

**Living Rivers, Dying Rivers:**

# **Rivers of Gujarat**

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(with thanks to Parineeta Dandekar)

[www.sandrp.in](http://www.sandrp.in)

# What is a River?

- Concise Oxford English Dictionary © 2008 Oxford University Press:

river/'rivə(r)/ ►noun

*A large natural flow of water travelling along a channel to the sea, a lake, or another river.*

However, this seems to be a very limited definition.

- Surprisingly, we could not find a scientific paper that actually tries to define a River.
- It is also connected to the word *rival*, which derives from Latin *rivalis*, originally meaning 'person using the same stream as another', from *rivus* 'stream'
- USGS for Schools: What is a river? *A river is nothing more than surface water finding its way over land from a higher altitude to a lower altitude, all due to gravity.*
- **Interestingly, Ganga, which is used interchangeably with rivers in India, means (Gan Gachhati): *That which flows!***
- **By this definition, there are hardly any rivers left in the country!!**



Above: Boat in a dry Sabarmati



Above: Polluted Damanganga

# Definition of a river

- Recently heard at IIT Kanpur: River has four dimensions: three spatial (longitudinal, lateral and vertical) and fourth temporal dimension. The temporal dimension has evolutionary trajectory, and this needs to be respected, its not just for you, now. It cannot be handled by reductionist science. There are many parts of the river, the whole is greater than the parts. We do not have a good inventory of the rivers and what we have done to them. Rivers also under go natural changes, but what we have done to rivers have had much more far reaching impact.
- Our take: River is a hydrological, geomorphic, ecological, biodiversity rich, landscape level system that serves as key part of freshwater cycle, balancing dynamic, though not always continuum (e.g. discontinuity when tributaries meet a river) equilibrium between soil moisture, snowfall, rainfall, surface water and groundwater and providing large number of social, environmental, economic, cultural, aesthetic, religious services to the people and ecosystems all along its watershed.

# *What is a healthy, living River?*

- An entity which performs all the evolutionary (geomorphologic), ecological, social, cultural, economic functions of a river, giving life not only to a selected class of society, but the living world at large can be called as a **Living River**.
- The comparison can be only with the evolutionary character of the same river.
- For example, some rivers are evolutionarily ephemeral or seasonal , while some rivers do not meet the sea, but disappear in the desert, like the Khari, Banas and Saraswati. These cannot be compared with rivers meeting the sea like Narmada, Tapi, Mahi, Sabarmati.

Australian definition ([www.water.vic.gov.au/environment/rivers](http://www.water.vic.gov.au/environment/rivers))

River has flow regimes, water quality and channel characteristics such that:

- natural ecosystem processes are maintained
- major natural habitat features are represented and are maintained over time
- in the river and along its banks, the majority of plant and animal species are native and the presence of exotic species is not a significant threat
- native river bank vegetation is sustainable along the majority of the river's length
- native fish and other animals can move and migrate up and down the river
- linkages between river and floodplain and associated wetlands maintain ecological processes
- natural linkages with the sea or terminal lakes are maintained
- associated estuaries and terminal lake systems are productive ecosystems.





## Gujarat Rivers: Many variations, *Contradictions*



Sr. No.	Region	Average Annual rainfall	Rainy days
1	South Gujarat	> 1100 mm	120
2	Central Gujarat	800 – 1000 mm	30 – 70
3	Saurashtra	400 – 800 mm	20 – 30
4	Kutchh	< 400 mm	10 - 20

**Gujarat has total 185 river basins.**

•Out of 185, Saurashtra region have 71 river basins while Kutchh region have 97 river basins. The river basins of Kutchh are very small.

