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Water resources management in Gujarat

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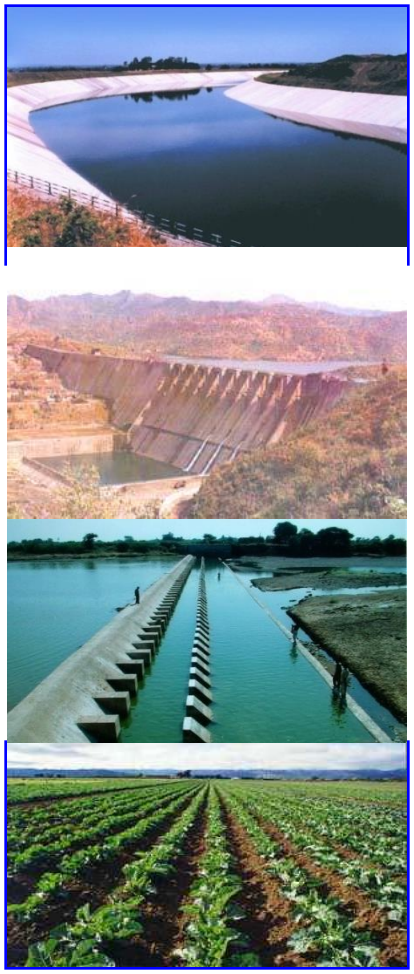


Equity
Efficiency
Sustainability
WRD

WATER RESOURCES MANAGEMENT IN GUJARAT

A Sustainable Water State

- ❑Water for all
- ❑Water for ever
- ❑ More crop per drop

सत्यमेव जयते

Narmada, Water Resources, Water Supply & Kalpsar Department
Government of Gujarat

WATER PROFILE OF GUJARAT

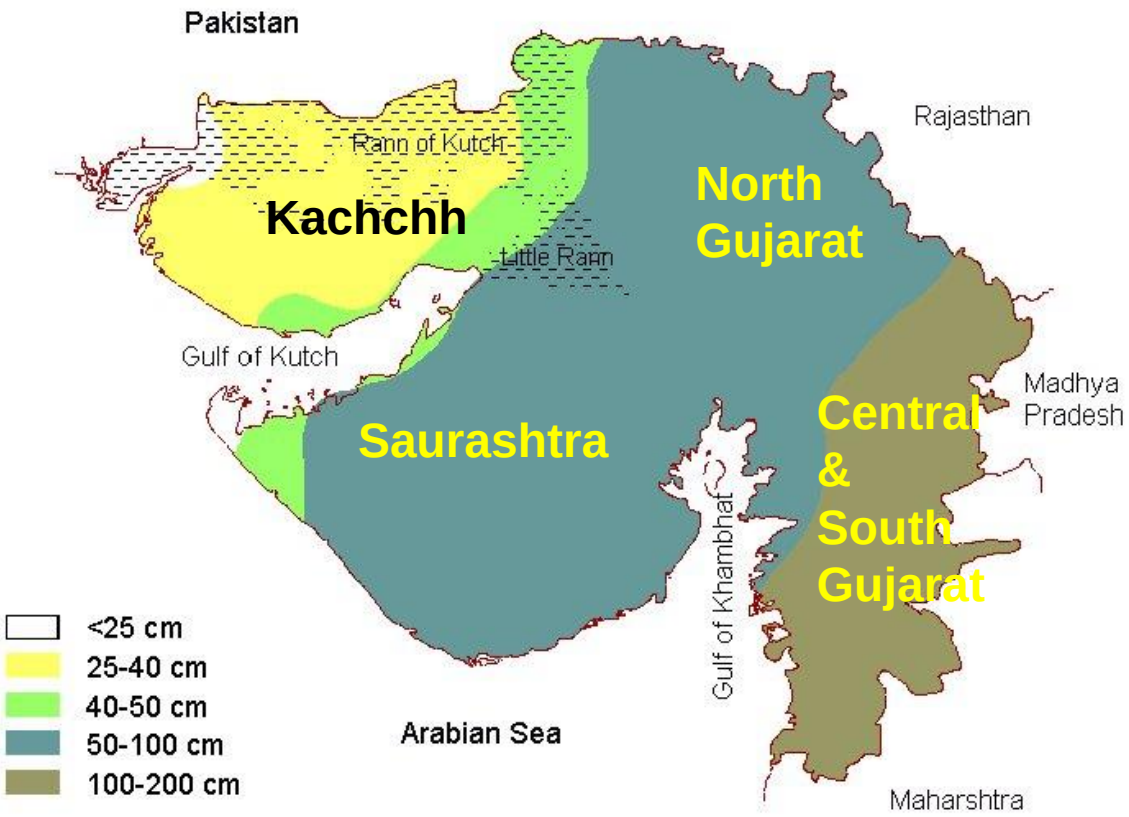
Irrigation Scenario: Gujarat State with reference to Nation

		National	Gujarat State
(A)	Geographical Area (Million Ha)	311.0	19.6 (6.30%)
(B)	Available Water (Billion Cum)		
	Surface Water	690	38 (5.50 %)
	Ground Water	433	17 (3.92 %)
	Total	1123	55 (4.90 %)
(C)	Irrigation Potential (Million Ha)		
	Ultimate	139.0	6.75 (4.86 %)
	Developed	93.95	6.00 (6.38 %)
	Actual Utilized	80.06	5.01 (6.25%)
(D)	Sector wise use of water		
	Irrigation	92%	89 %
	Drinking Supply	5%	8 %
	Industrial	3%	3 %

