

## Climate Variability in Gujarat and the Role of Sardar Sarovar Project

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**Climate Variability in Gujarat  
and the Role of  
Sardar Sarovar Project**





## Climate Change – A Reality and not Rhetoric

The mean temperature in India is projected to increase up to 1.7 °C in *kharif* (July to October) and upto 3.2 °C during *rabi* (November to March) season, while the mean rainfall is expected to increase by 10% by 2070 (IARI, 2012).

# Climate Change – A Reality and not Rhetoric



Cherrapunji  
– In August 2006

Flood in Desert?

The case of Rajasthan –  
August 2006



# Saudi Arabia, November 16, 2013



# Dubai, 2016



# Climate Change Projections by IARI

- The mean temperature in India is projected to increase up to
  - 1.7 °C in *kharif* (July to October) and
  - 3.2 °C during *rabi* (November to March) season
- The mean rainfall is expected to increase by 10% by 2070 (IARI, 2012).

Let us see the Projections made for the Districts covered under SSP Command Area (GSDMA Report on Climate Variability and Climate Change – Disaster Risk Scoping Study for Gujarat.)

# Estimated change in precipitation (mm) for 2070-2100

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ahmedabad	2	0	0	0	11	74	67	33	74	5	-9	0
	1	1	0	1	5	40	51	55	71	-10	-13	4
Anand	3	-1	0	0	9	76	93	39	85	11	-5	-1
	0	0	0	0	-1	35	46	48	64	-20	-11	3
Banas Kantha	0	0	1	0	15	17	46	-4	8	-9	-18	1
	0	1	0	1	3	1	11	-25	17	-5	-21	5
Bharuch	5	-1	1	1	8	130	145	62	125	31	-5	0
	0	0	0	0	-4	59	108	65	93	-21	-10	3
Bhavnagar	4	0	0	0	15	110	72	36	103	15	-8	1
	1	0	0	0	5	44	51	61	97	-11	-13	5
Gandhinagar	2	-1	1	0	11	38	71	32	31	-5	-12	-1
	1	0	0	1	0	19	42	29	41	-11	-16	5
Kachchh	0	0	0	0	15	54	47	-6	47	-6	-23	2
	-1	0	0	0	1	28	8	20	82	4	-26	4
Kheda	2	0	1	0	11	47	97	56	58	6	-6	-1
	1	0	0	1	-2	28	53	48	58	-10	-11	4

Baseline : 1960-1990



A2 Scenario



B2 Scenario

# Estimated change in precipitation (mm) for 2070-2100

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mehsana	1	0	1	0	15	33	68	21	27	-1	-15	0
	1	1	0	2	6	22	47	14	41	-2	-19	6
Narmada	8	0	1	1	7	105	178	85	108	39	-3	-2
	0	-1	0	1	-11	46	101	52	79	-25	-8	0
Panchmahal	2	-1	1	0	14	21	103	67	40	8	-4	-2
	0	0	0	1	-2	16	45	35	47	-11	-9	3
Patan	1	0	1	1	18	40	71	24	31	-5	-18	1
	1	1	0	1	9	12	32	11	30	-6	-21	5
Rajkot	1	0	0	1	30	127	78	10	77	-7	-20	1
	1	0	0	0	0	34	57	72	104	-11	-24	4
Surendranagar	1	0	0	0	16	84	69	27	72	-1	-16	1
	1	1	0	1	7	36	54	59	80	-6	-20	5
Vadodara	4	-1	1	0	7	74	126	64	68	17	-2	-2
	0	0	0	1	-5	32	74	63	60	-13	-6	2

Baseline : 1960-1990



A2 Scenario



B2 Scenario

# Climate Change Experience in Gujarat

- Daily Weather Report of the IMD showed
  - Deviation in Maximum Temperature -2 to +2 °C,  
Deviation in Minimum Temperature -2 to +4 °C.
- Normal date for onset of south-west monsoon is June 10 for south Gujarat, June 15 for Saurashtra, Middle and North Gujarat and July 1 for Kachchh.
- Consistently delayed by almost one fortnight to one month.
- Normal withdrawal date is 15th September, however in the current year, even after 1st October the rainfall continued

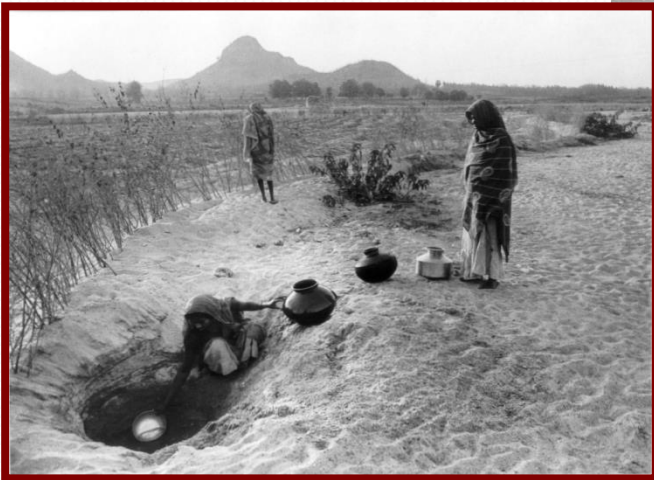
# Navratri - Festive Mood spoiled by Rains



