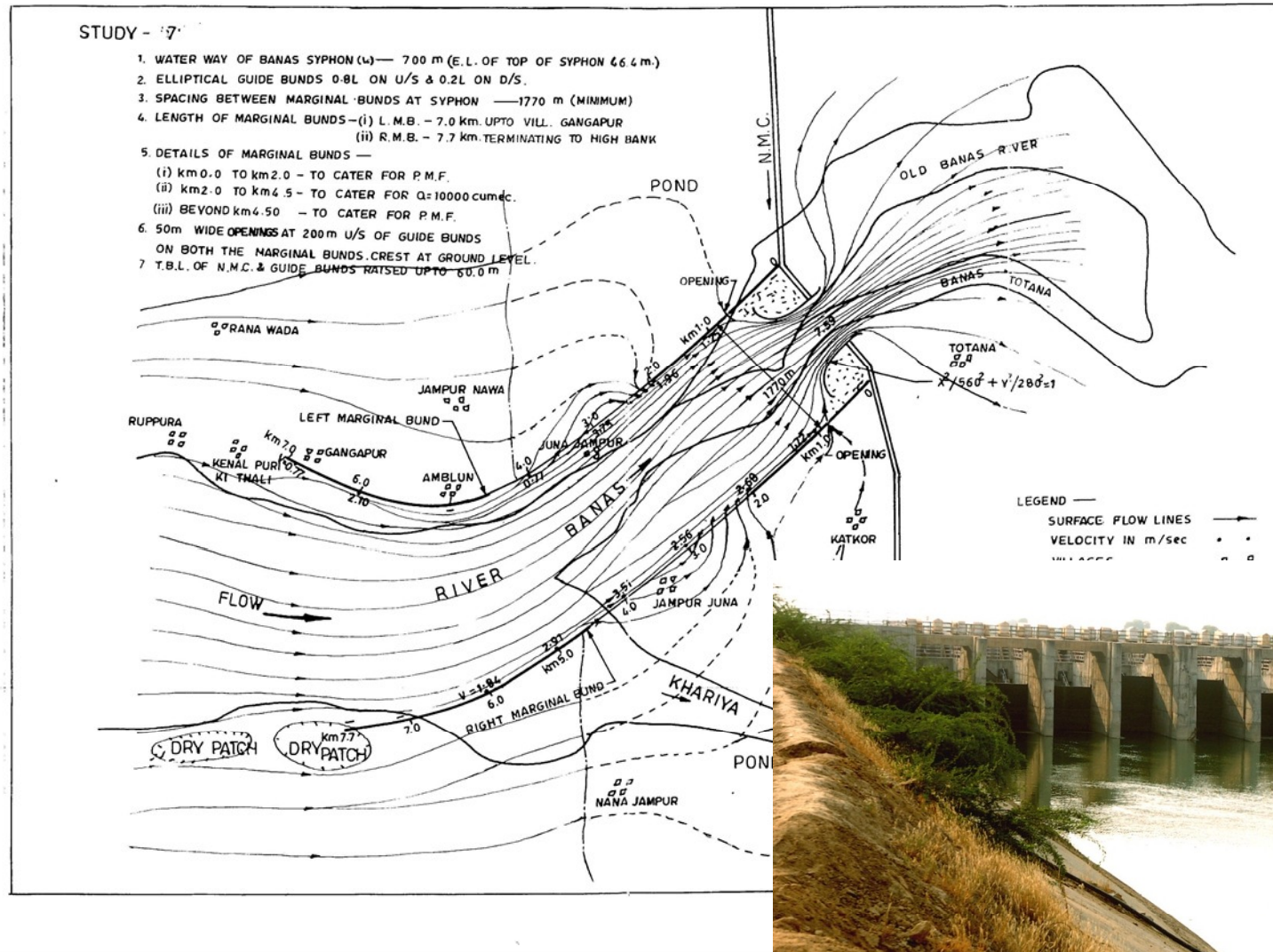
- **Fixing the alignment and ensuring gravity flow coverage**
- **Land Acquisition**
- **Identification of Forest Area, Wild Life Sanctuary etc.**
- **Roads & Railways crossing**
- **Flood Plain management**

Canal Network Construction



- Acquisition of Land

Canal Network Construction



900m long
Canal Syphon
on NMC



Planning for Cross-Drainage Work

Canal Network Construction

The screenshot displays a software interface for managing canal network construction. At the top, there are two rows of dropdown menus for filtering data: 'Main SBCs', 'Package/Chainage', 'Structure', 'Distributaries', and 'Minors' in the first row; and 'Contractor', 'Activities', and 'Others' in the second row. On the left side, there are buttons for time-based views: 'Launch Till Date', 'For The Year', 'For The Quarter', 'For The Month', 'Spread Q1-Q4', 'Spread M1-M12', and 'Others'. The main area is divided into several sections. A top-left map shows a network of canals with a red dot and a green arrow pointing to a specific location. Below this is a photo of a concrete structure with labels for 'Date', 'Package', 'WBS Code', and 'Sta'. To the right of this is another set of filter dropdowns identical to the top row. Below the photo is a horizontal strip of three small images showing different stages of construction: a dirt road, a concrete structure, and a paved road. On the right side, there is a large map showing a detailed canal network with various structures marked by colored dots (green, yellow, red). A legend on the left of this map lists completion levels: '100% Complete', '75-99%', '50-75%', and '0-50%'. Below the legend are two columns of filter buttons: the first column includes 'SBCs', 'Structures', 'Distributaries', and 'Minors'; the second column includes 'EW', 'Concreting', 'Lining', 'WBM', and 'Others'. The large map on the right also has a compass rose and a scale bar.