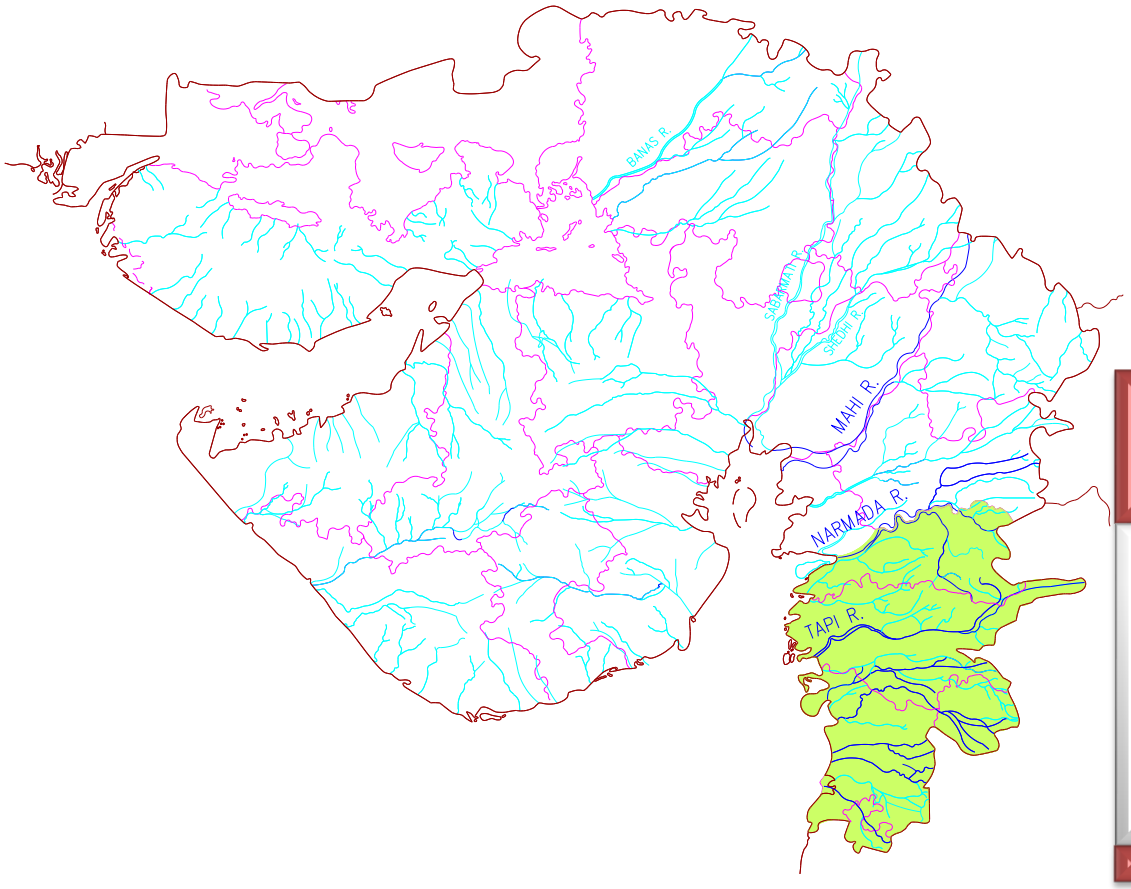
Major Irrigation Projects -19	12935 MCM
Medium Irrigation Projects -73	1748 MCM
Minor Irrigation Schemes -981	1620 MCM
Total	16303 MCM
Sardar Sarovar Project	9460 MCM

Rainfall Distribution in Gujarat

Annual Rainfall	
Central & South Gujarat	80 – 200 cm
North Gujarat, Saurashtra	40 – 80 cm
Kachchh	< 40 cm