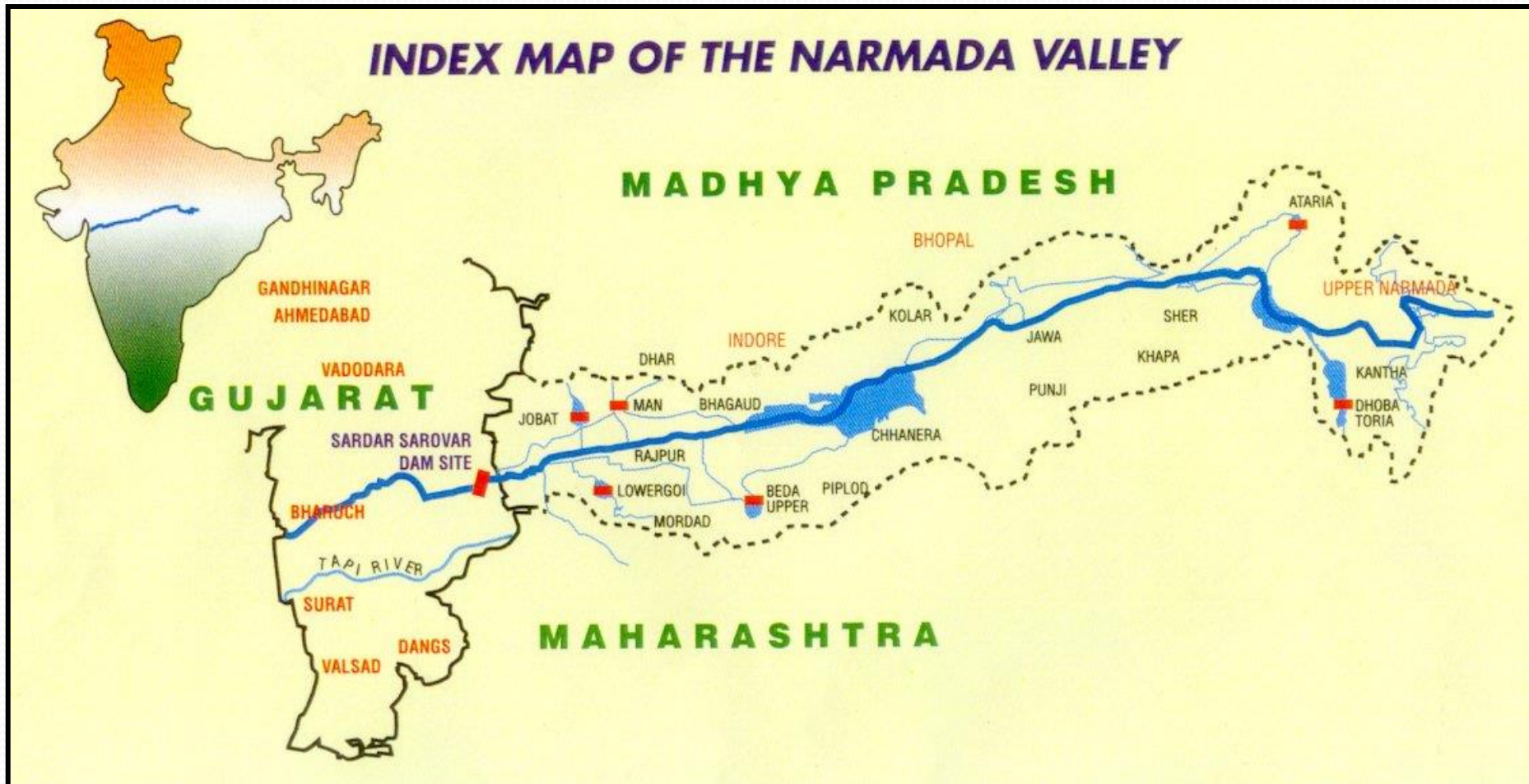
# Regional Water Transfer



**A means to address Water Scarcity**



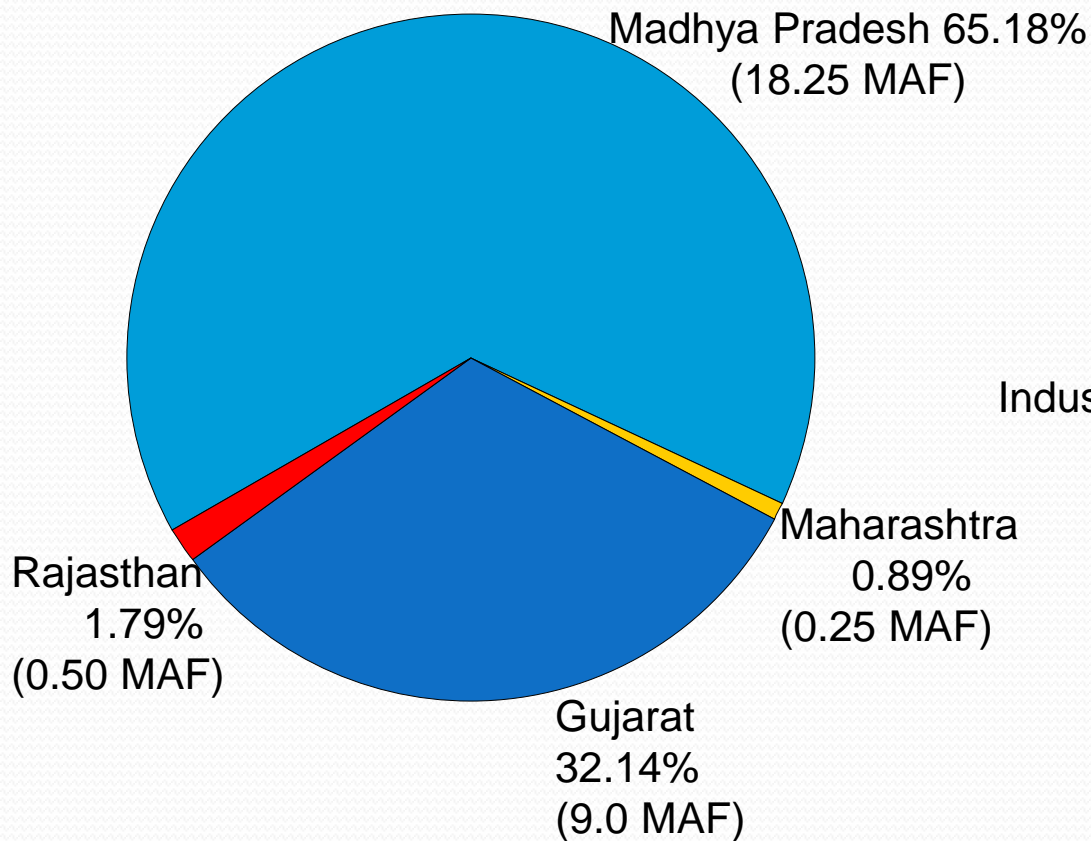
# Sardar Sarovar Project – for Long Term Water Security