- **Construction – Planning & Monitoring**

Canal Network Construction

5.1 FORMATS

5.1.1 CONTROL OF NON CONFORMING PRODUCT

Site: _____ Location: _____

Description of non-conformance: _____

Identified by: _____ Date: _____

Accepted by: _____

Reviewed: Acceptable with no report Acceptance for all use Rejected / scrapped

Disposal for disposition: _____

Verification: _____

Remarks if any: _____



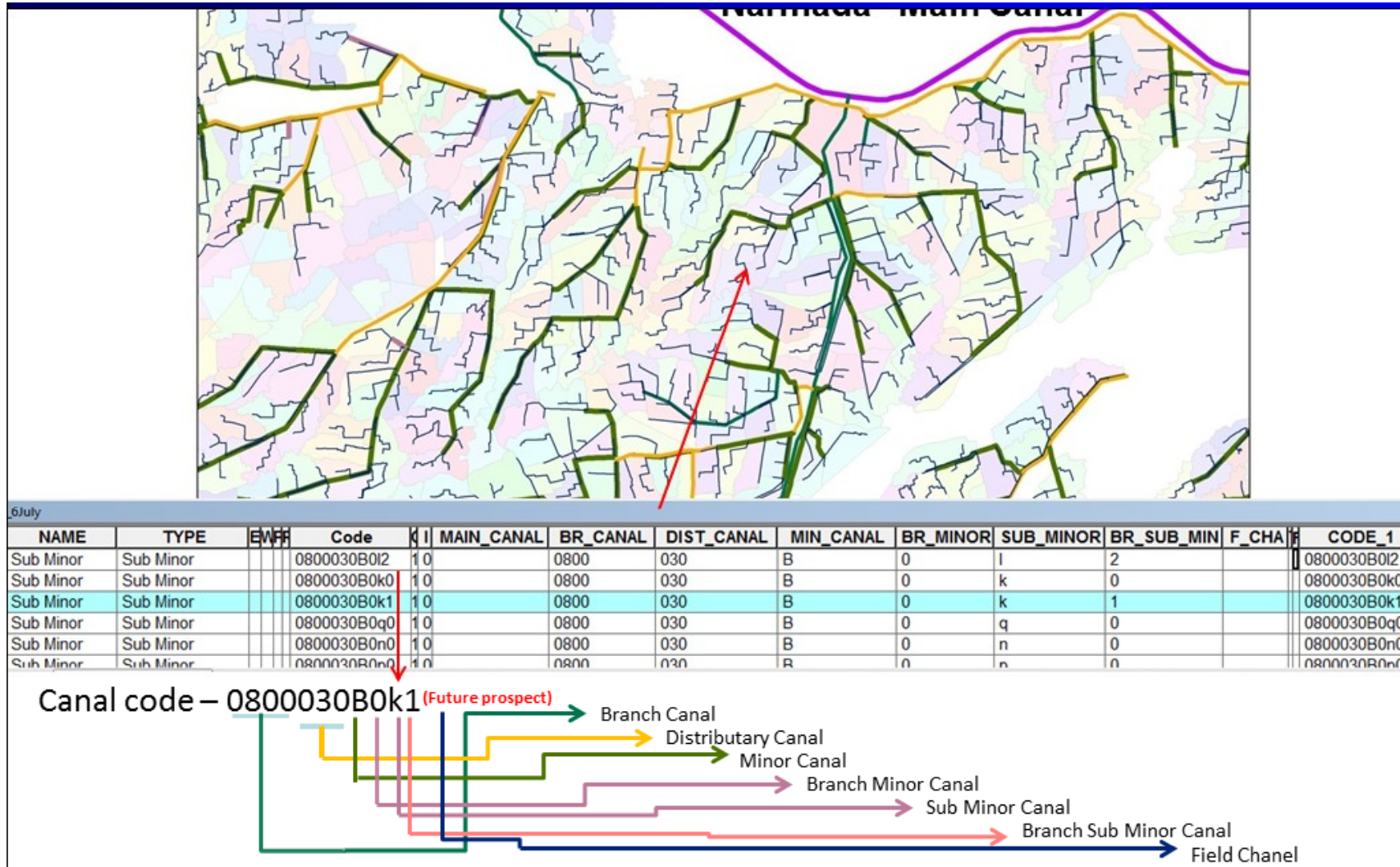
Sub Item	Sub Branch Canal	Structure	Material	Unit	Rate	Quantity	Amount	Remarks
1.1.1	1.1.1.1	1.1.1.1.1	1.1.1.1.1.1	1.1.1.1.1.1.1	1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1.1.1