River Map of Gujarat State

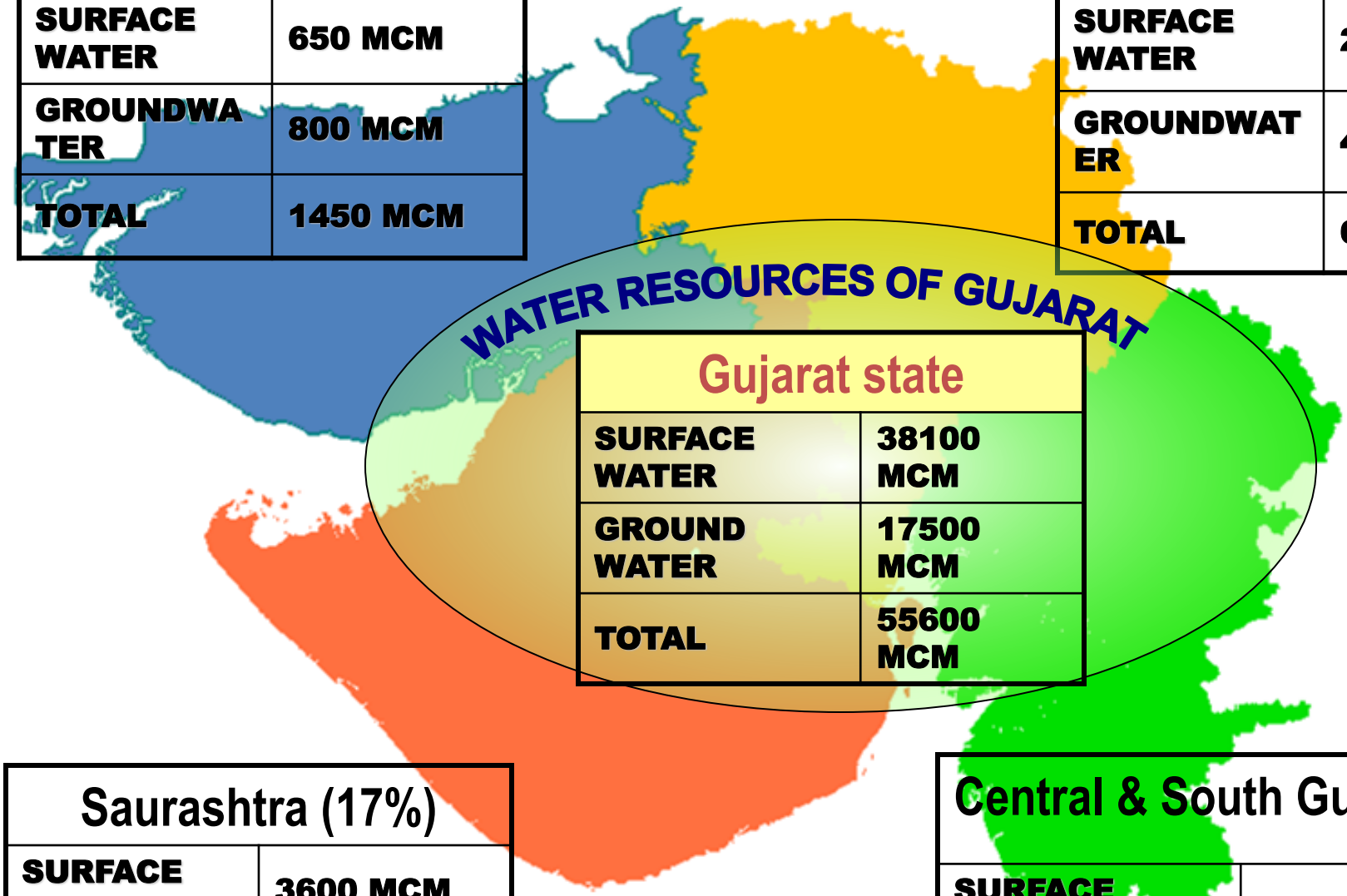


Out of 185 Rivers
8 Perennial Rivers

River Basins (185)		
South, Central and North Gujarat 17	Saurashtra 71	Kachchh 97

Perennial rivers are located in only 20% area of the State which accounts for 80% of the surface water of the State.

WATER RESOURCES OF GUJARAT



Kachchh (3%)	
SURFACE WATER	650 MCM
GROUNDWATER	800 MCM
TOTAL	1450 MCM

North Gujarat (11%)	
SURFACE WATER	2100 MCM
GROUNDWATER	4200 MCM
TOTAL	6300 MCM

Gujarat state	
SURFACE WATER	38100 MCM
GROUND WATER	17500 MCM
TOTAL	55600 MCM

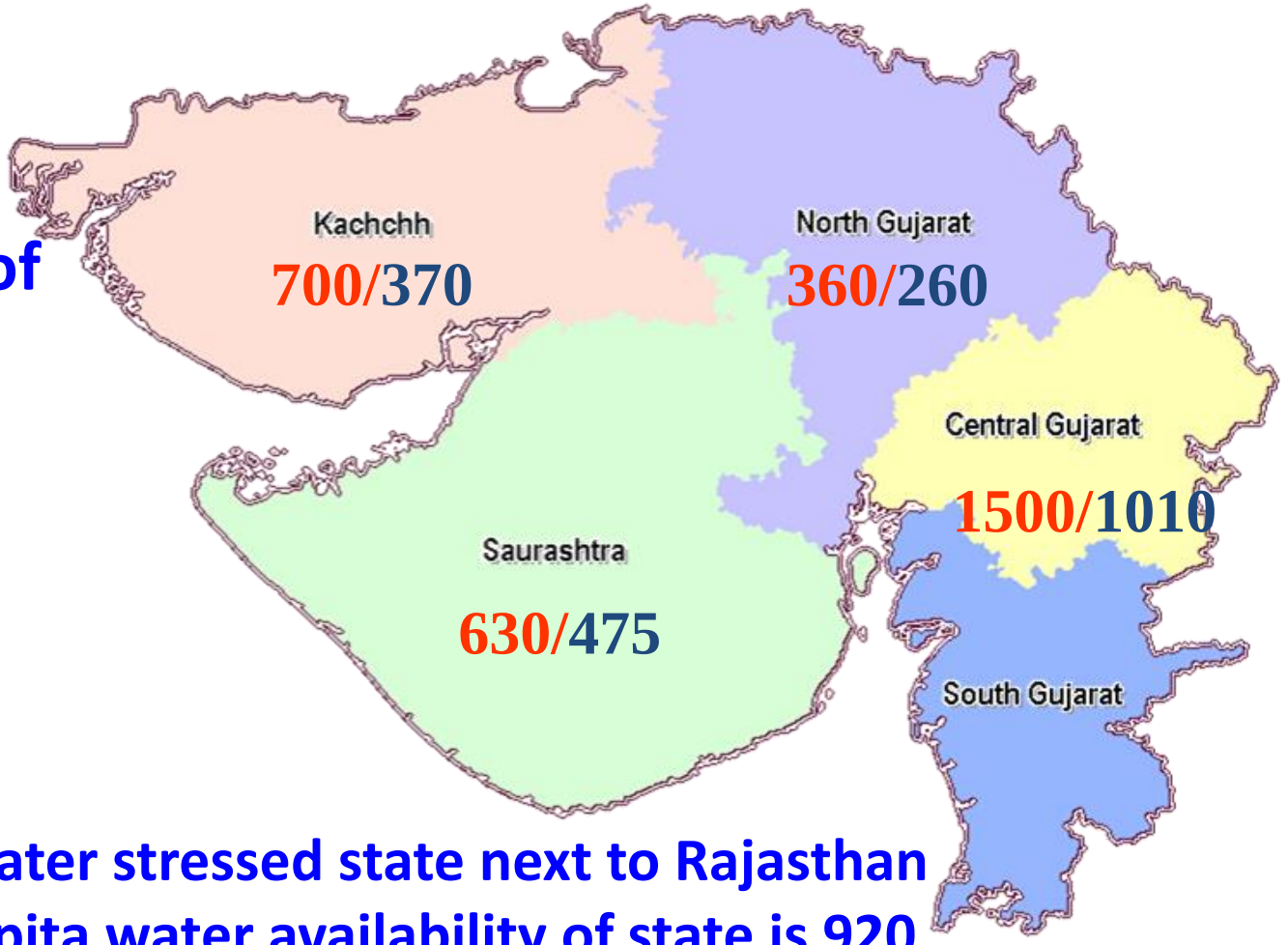
Saurashtra (17%)	
SURFACE WATER	3600 MCM
GROUNDWATER	6100 MCM
TOTAL	9700MCM