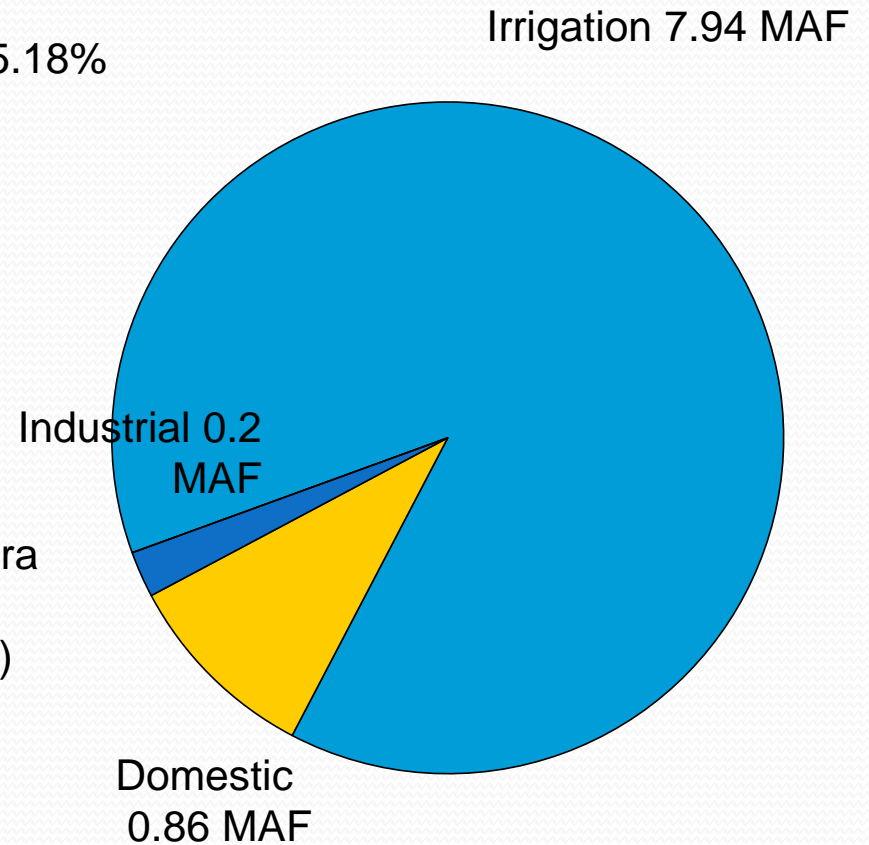


# Narmada Water Use Plan

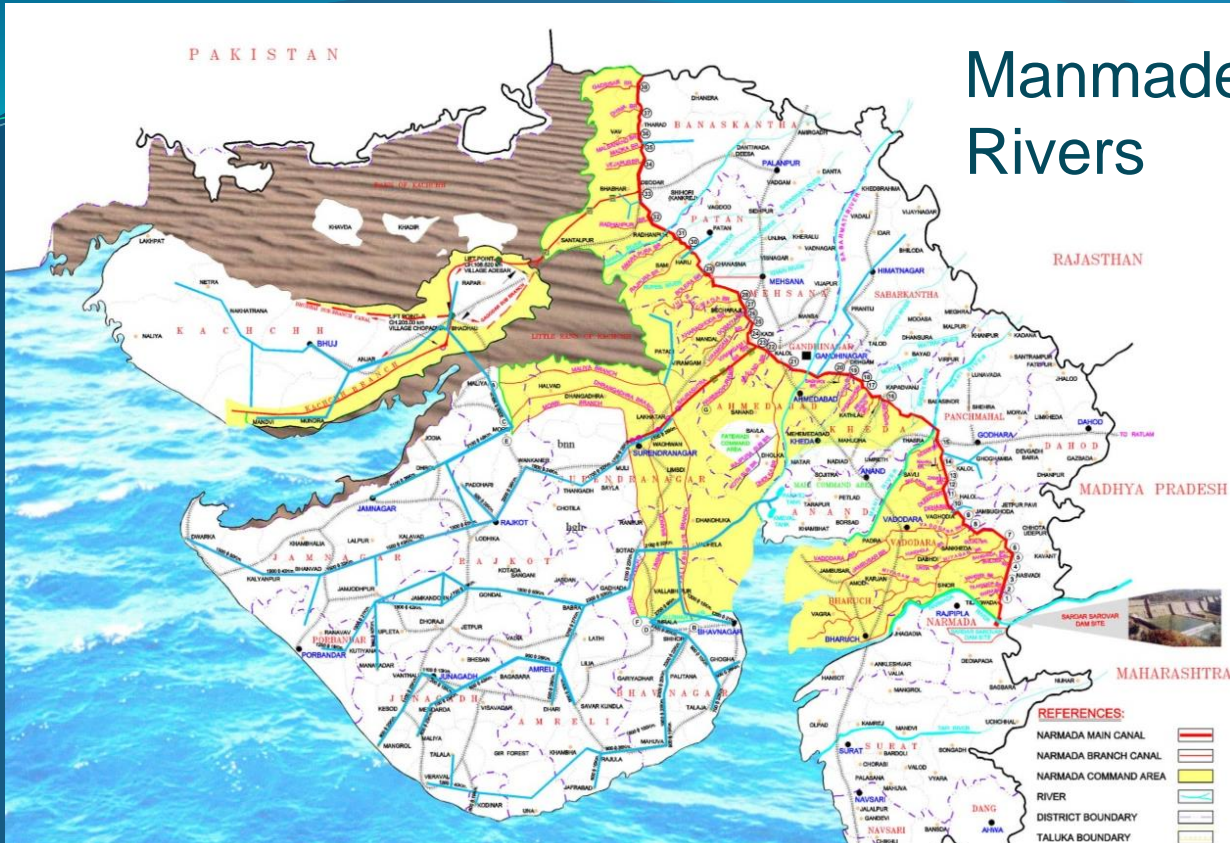
## Water (28 MAF)



