

Best Practices in Water Resources Management in Irrigation Sector - A Case Study of Gujarat



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Constraints are boundary conditions and Growth is the objective function

In 2024-25 Gujarat became the **4th largest state economy** in India with **GSDP of ₹27.99 lakh crore**

The agricultural and allied sector in Gujarat saw a sustained **9.7% CAGR**-significantly higher than the national average (~5.7%) in last 25 years.

Gujarat accounts for about **7.65% of India's total milk production.**

Land and Population ~ 6% but Water Resources < 2.3% of India

Water scarcity and lopsided distribution of water

Arid State - 196,000 km² of total area, **31.72% arid** and **46.18% semi-arid**

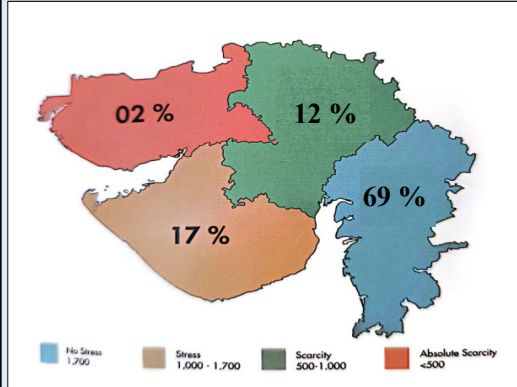
Frequency of deficit rainfall (< 75% of average) is once in three years

Significant increase in number of heavy rainfall days and of dry days.

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Gujarat: Water Stressed State with glaring regional imbalance



Region	Surface Water (MCM)	Ground water (MCM)	Total Water Resources (MCM)
South & Central	31,750	6,355	38,105 (69%)
North Gujarat	2,100	4,242	6,342 (12%)
Saurashtra	3,600	6,123	9,723 (17%)
Kachchh	650	788	1,438 (2%)
Total	38,100	17,508	55,608

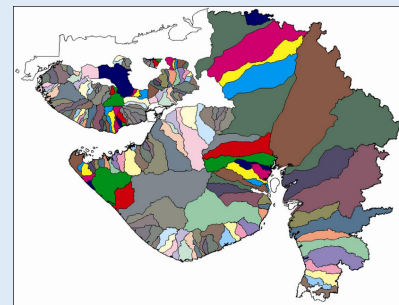
- Fresh water availability 909 m³ /capita - National average is 1,820 m³/capita

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WRM (Scarcity and Variability)

REGION	Surface water resource (Mm ³)	Total live storage in existing dams (including SSP) (Mm ³)	Runoff without storage (Mm ³)
SOUTH & CENTRAL GUJARAT	31750	16020	15730 (49%)
SAURASHTRA	3600	2380	1220 (34%)
NORTH GUJARAT	2100	1780	320 (15%)
KACHCHH	650	300	350 (54%)
TOTAL	38100	20480	17620 (46%)

Objective is to increase storage capacity and harvesting excess runoff during rainy season –
“Catch the Rain”



Annual Rainfall

- (a) Gujarat region - 800 to 2000 mm
- (b) Saurashtra region - 400 to 800 mm
- (c) Kachchh region - less than 400 mm

River Basins

- (a) Gujarat region 17
- (b) Saurashtra region 71
- (c) Kachchh region 97

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WRM - Enhancing Supply and Managing the Demand for Water

Supply Management

- Inter Basin Transfer of Water
- Increasing Water Storage Capacity in Ponds/tanks
- Construction of barrages/Weirs in rivers

Demand Management

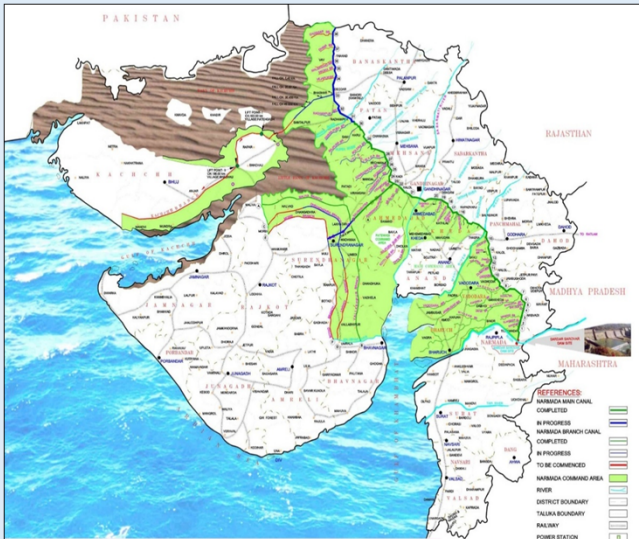
- Large Scale adoption of Micro Irrigation Schemes
- Empowering Water User Association
- Use of Recycled Water
- Progressive tariff for industrial Use