Central & South Gujarat(69%)	
SURFACE WATER	31750 MCM
GROUNDWATER	6350 MCM
TOTAL	38100 MCM

Available Per capita Water in 2011/2031 (Cubic Meter/Year)

Minimum requirement of water per person

1000 Cubic Meter/Year

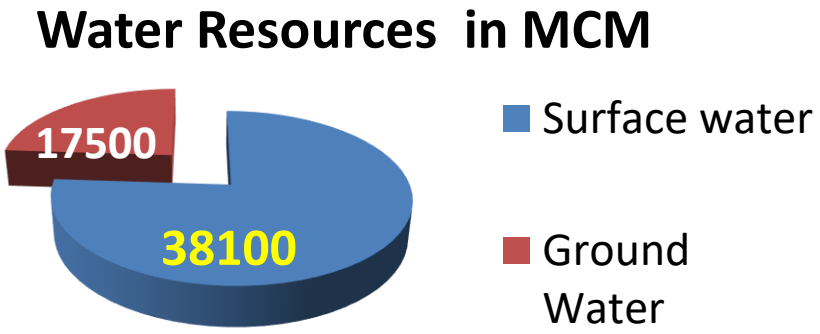


- Gujarat is a water stressed state next to Rajasthan
- Overall Per Capita water availability of state is 920 Cubic meter/year in2011 (640 cum/year in 2031)

WATER RESOURCES OF GUJARAT

- **TOTAL GEOGRAPHICAL AREA 19.6 M ha**
- **CULTURABLE AREA 12.4 M ha**
- **Ultimate Irrigation Potential 6.75 M ha**
- **Surface Water Potential**
  - **Major & Medium Dams -1.788 M ha (Thro'92 projects)**
  - **Sardar Sarovar Project - 1.792 M ha (under progress)**
  - **Minor Irrigation projects-0.497 M ha (Thro' 981 Schemes)**
  - **Water conservation Strucures-0.681 M ha**
- **Ground Water Potential -2.00 M ha**

  Thro' Tube well, Shallow Wells & Community Wells
- **Rain fed area - 5.65 M ha**



INNOVATIVE APPROACH

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

Gujarat has taken effective measures for conservation of water as well as rain water harvesting for arresting Ground Water Depletion

- Convergence of various schemes implemented under different Departments
  - ❑ Rural Development Dept (Water shed Development)
  - ❑ Water Resources Dept (State fund and NABARD Assistance)
  - ❑ Water Supply Dept (Source Development)
  - ❑ Forest Department (Within Forest Area)
- Made one agency accountable to collect information from all the departments to have a common and consolidated data base


Check-dam


Bori bundh


Farm Pond


Terrace Talavadi

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


Check-dam


Bori bundh


Farm Pond


Terrace Talavadi

RIGHT STEP – ASTOUNDING EXPERIENCE

Water conservation structures	• 1,66,082 Check-dams • 2,61,785 Farm Ponds • 1,22,035 Bori Bunds
Ponds	• About 25,000 deepened to enhance capacity
Step-wells	• About 1000 revived, cleaned & put to use

INNOVATIVE APPROACH--MICRO IRRIGATION

Initiatives taken for regulating water use for agriculture by spreading micro irrigation technology

A special tool called Gujarat Green Revolution Company(GGRC) created in 2005 to expedite promotion of micro irrigation- **13,08,143 ha** (**8,13,499 Beneficiaries**)

Instead of providing financial assistance only , GGRC

- **Motivates and guides the farmers for adoption of micro irrigation,**
- **Helps farmers in selection of crop and deciding layout of micro irrigation system**
- **Assists farmers in securing loan from banks to supplement financial assistance**
- **Ensures third party supervision during installation of the system**
- **Maintains and ensures trouble free operation for 5 years**

Innovative Approach –PIM

- Initiatives taken to promote Participatory irrigation management in Gujarat
- Enactment of PIM Act, 2007
- Formation of 2045 Water Users' Association (WUA) covering about 5 lac hectare area
- Cost of Community mobilisation borne by Govt.
- Rehabilitation of canals by Government before handing over
- Contribution by WUA at 10% of rehabilitation cost. Preference is given to WUA for rehabilitation
- 50% collection of water rates can be retained by WUA for Maintenance