## Gujarat (9 MAF)

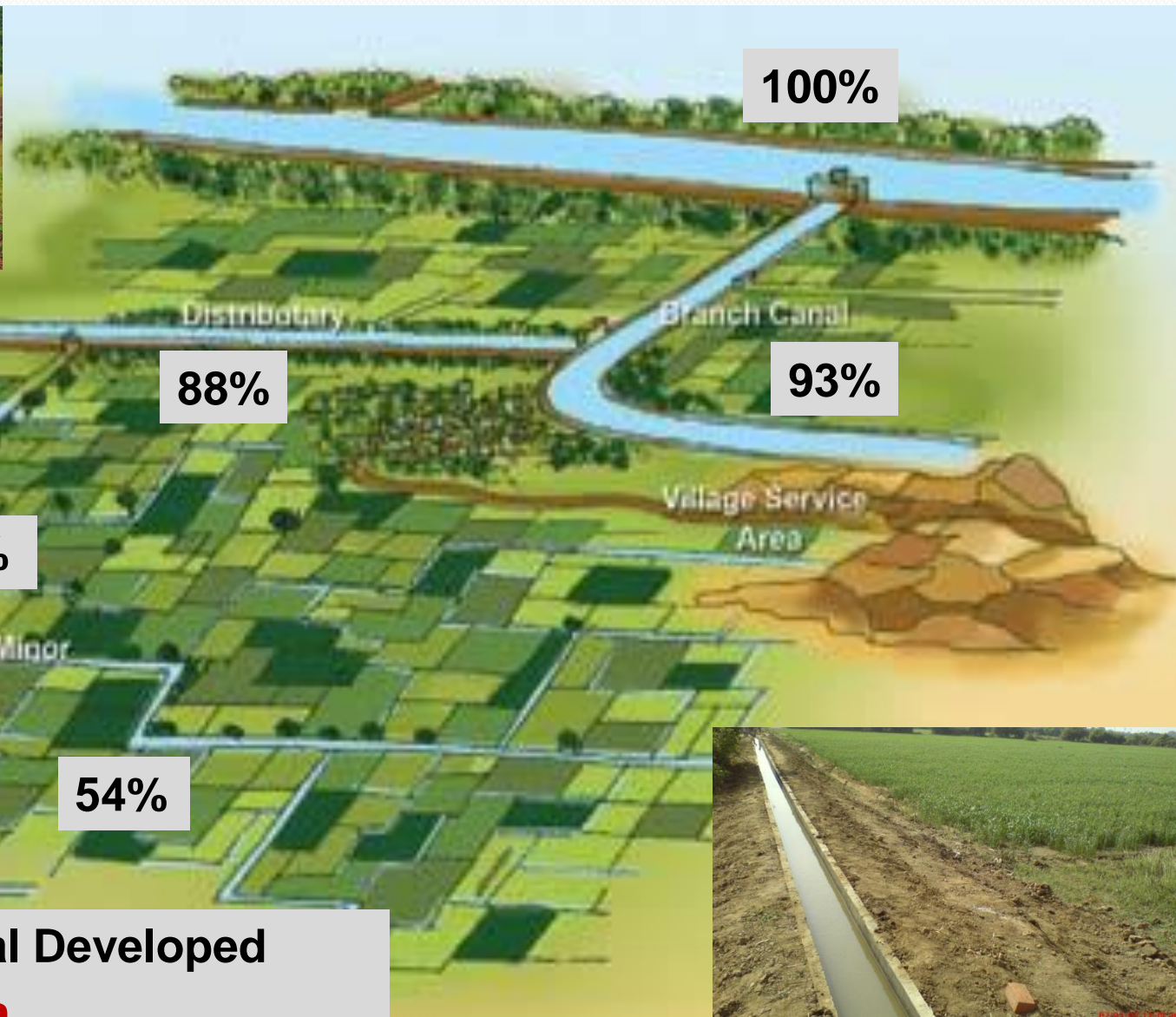


# Manmade Perennial Rivers



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

# Narmada Canal Network



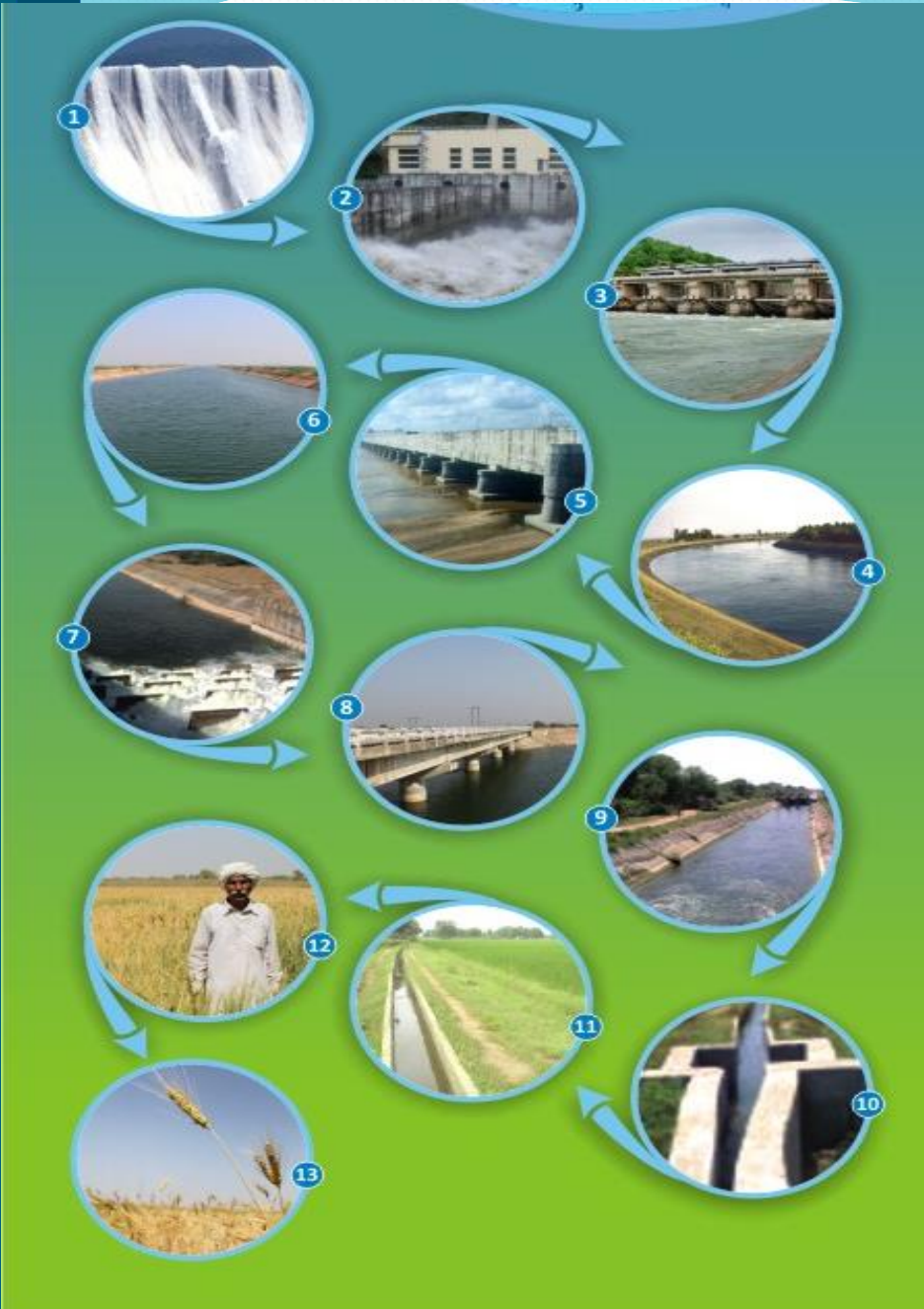
**Irrigation Potential Developed**  
**1.34 million Ha.**