		Saurashtra Branch Canal	
1			
2	1.1		MSBC
3	1.1.1		Ch 0-16
4	1.1.1.1		Sub Branch Canal
18	1.1.1.2		Structures
19	1.1.1.2.1		S1
33	1.1.1.2.2		S2
47	1.1.1.2.3		S3
61	1.1.1.2.4		S4
75	1.1.1.3		Distributories
78	1.1.1.3.1		D1
77	1.1.1.3.1.1		Ch 0-10
78	1.1.1.3.1.1.1		Distributory Canal
82	1.1.1.3.1.1.2		Minors
93	1.1.1.3.1.1.2.1		M1
94	1.1.1.3.1.1.2.1.1		Pre Tendering
95	1.1.1.3.1.1.2.1.1.1		Survey & Investigation Works
96	1.1.1.3.1.1.2.1.1.2		Alignment approved
97	1.1.1.3.1.1.2.1.1.3		Land Acquisition
98	1.1.1.3.1.1.2.1.1.4		Detailed Design & Engineering
99	1.1.1.3.1.1.2.1.1.5		Tender Process
100	1.1.1.3.1.1.2.1.1.6		Contract Finalization
101	1.1.1.3.1.1.2.1.2		Execution
102	1.1.1.3.1.1.2.1.2.1		Mobilization
103	1.1.1.3.1.1.2.1.2.2		Earth Work
104	1.1.1.3.1.1.2.1.2.3		Concreting
105	1.1.1.3.1.1.2.1.2.4		Lining
106	1.1.1.3.1.1.2.1.2.5		WSM Service road
107	1.1.1.3.1.1.2.2		M2
121	1.1.1.3.1.1.2.3		M3
135	1.1.1.3.1.1.2.4		M4



- **Earthwork – Material Flowchart**

Canal Network Construction



- Identification of Missing Link

Canal Network Construction



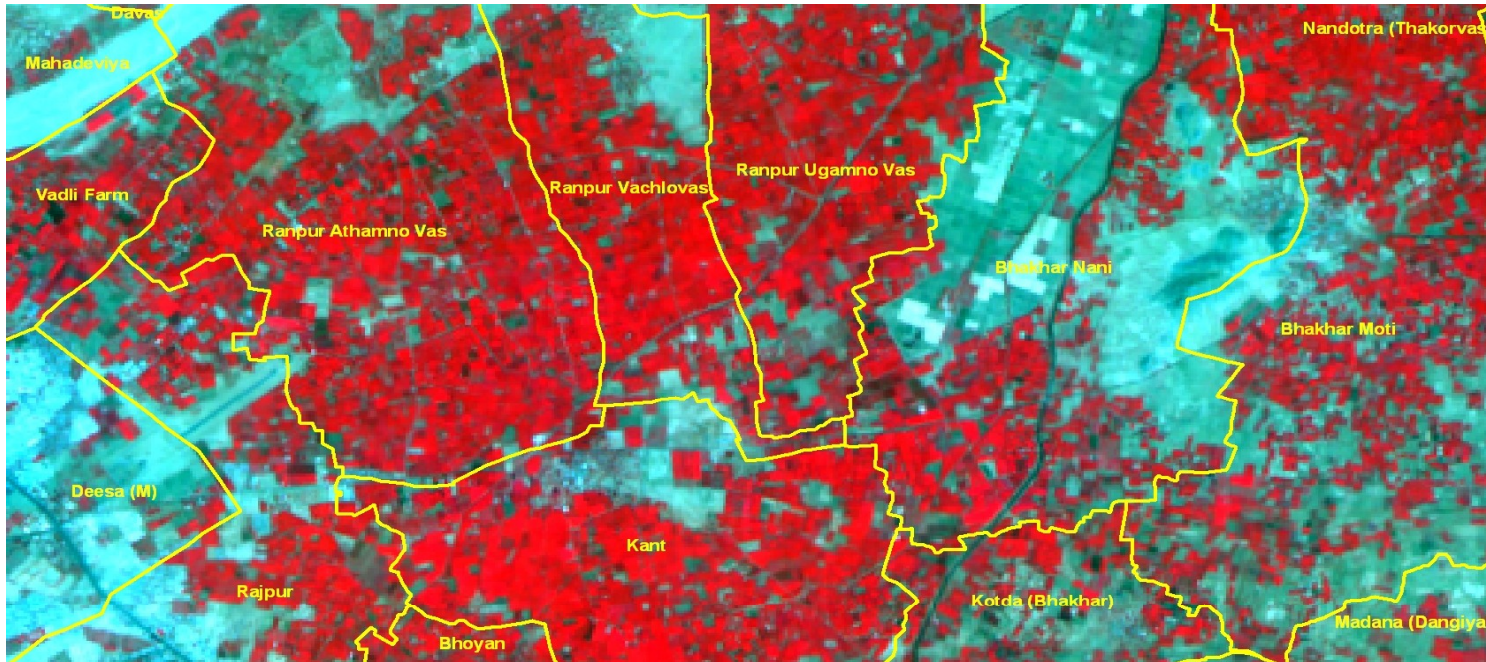
- Identification of Missing Link

Canal Operation & Maintenance



- **Remote sensing to know the canal flow condition**

Command Area Development & Irrigation



1	2	3	4	5	6	7	8	9	
2	District	BISAG	Deptt	Difference	Cotton	Bajri	Tuver	Castor	Tobacco
3	Ahmedabad	582481	334800	247681	201465	189478	1100	35800	100
4	Amreli	412656	73400	339256	345789	29102	700	1500	0
5	Anand	189893	170400	19493	10369	63099	800	3200	10700
6	Banaskantha	625656	408600	217056	47987	93966	3200	178700	
7	Bharuch	200355	83200	117155	113696	21323	46500	2500	0
8	Bhavnagar	335458	64200	271258	268096	12000	600	600	0
9	Dang	29899	23800	6099	389	4000	2500	0	0
10	Dahod	131656	136900	-5244	156	45696	13300	400	0
11	Gandhinagar	148989	88800	60189	32656	36056	600	29300	
12	Jamnagar	386565	156100	230465	215899	28136	400	13500	0
13	Junagadh	390568	335900	54668	45655	155656	800	2200	0
14	Kutch	245888	122200	123688	70000	20000	0	120000	0