Innovative Approach – Interlinking & inter-basin transfer

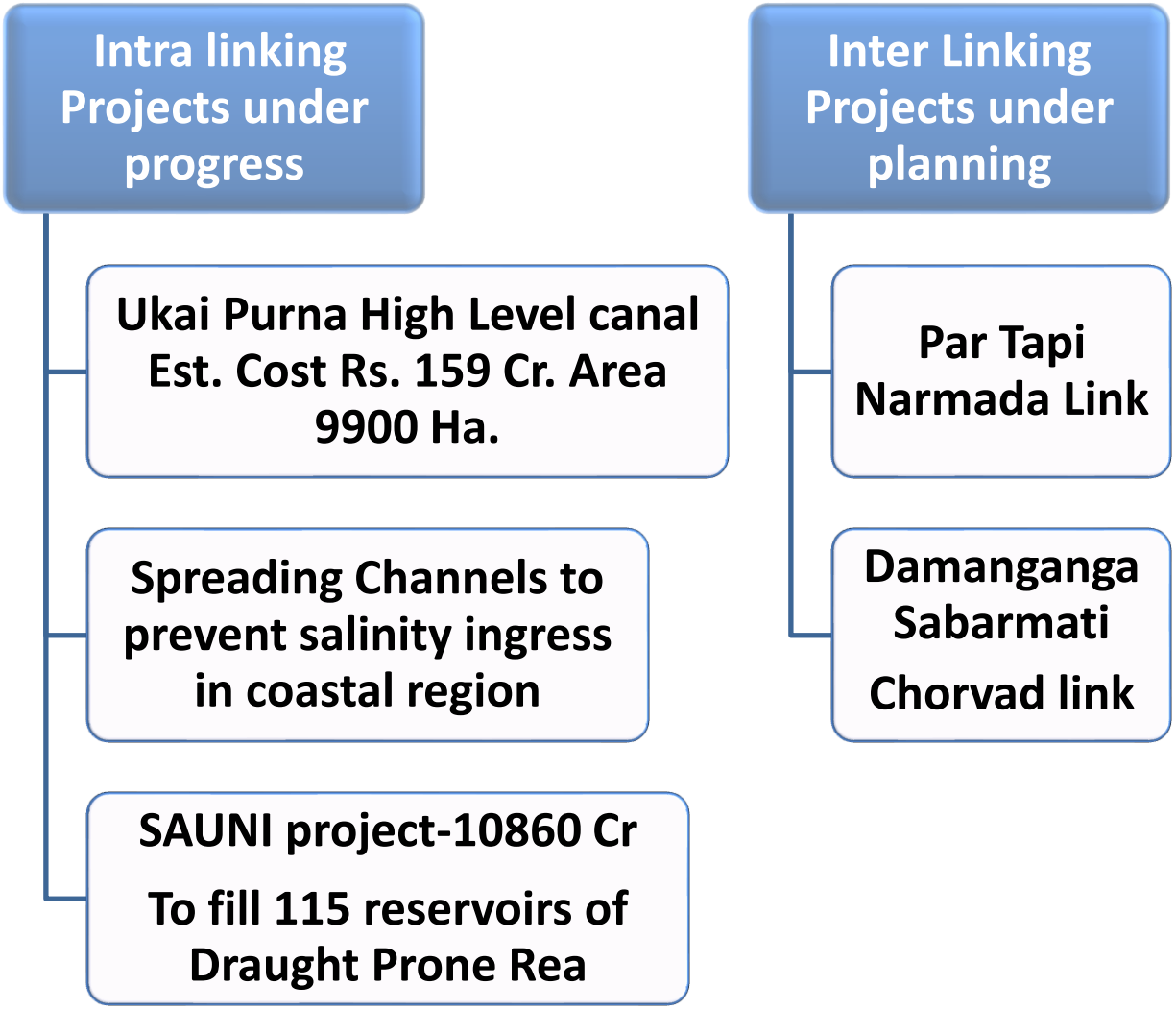
Local water resources should be optimally harnessed and utilised

Augment available water resources through water conservation measures

Intra basin transfer of water

After exhausting all measures, Inter basin transfer of water should be resorted to.