## From Dam to Farm

Conveying water over distances upto 700 km, and even by lifting 71m for Saurashtra and 55m for Kachchh

**11.7**  
**BCM**

**92.28 BCM already conveyed so far**



# World's Largest Lined Irrigation Canal



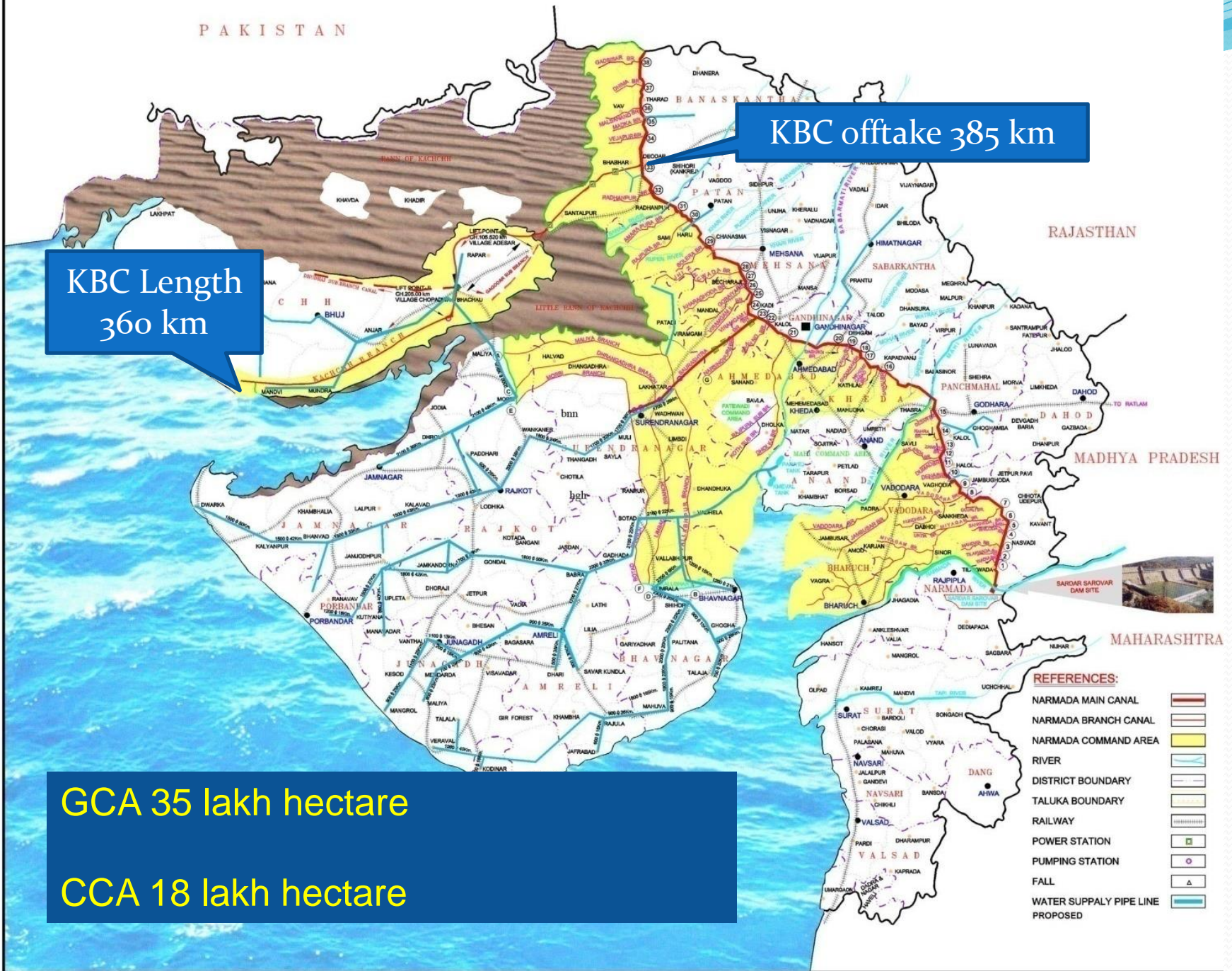
PAKISTAN

KBC offtake 385 km

KBC Length 360 km

GCA 35 lakh hectare

CCA 18 lakh hectare



REFERENCES:

- NARMADA MAIN CANAL
- NARMADA BRANCH CANAL
- NARMADA COMMAND AREA
- RIVER
- DISTRICT BOUNDARY
- TALUKA BOUNDARY
- RAILWAY
- POWER STATION
- PUMPING STATION
- FALL
- WATER SUPPLY PIPE LINE
- PROPOSED

- 
- In-line Storage Capacity due to CVC
    - NMC – 220 MCM
    - SBC – 28.5 MCM
    - KBC – 39 MCM