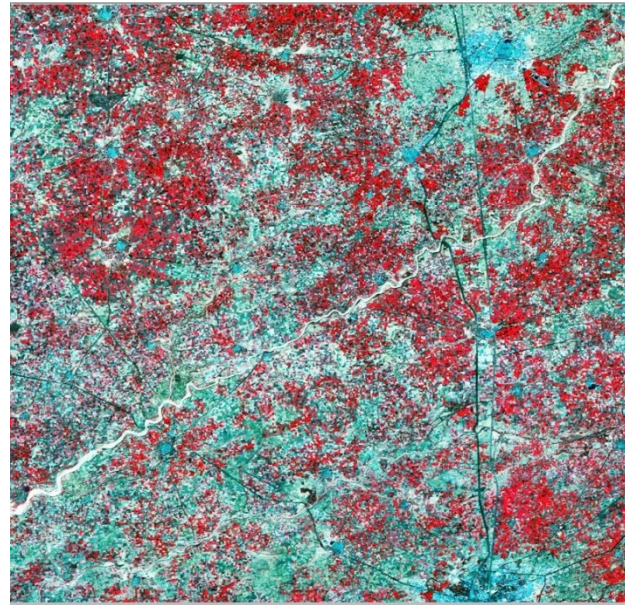
- Area cultivated under different crops

AGRICULTURE



DATE: 12 JAN 1999

NEAR UNJHA



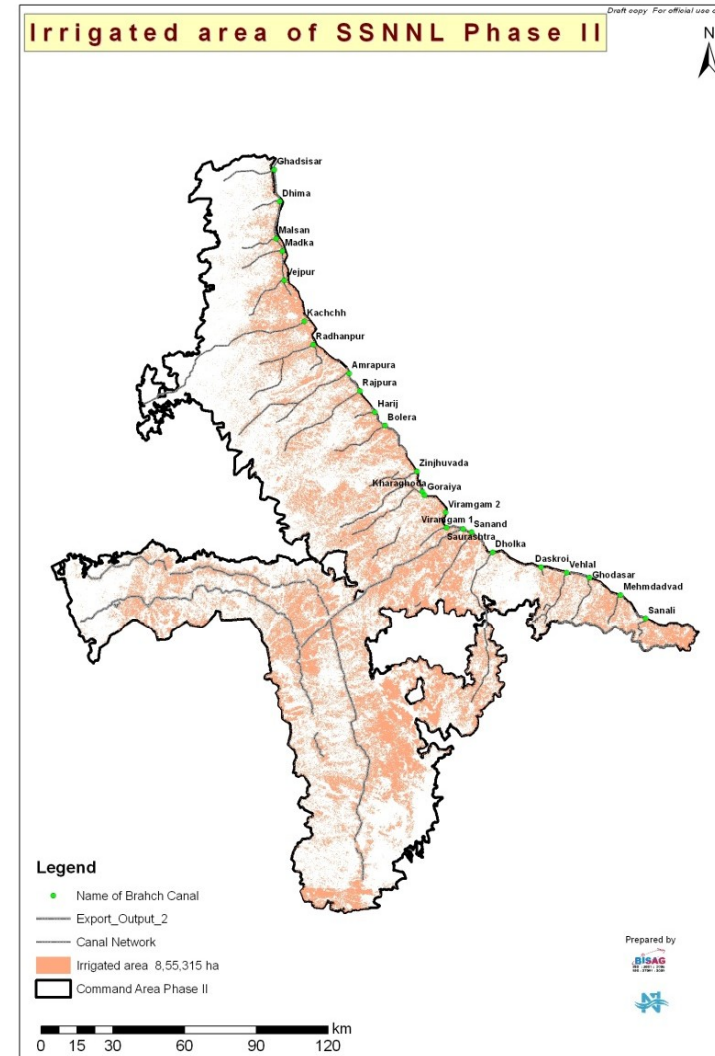
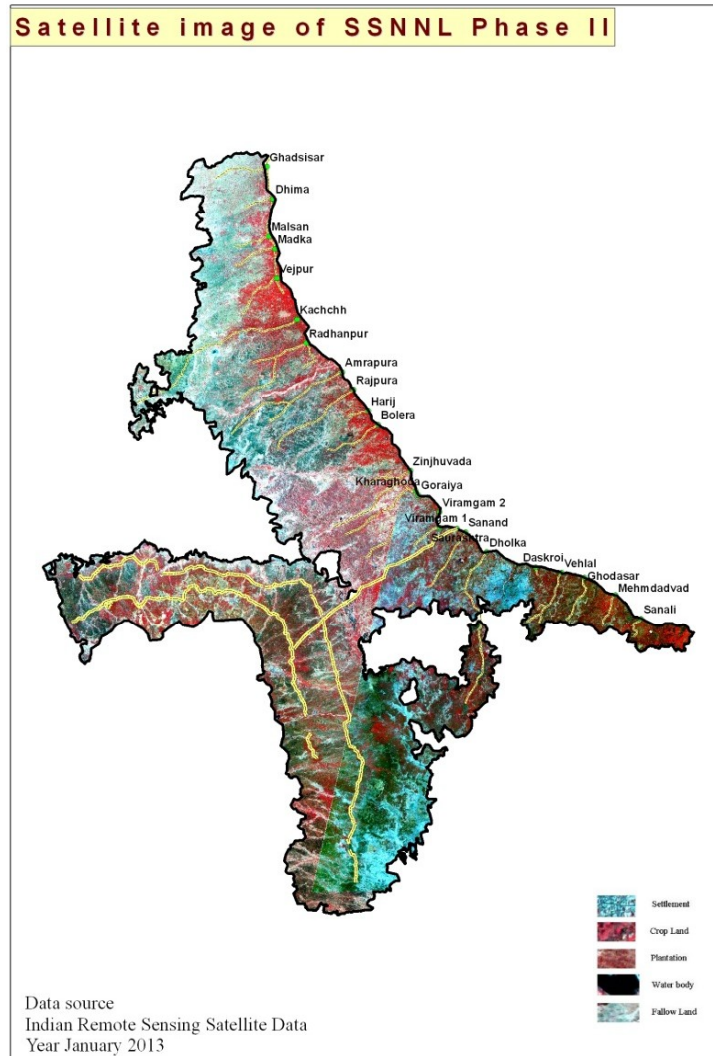
DATE: 23 JAN 2001