Interlinking & inter-basin transfer



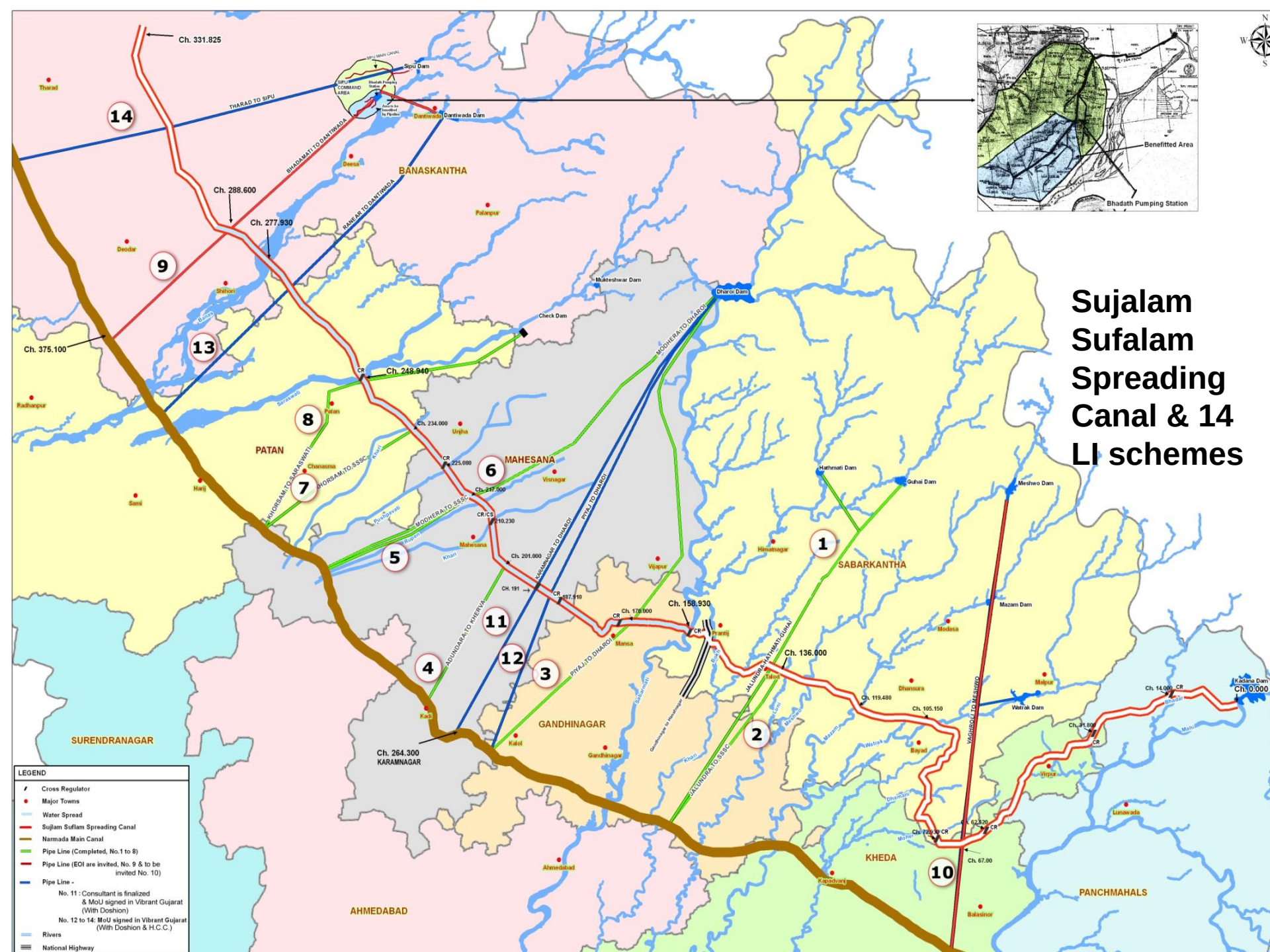
Sujalam Suphalam project:

A leading step to divert surplus flood water from surplus to deficit basins

An integrated approach to augment water resources in water deficit and over-exploited area

Micro & macro level measures like intra basin transfer through

- Spreading canals
- Lift irrigation through pipe lines
- High level canals
- Salinity ingress prevention measures
- Check-dams


Sujalam
Sufalam
Spreading
Canal & 14
LI schemes
Benefitted Area
Bhadath Pumping Station
Ch. 331.825
Ch. 288.600
Ch. 277.930
Ch. 375.100
Ch. 248.940
Ch. 234.000
Ch. 225.080
Ch. 217.000
Ch. 210.230
Ch. 201.000
Ch. 191
Ch. 187.910
Ch. 178.000
Ch. 158.930
Ch. 136.000
Ch. 119.480
Ch. 105.150
Ch. 31.800
Ch. 14.000
Ch. 0.000
Ch. 264.300
KARAMNAGAR
Ch. 67.00
THARAD TO SIPU
BHADAMATI TO DANTIWADA
RAHEAR TO DANTIWADA
MODHERA TO DHAROI
PIYAJ TO DHAROI
KARAMSHORI TO DHAROI
JALUNDRA TO HATHMATI GUHAI
VAGHROLI TO MESHWO
MODHERA TO SSSC
KHORSAM TO SSSC
KHORSAM TO SARASWATI
ADJUNDARA TO KHERVA
JALUNDRA TO SSSC
Sipu Dam
Dantiwada Dam
Mukteshwar Dam
Dharoi Dam
Check Dam
Hathmati Dam
Guhai Dam
Meshwo Dam
Mazam Dam
Watrak Dam
Kadana Dam
BANASKANTHA
PATAN
MAHESANA
SABARKANTHA
GANDHINAGAR
SURENDRANAGAR
AHMEDABAD
KHEDA
PANCHMAHALS
Tharad
Deesa
Palanpur
Deodar
Radhanpur
Harij
Sami
Patan
Mahesana
Visnagar
Himatnagar
Modasa
Malpur
Bayad
Dhansura
Kadi
Kalol
Gandhinagar
Ahmedabad
Kapadvanj
Balasinor
Lunawada
Virpur
Pranij
Talod
Mansa
Vijapur
Unjha
Shihori
Sipu Main Canal
Sipu Command Area
LEGEND
Cross Regulator
Major Towns
Water Spread
Sujlam Suflam Spreading Canal
Narmada Main Canal
Pipe Line (Completed, No.1 to 8)
Pipe Line (EOI are invited, No. 9 & to be invited No. 10)
Pipe Line -
No. 11 : Consultant is finalized & MoU signed in Vibrant Gujarat (With Doshion)
No. 12 to 14: MoU signed in Vibrant Gujarat (With Doshion & H.C.C.)
Rivers
National Highway

Sujalam Sufalam Spreading canal

SUJALAM SUPHALAM PROJECT

LIFT IRRIGATION SCHEME TO UTILISE EXCESS FLOOD WATER

14 lift irrigation pipelines planned (1 MAFT.)