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Case Study of Sardar Sarovar Project

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Inter Basin Transfer of Water - The Sardar Sarovar Project (SSP) Transfer for irrigation



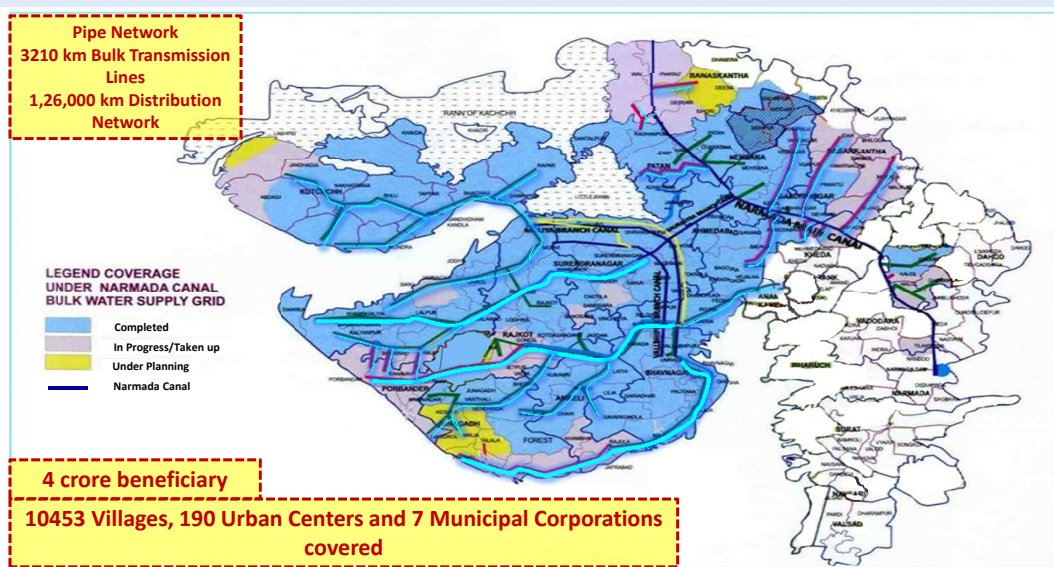
Irrigation Benefits	Nos.
Districts	17
Taluka	78
Villages	3,173

**Irrigation Area
17.92 Lakh Ha.**

- Beneficiary Population for Irrigation -13.6 Lakh
- Water utilization upto 8 MAF (9864 MCM) in year 2023-24

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SSP for Drinking Water Security – Gujarat Water Grid



- Water utilization upto 1.69 MAF (2085 MCM) in year 2023-24

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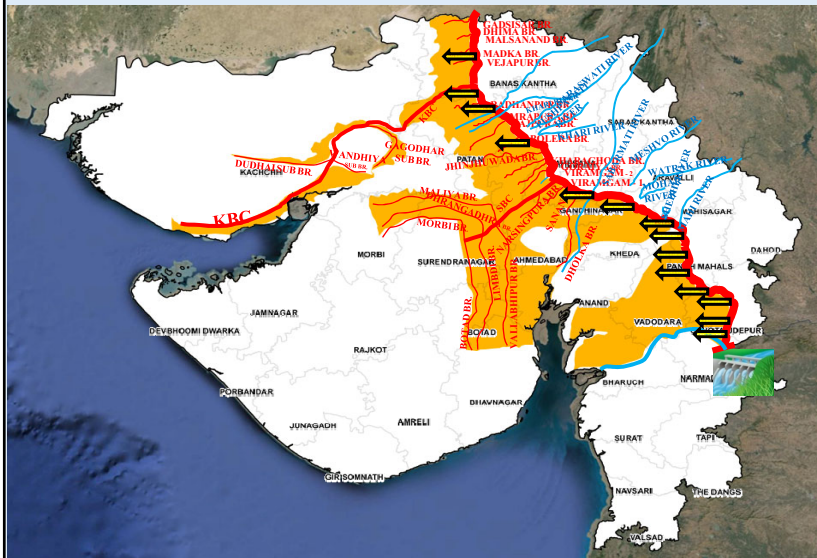
Cross cutting basins for surface water integration