- Crop acreage estimation
- Crop condition Assessment
- Monsoon performance analysis.

Computerisation & integration with multi-year satellite data, soil information, village-wise cropping patterns, yields, adopted technology, water use, etc.

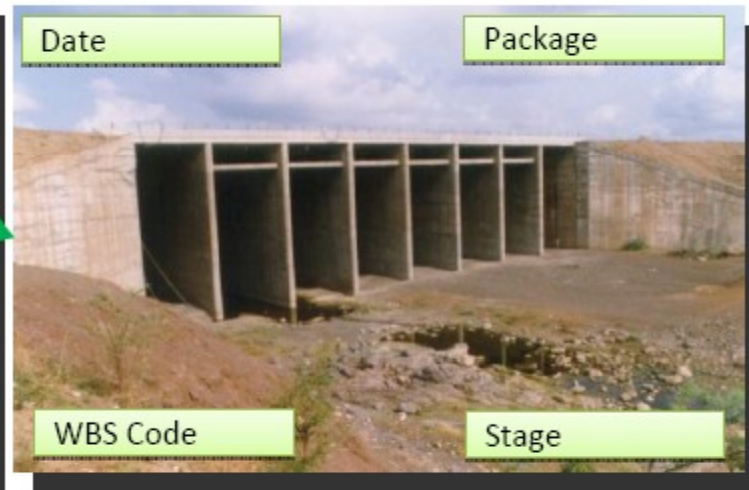
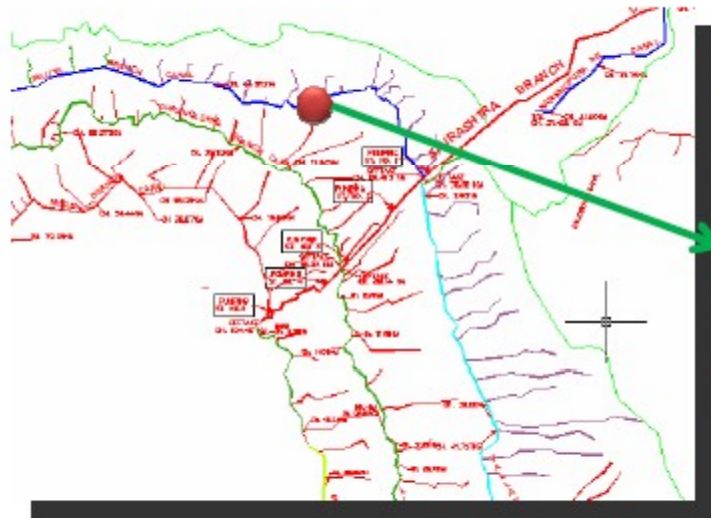
- Precision Farming
- Identification of highly degraded agricultural areas & their planning
- Information System for Animal Husbandry
- Support to Farmer Call Centre