10 pipelines completed (2475 Cusecs)

2 tender stage, 2 at planning stage(800Cusecs)

To fill up nine reservoirs and en route ponds of North Gujarat

To augment irrigation facilities & drinking water supply to villages

SAUNI Yojana Project

SAUNI : Scheme Details

- **Four links**

  Machchhu-II to Sani

  Limbadi Bhogavo-II to Raydi

  Dholidhaja to Venu-I

  Limbadi Bhogavo-II to Hiran-II

- **1126 Km length of pipeline**
- **115 Reservoir of Saurashtra region will be filled**
- **412335 ha draught prone area will be benefitted**
- **Project Cost - 10860 Cr**

Salinity Ingress Prevention Projects

Govt. has taken aggressive steps to prevent salinity Ingress in coastal belt

- **Tidal Regulator/ Bandhara**

49 planned in Saurashtra and 53 in Kachchh

152300 Ha area benefitted

➔ **47 Completed in Saurashtra and 52 in Kachchh**

➔ **2 under progress in Saurashtra & 1 in Kachchh**

- **Spreading Canal**

360 km spreading canal planned in Saurashtra region

- **220 km completed**

166 km spreading canal planned in Kachchh region

- **71 km completed**

Narayan Sarovar Bandhara Ta. Lakhpat Dist. Kachchh

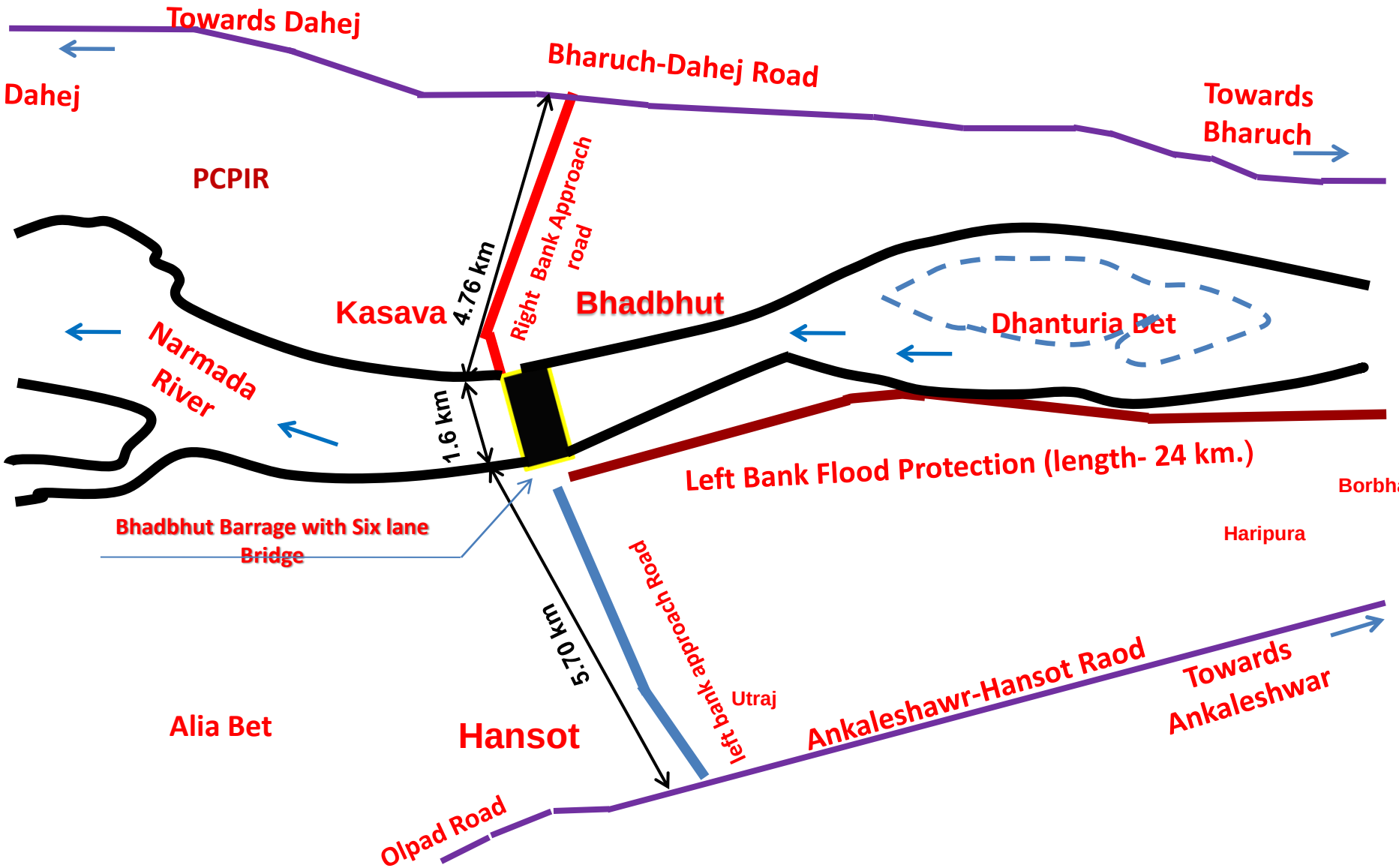
Nikol Bandhara Ta. Mahuva Dist. Bhavnagar