# The End of Thirst for Kutch



## Drinking Water

- **Drinking water** to 9490 villages and 173 urban centres

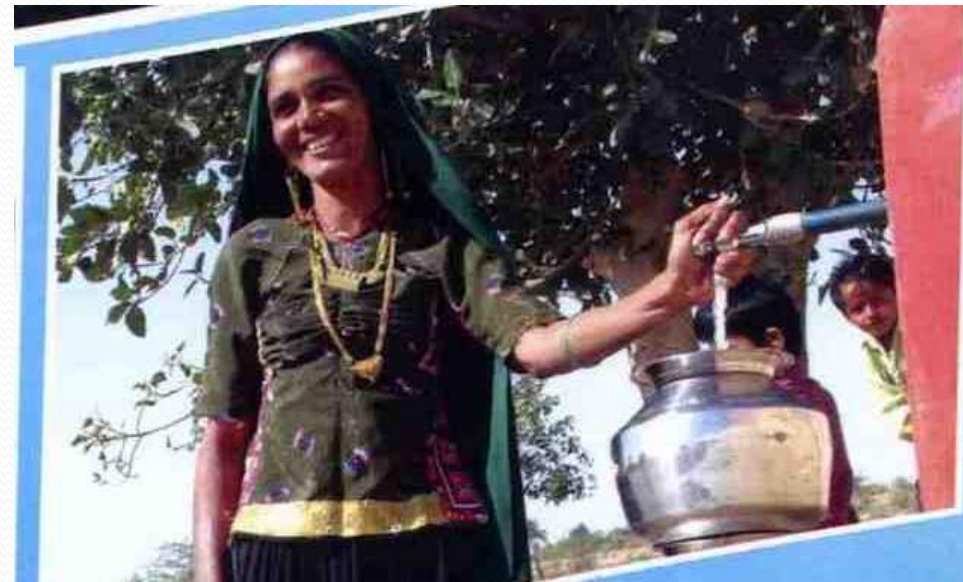
In addition to 159 towns, Number of villages already covered in the Narmada based Drinking Water Supply schemes