Command Area Development & Irrigation



- **Actual Area irrigated**

Asset Management



- **Hierarchy, Location and Vulnerability of Structures**

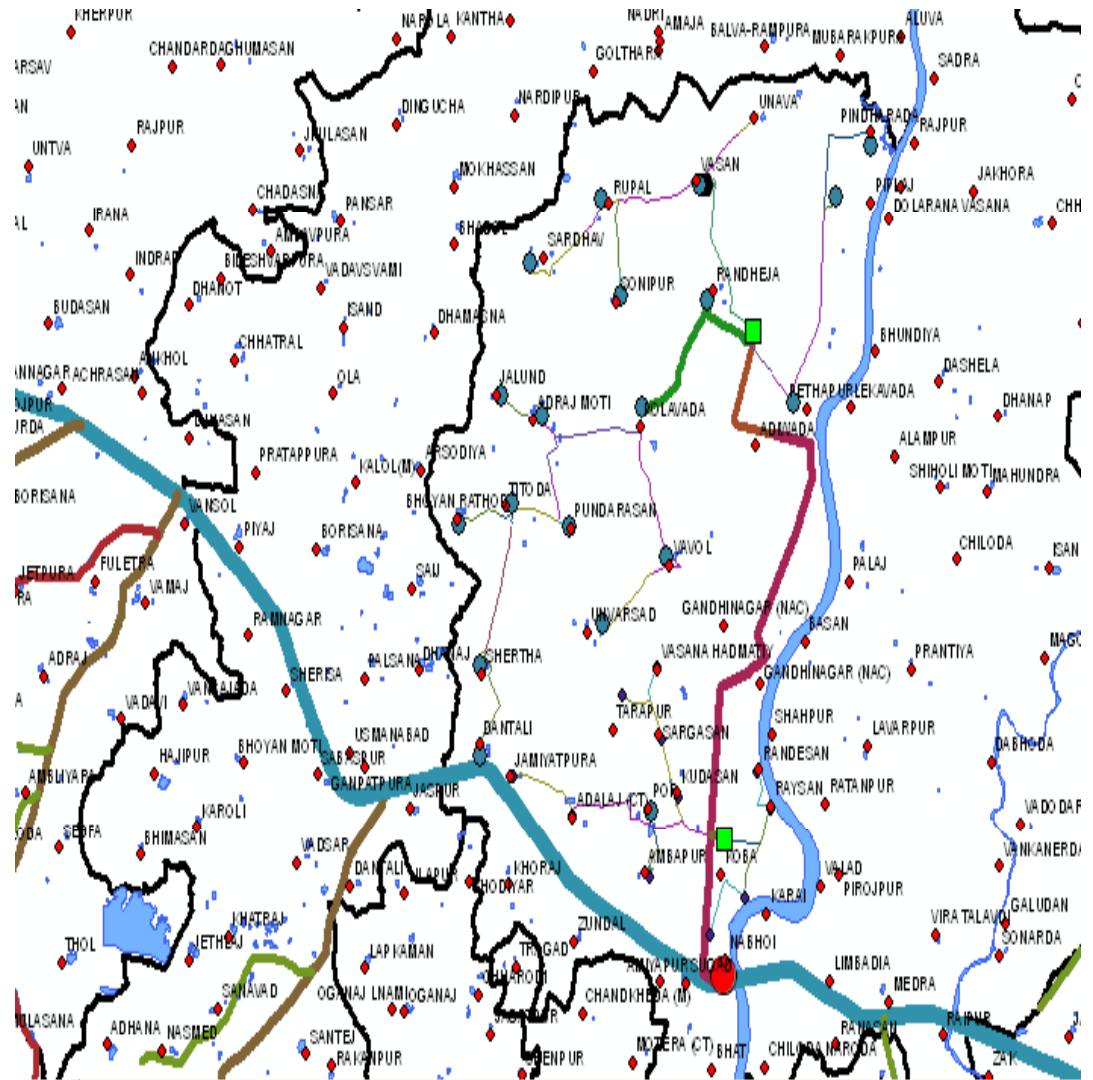
Drinking Water Supply: Planning & Management

Assets Mapping

- Pipeline
- Pumping Station
- Head work
- Sump
- ESR
- Bulk pipeline
- Canal

Water Quality Mapping (Fluoride, TDS, Chloride, Nitrate)