Garibpra Ta. Ghogha Dist. Bhavnagar

Thepada Check Dam Tal. Kutiana Dist. Porbandar

Sodam Bandhara Spreading Canal Ta. Kodinar Dist. Junagadh

Lay Out of Proposed Bhadbhut Barrage



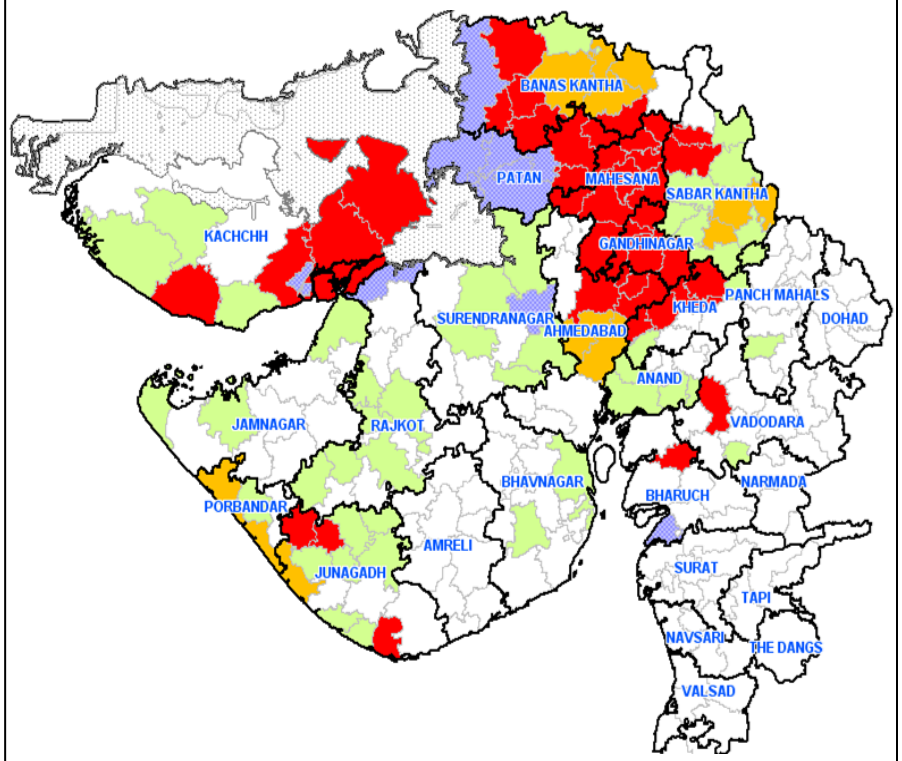
SALIENT FEATURES(Tentative)

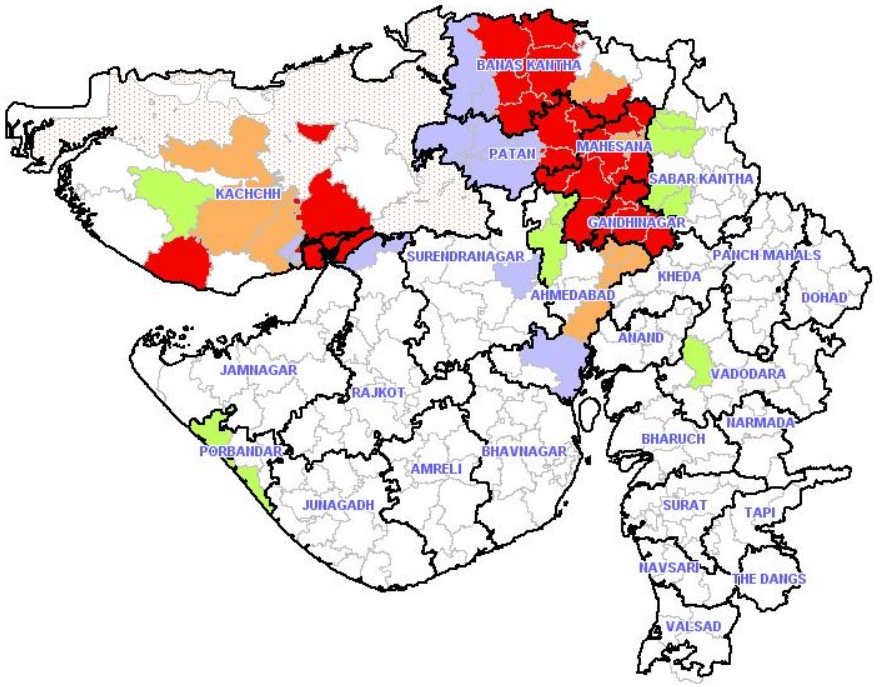
- **River gorge width : 1600m**
- **Sub-soil strata : mostly silty sand**
- **Total length of barrage : 1663 m**
- **Storage capacity : 500 MCM**
- **FRL : (+) 7.50 m**
- **Nos. of gates : 90 (Vertical)**
- **Size of gates : 15.5 m x 9.5 m**
- **Top width of road bridge : 30 m (6-lane road)**
- **Approach road on left & right bank :10.5 km long**
- **Left flood protection embankment : 24 km long**
- **Type of embankment : Rock fill type**

BENEFITS OF PROPOSED BHADBHUT BARRAGE

- Prevention of salinity ingress and thereby improvement in surface & ground water quality
- Flood protection and prevention of land erosion of low lying left bank area
- Shorter connectivity to Dahej-Hajira (Olpad-Hansot road) by six lane road on barrage top
- Domestic water supply(60 MCM) for 4 towns and 192 villages
- Assured water supply(200 MCM) to industries in GIDC and PCPIR, Dahej
- Lift irrigation facility to the area located at higher level

Level of Ground Water Development in different part of the State in 1997 & 2013





1997			2013		
	Over Exploited	; 40	Over Exploited	;	23
	Dark	; 10	Critical	;	06
	Gray	; 63	Semi-Critical	;	09
	White	; 103	Safe	;	175
	Saline	; 07	Saline	;	10

Level of Ground Water Development in different parts of the State in1997 and 2013

Particulars	1997	2013
Over Exploited >100 %	40	23
Dark 90-100%	10	06
Saline >2500 PPM	7	10 (Due to Bifurcation of 7 Talukas)
Grey 70-90%	63	09

Policy under Consideration

- Utilisation of saline water after proper treatment
- Zero Liquid Discharge Concept should be strictly adopted for industries
- Inter basin transfer of water

THANK YOU