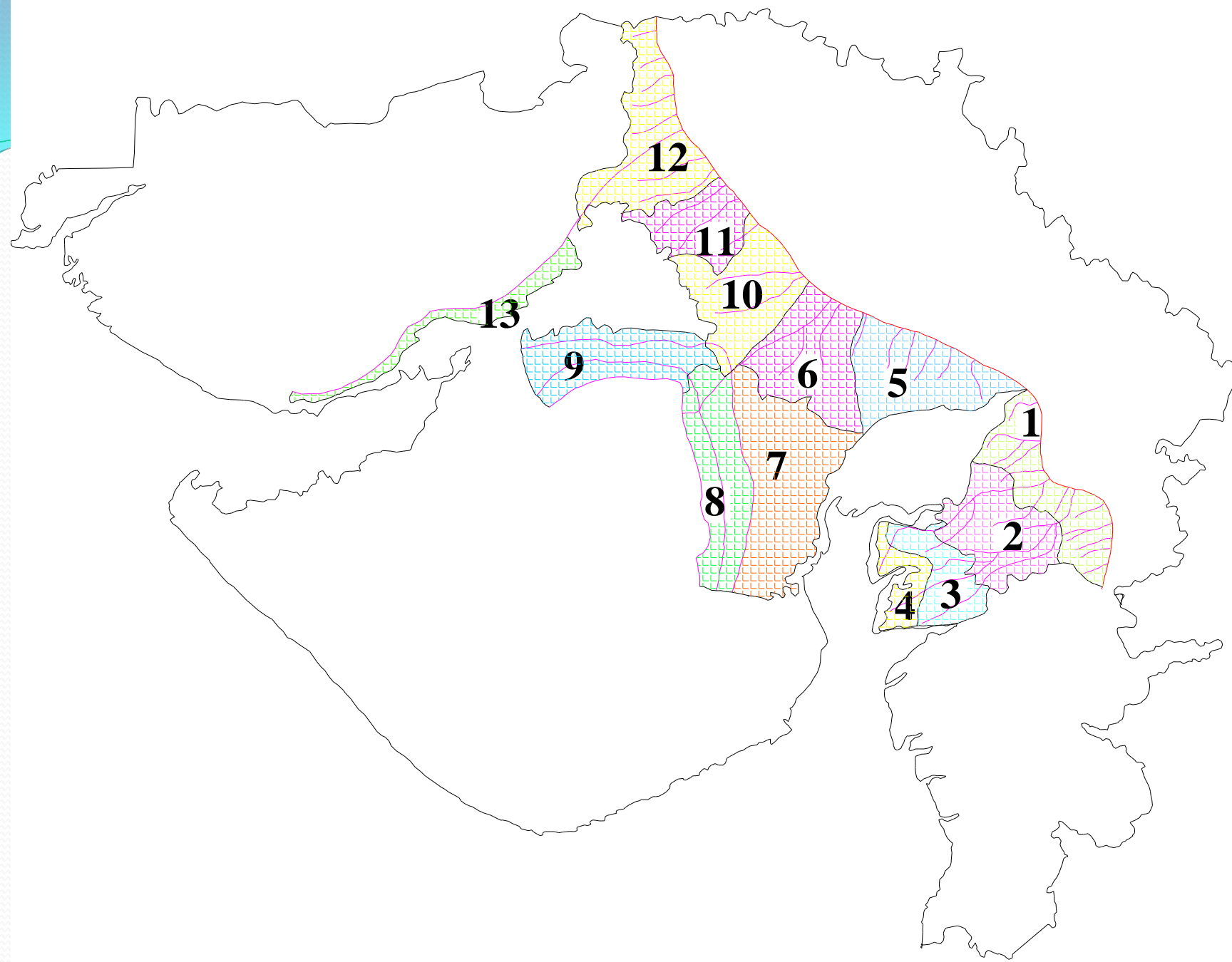
**8188**



# After SSP

Narmada water reaching the village  
even 700 km away





**AGRO CLIMATIC ZONES IN SSP CANAL NETWORK**

# Extent of Coverage and Interfacing



# SSP – The Transformer

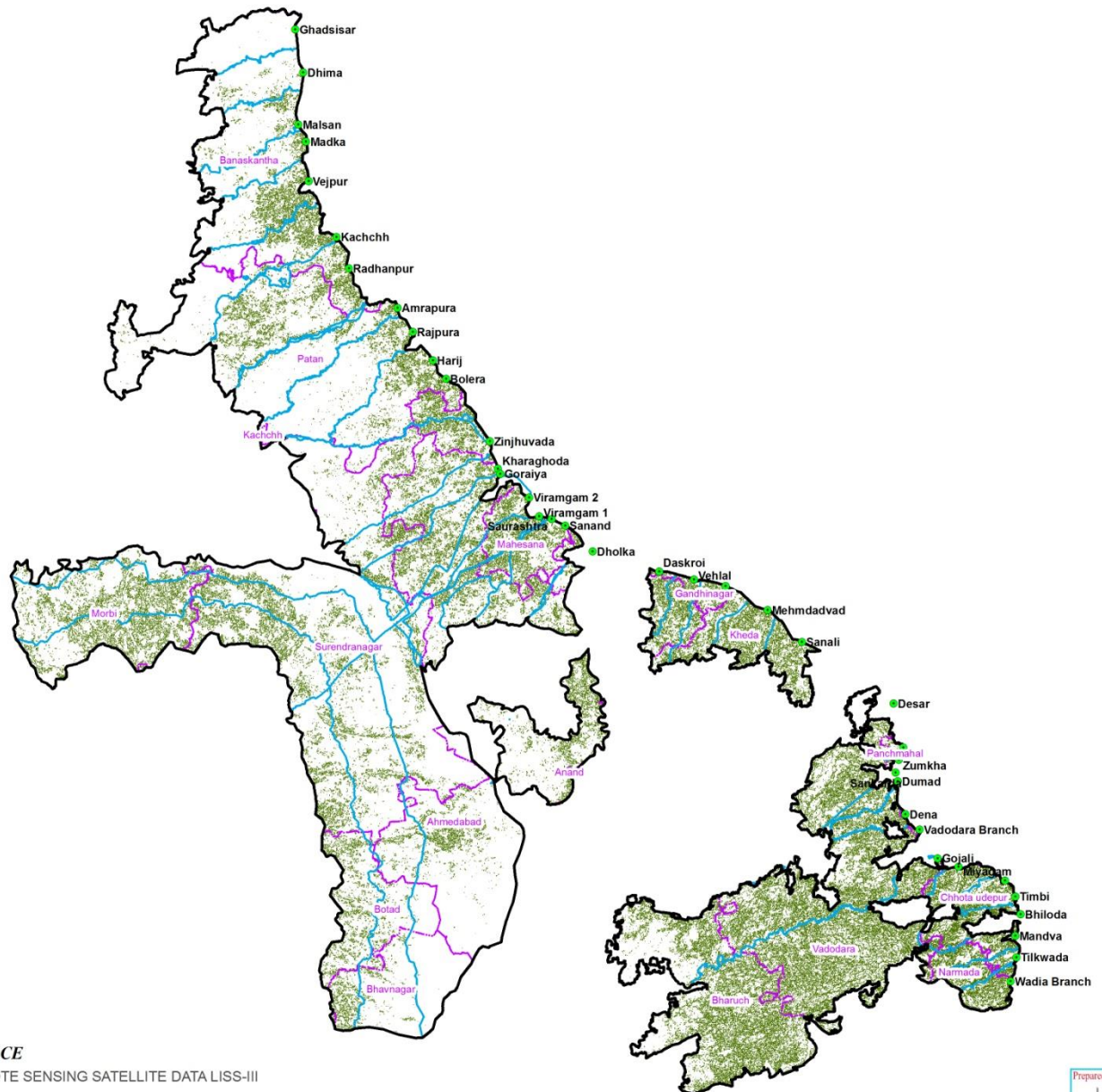


# MAP SHOWING FOR SSSNL COMMAND AREA GUJARAT STATE.

INDIAN REMOTE SENSING SATELLITE DATA

Date: 22, Dec 2003

Draft Copy



## Legend

- Chanage Location
- Command Area Boundary
- District Boundary
- Irrigated Area (22 dec 2003)

(Total Irrigated Area  
545276.48 ha.)

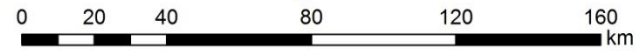
Prepared by :



**BHASKARACHARYA INSTITUTE FOR SPACE APPLICATION AND GEO-INFORMATICS**  
DEPARTMENT OF SCIENCE & TECHNOLOGY, GOVERNMENT OF GUJARAT