- Pre monsoon
- Post monsoon



Assets Photograph

Bulk water Pipeline



Overhead tank



Canal Intake



ESR



Intake



Filtration



UG Sump



Pumping Machinery

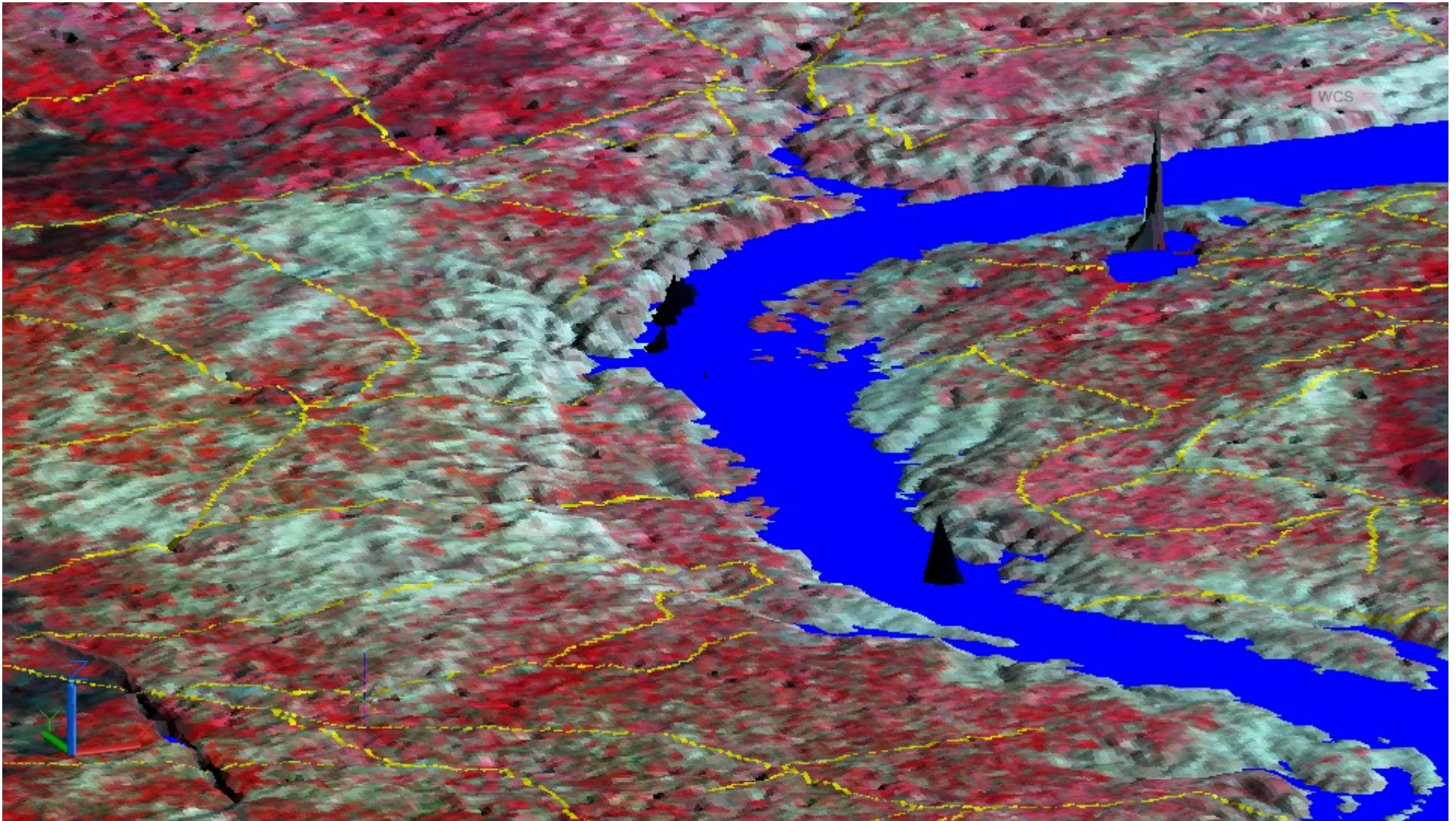


Disaster Management

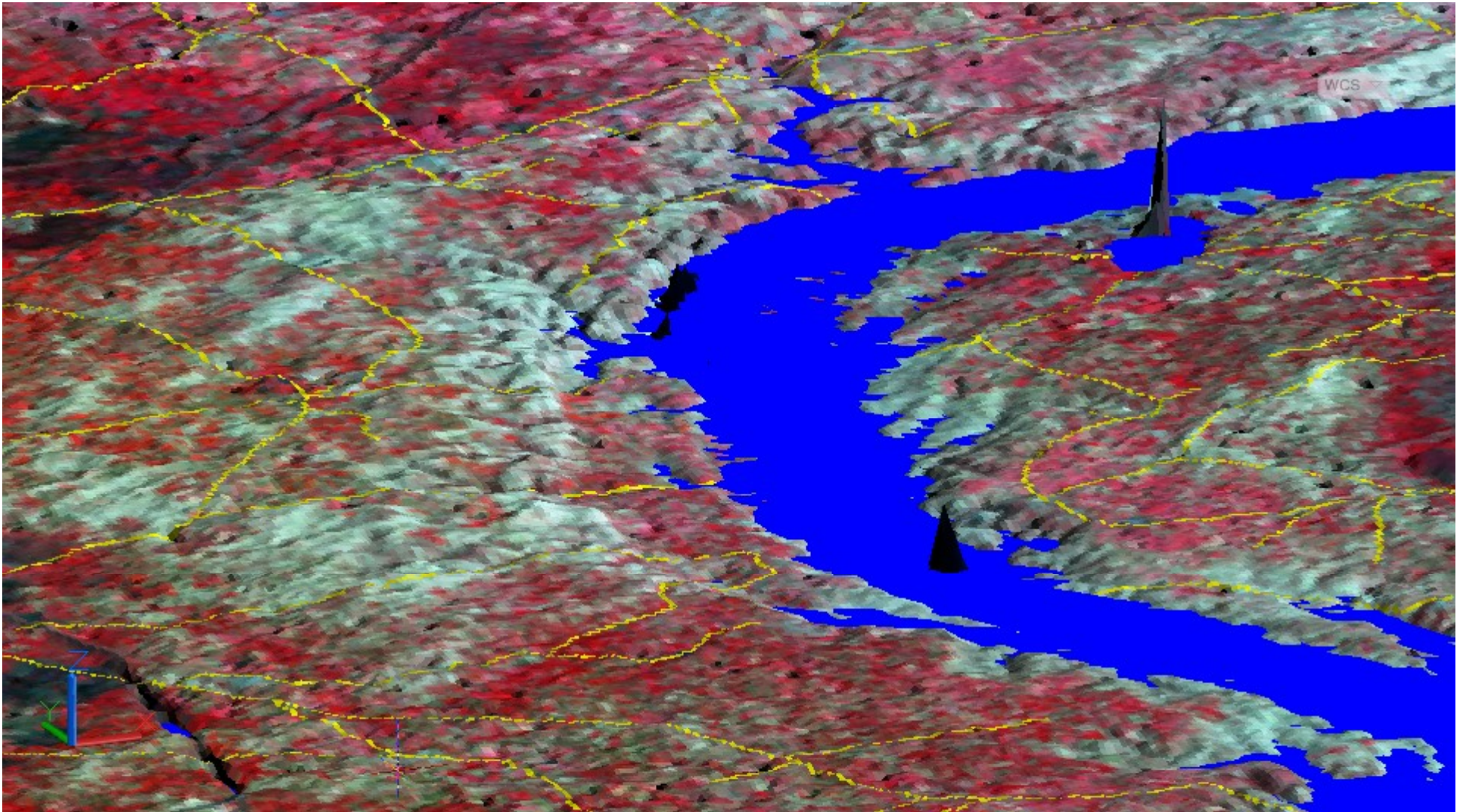
- Extent of Inundation in case of a Canal Breach
- Loss to the standing crops
- Alternate routes to reach the site of disaster
- Duration and effect of restoration