- Transfer of water from across basins
- Surplus-Deficit transfer or less deficit to more deficit
- Objective is to disperse water stress
- Cost is high because of crossings with water courses and in some cases going against gravity
- Social perception might go adverse
- Riparian issues required to be handled skillfully

Water utilization (2023-24)	MCM
SSP command	11244
Sujalam Sufalam Project	817
Sauni Project	870
Through Escape during Monsoon Season	1514
Total	14445 (~ 11.71 MAF)

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SSP- Interlinking of Rivers for transfer of Excess Water during Monsoon



16 Escapes	
Name of River	Chainage in Km.
Hiran River	26.9
Deo River	75.3
Karad River	105.2
Kun River	134.8
MRBC	149.8
Saidak River	160.3
Mahor River	181.8
Watrak River	194.4
Meshwo River	211.4
Sabarmati River	229.3
Eastern Drain	255.5
Sher-Panar Drain	273.3
Rupen River	309.9
Pushpavati River	314.8
(Khari-II)	356.4
Banas River	359.1

☐ Transferred Total 1514 MCM of Water during Year 2023-24

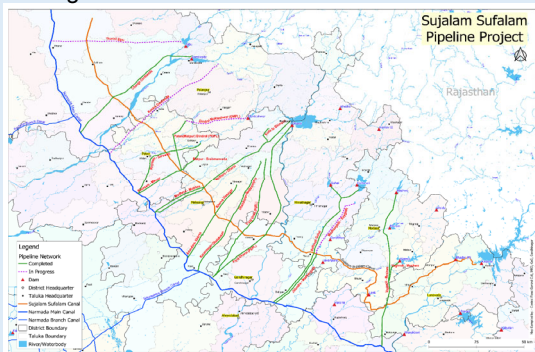
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Cross cutting basins for surface water integration

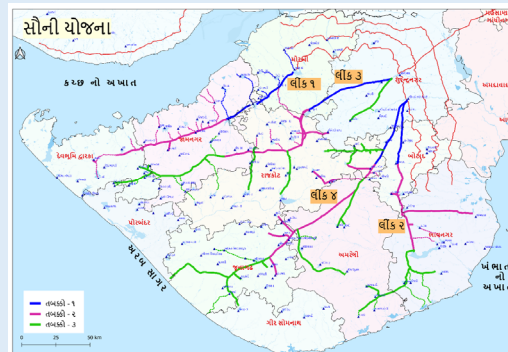
Sujlam Sufalam Project

- 332 km long Spreading Canal to transfer water from Narmada and Kadana river basins to North Gujarat
- Filling 7 reservoirs and 1111 ponds for augmenting irrigation in 1.20 Lakh Ha.
- **817 MCM** of water Diverted to Northern Regions



Saurashtra Narmada Irrigation Avtaran Yojna (SAUNI)

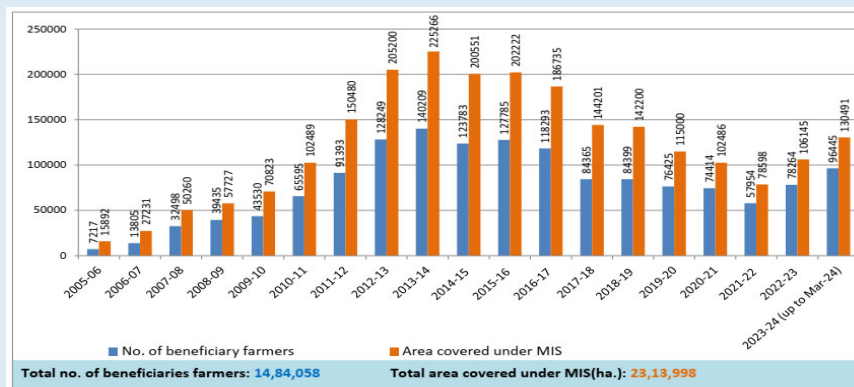
- **Object:** To divert 1233 Million M³ (1 MAF) surplus waters of river Narmada, during monsoon and fill **115** irrigation projects located in drought prone areas in **Saurashtra region**.
- **870 MCM** of water Diverted to Saurashtra Regions



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Demand Management - Large Scale adoption of Micro Irrigation Schemes

In Gujarat, 23.14 Lac ha has been covered under micro irrigation scheme.



- Gujarat started Micro Irrigation in 2005-06 and presently is the leading state with about 24.48% (i.e. **24.04 Lakh ha**) of net sown area benefitting about **15.5 Lakh** farmers – **not only for enhancing on-farm efficiency but also as a part of demand management**
- Developed guidelines to implement any new LI scheme irrigation project through micro irrigation only.