### DATA SOURCE

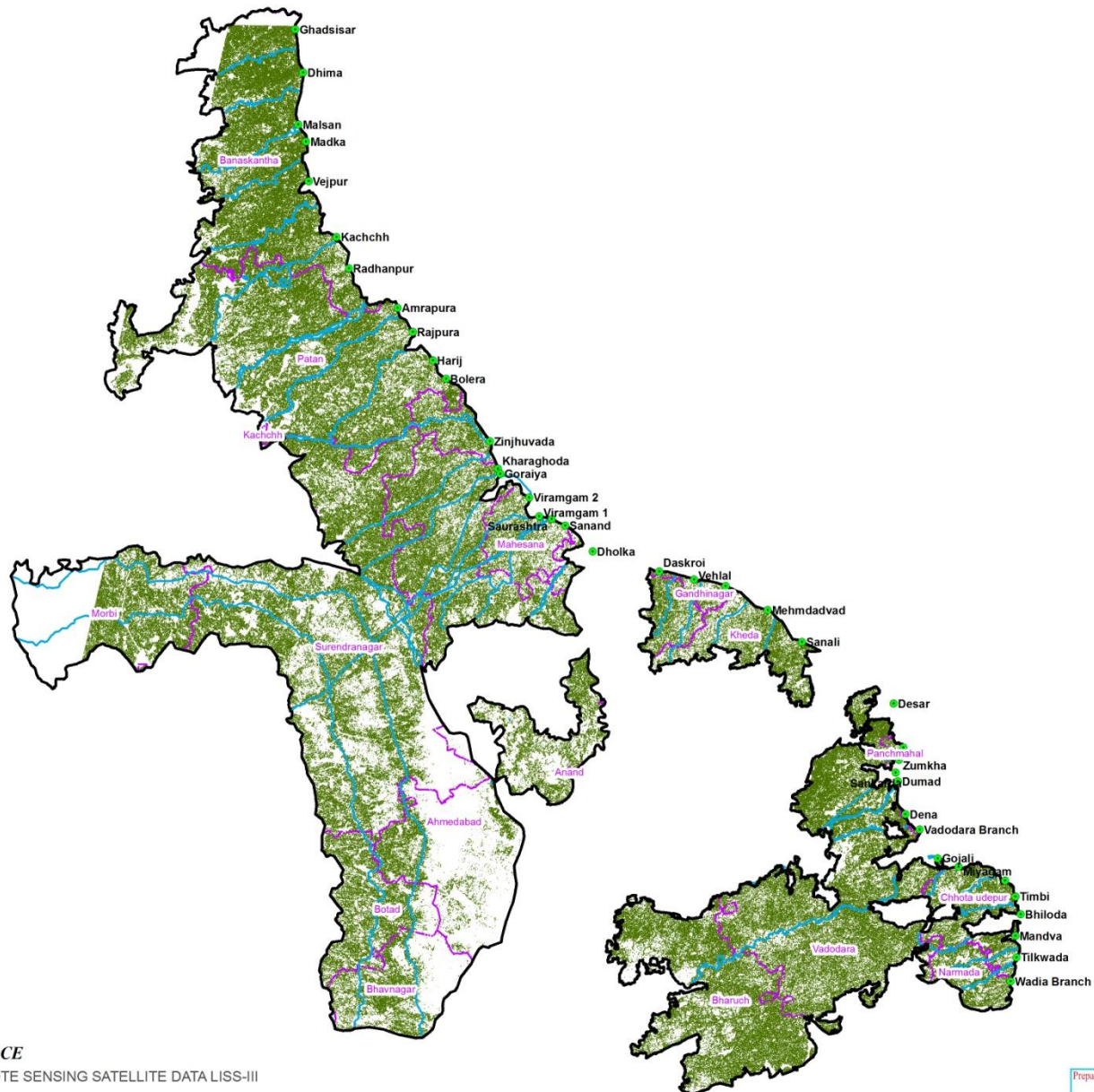
INDIAN REMOTE SENSING SATELLITE DATA LISS-III  
22, dec 2003  
SATELLEMENT COMMISSONNERAT OF LAND RECORDS.  
SARDAR SAROVAR NARMADA NIGAM LIMETED  
LINE DEPARTMENT.



# MAP SHOWING FOR SSSNL COMMAND AREA GUJARAT STATE.

INDIAN REMOTE SENSING SATELLITE DATA

Date: October-2015



## Legend

- Change Location
  - Command Area Boundary
  - District Boundary
  - Irrigated Area on (October-2015)
- (Total Irrigated Area  
1092262.92 ha.)

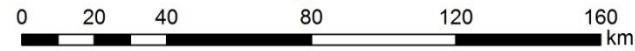
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## Gujarat to see bumper mustard crop on record yield



The Indian EXPRESS

# Gujarat top cotton producing state, harvests 108 lakh bales

CCI officials said that these figures could go up further as figures from several ex...



## Bumper crop leaves Gujarat potato hub with storage woes

Potato farmers at Deesa in Gujarat are a worried lot. The area has spoiled the euphoria over a bumper...

By: FE Bureau | Ahmedabad | Published: March 6, 2015 12:09 AM



# The Largest Escape on River Sabarmati (450 cumecs)



# Inter-Basin Transfer of Narmada Water



**Narmada water released in enroute rivers,**

Heran, Orsang, Karad, Dhadhar, Mahi,

Saidak, Mohar, Shedhi, Watrak, Meshwo,

Khari, Sabarmati, Rupen, Pushpawati,

Khari-II, Banas and Saraswati.

## **Benefits**

Frenchwells and Tubewells rejuvenated

Recharging of natural aquifers

Water quality of these rivers got enriched in terms of pH, Dissolved Oxygen, Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) etc.

# *Harnessing the Potential of Small/Micro Hydel*





Ban Ki-moon inaugurates Solar Power Plant in Vadodara  
11 January 2015



“Looking out at the Canal Top Solar Power Plant, I saw more than glittering panels – I saw the future of India and the future of our world.”

UN Secretary  
General

# Integrated approach adopted for

**sustainable and efficient water resources development and management**



## Includes

**Water  
conservation**

**Inter-  
basin  
water  
transfer by  
interlinking**

**Strengthening of  
existing  
canal system**

**Participatory  
irrigation  
management**

**Micro  
irrigation**

# Augmentation of water resources

## Water Harvesting

- Check-dams, Boribundh,
- farm ponds, Sim Talavdi,
- Van Talavadi, Terrace Talavadi
- Recharge wells
- Series of check-dams in a river basin

## GIS Atlas of irrigation structures

## Shifting to basin wise integrated approach

- Convergence with other departments



## RIGHT STEP – ASTOUNDING EXPERIENCE



### Water conservation structures

- 1,68,694 Check-dams
- 2,74,418 Farm Ponds
- 1,25,541 Bori Bundhs

### Ponds

- About 26,619 deepened to enhance capacity

### Step-wells

- About 1000 revived, cleaned & put to use

ॐ

## अथर्ववेद-संहिता

४५७०. शं त आपो हैमवतीः शमु ते सन्तुत्स्याः ।

शं ते सनिष्यदा आपः शमु ते सन्तु वर्ष्याः ॥१॥

(हे साधको !) हिम से उत्पन्न जल- प्रवाह, स्रोत (झरने) से प्रवाहित होने वाले, अनवरत तीव्रवेग से बहने वाले तथा वर्षा द्वारा नदियों में आये जल- प्रवाह , ये सभी आपके लिए सुखदायक एवं कल्याणकारी हों ॥१॥

४५७१. शं त आपो धन्वन्याः शं ते सन्त्वनूप्याः ।

शं ते खनित्रिमा आपः शं याः कुम्भेधिराभृताः ॥२॥

हे यजमान ! मरुस्थल के जल, जल सम्पन्न भू- भाग में होने वाले जल, खोदकर प्राप्त किये गए (कुएँ, बावड़ी आदि के) जल तथा घड़ों में भरकर लाये गए जल , ये सभी प्रकार के जल आपके लिए कल्याणप्रद हों ॥२॥

***One should take proper managerial action to use and conserve the water from mountains, wells, rivers and also rainwater for use in drinking, agriculture, industries etc.***

***Atharva Ved 19.2.1***



*Thank You*

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