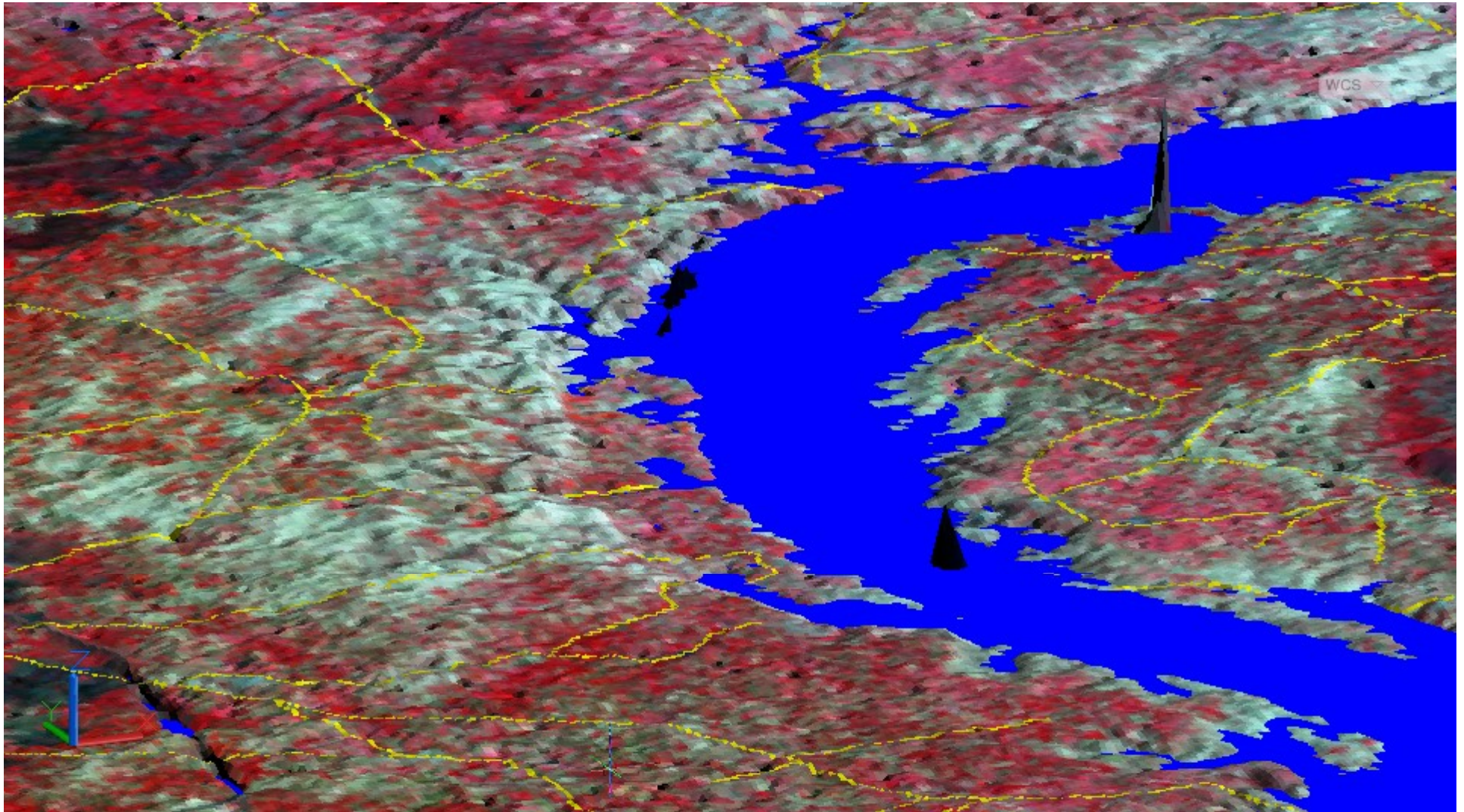
Floods Visualization using 3D Satellite images



Floods Visualization using 3D Satellite images



Floods Visualization using 3D Satellite images



Challenges involved

- Geographical spread
- Availability of satellite imageries
 - Time of interest
 - Clarity on cloudy days
- Analytical Tools
- Skilled manpower
- Involvement of subject experts
- Field validation of inferences drawn
- Knowledge sharing





Farm

THANKS
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