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Impact of IWRM

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Irrigation management in Problematic Soil Areas - Success in Bara Tract

- Cotton - main monsoon crop, improvement in all parameters like area covered, yield, income etc.
- Area covered under cotton increased from 46 % to 52.6 % and yield also increased from 968.75 Kg/ ha to 2259.16 Kg/ ha
- annual income - a phenomenal rise of Rs. 70977.8 per hectare
- Wheat - main winter crop, yield increased by 35%
- Improvement in socio-economic parameters like education, health, saving, etc.

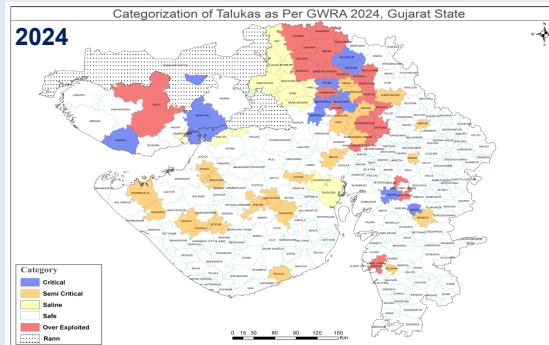
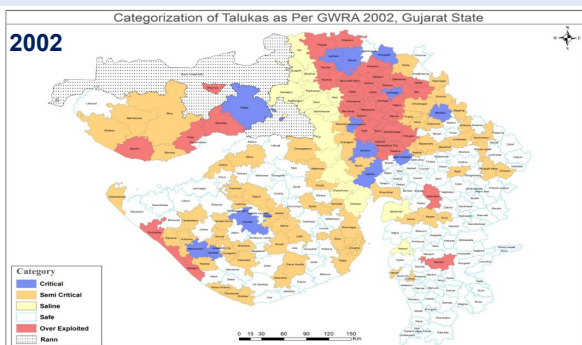
Annual income from livestock (Indian Rupees)

	Pre-Irrigation	Post-Irrigation
Cow	-205	7050
Buffalo	10475	13241

In total, over 3,50,000 hectare of sodic soil of different parts of command area is irrigated at present and soil quality and productivity are being monitored

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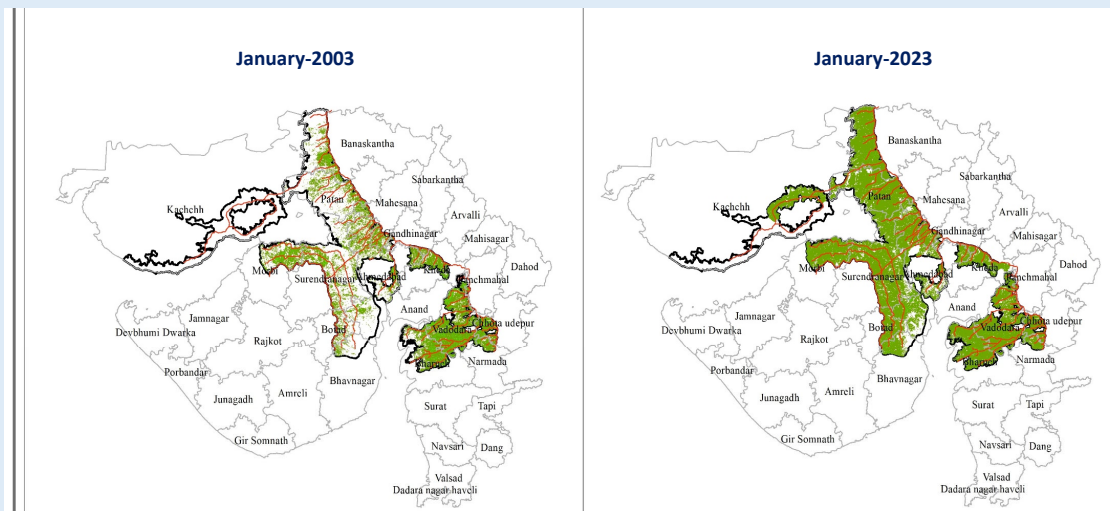
Improvement in Ground Water Resources of Gujarat



Particulars	2002	2024
Over Exploited blocks	30	22
Critical blocks	12	10
Semi Critical blocks	63	24
Safe blocks	104	184

Out of 130 districts in over exploited, critical & semi critical districts of India – only 4 districts are from arid & water stressed State of Gujarat (source: Jal Shakti Abhiyan, 2025 document)

Positive Effect of Narmada Water in the Command Area



Thank You

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