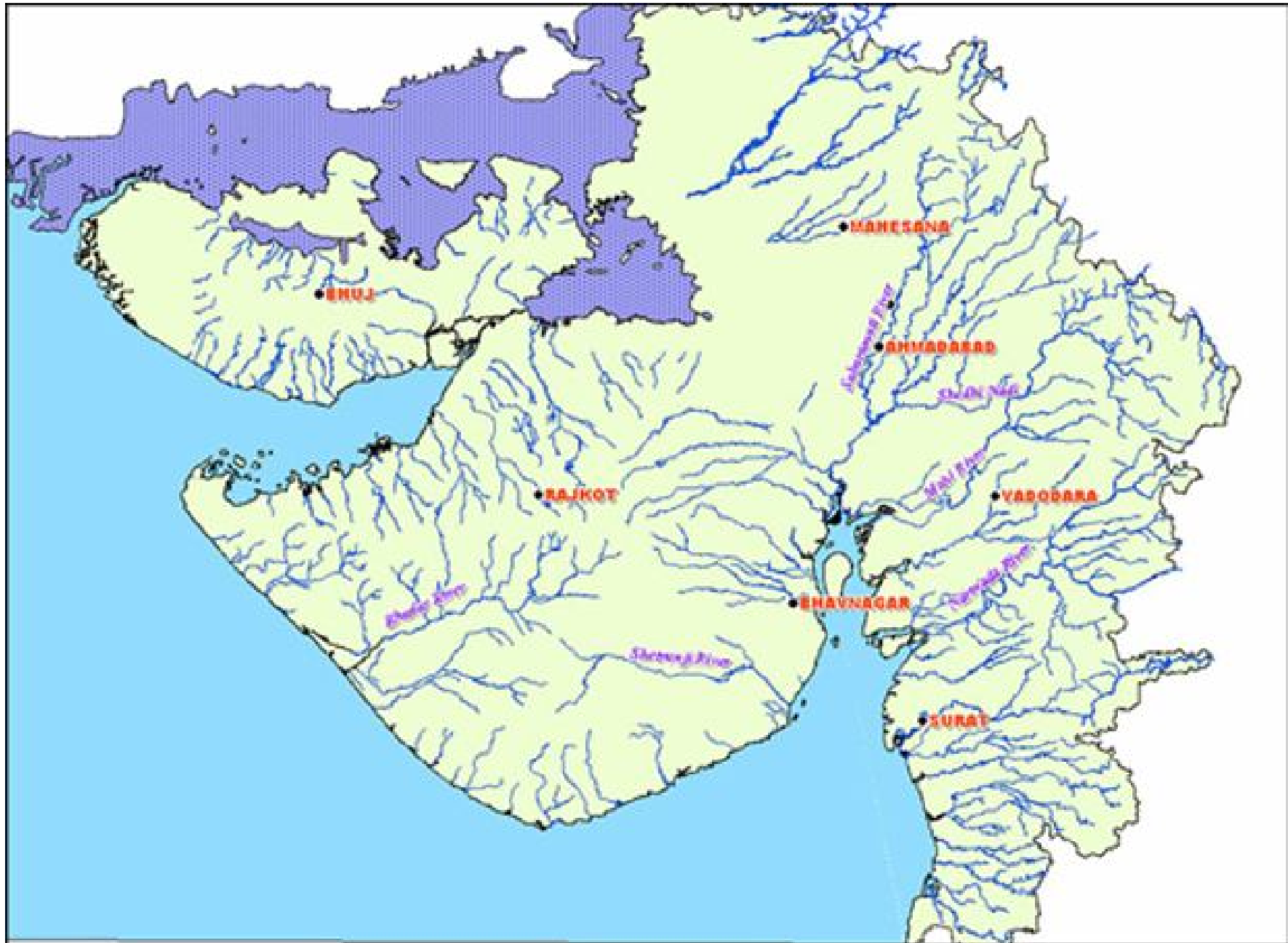
•The available water resources of Gujarat:

(1) Available Surface Water : 38,000 MCM

(2) Available Ground Water : 12,000 MCM

Total 50,000 MCM with inequitable distribution

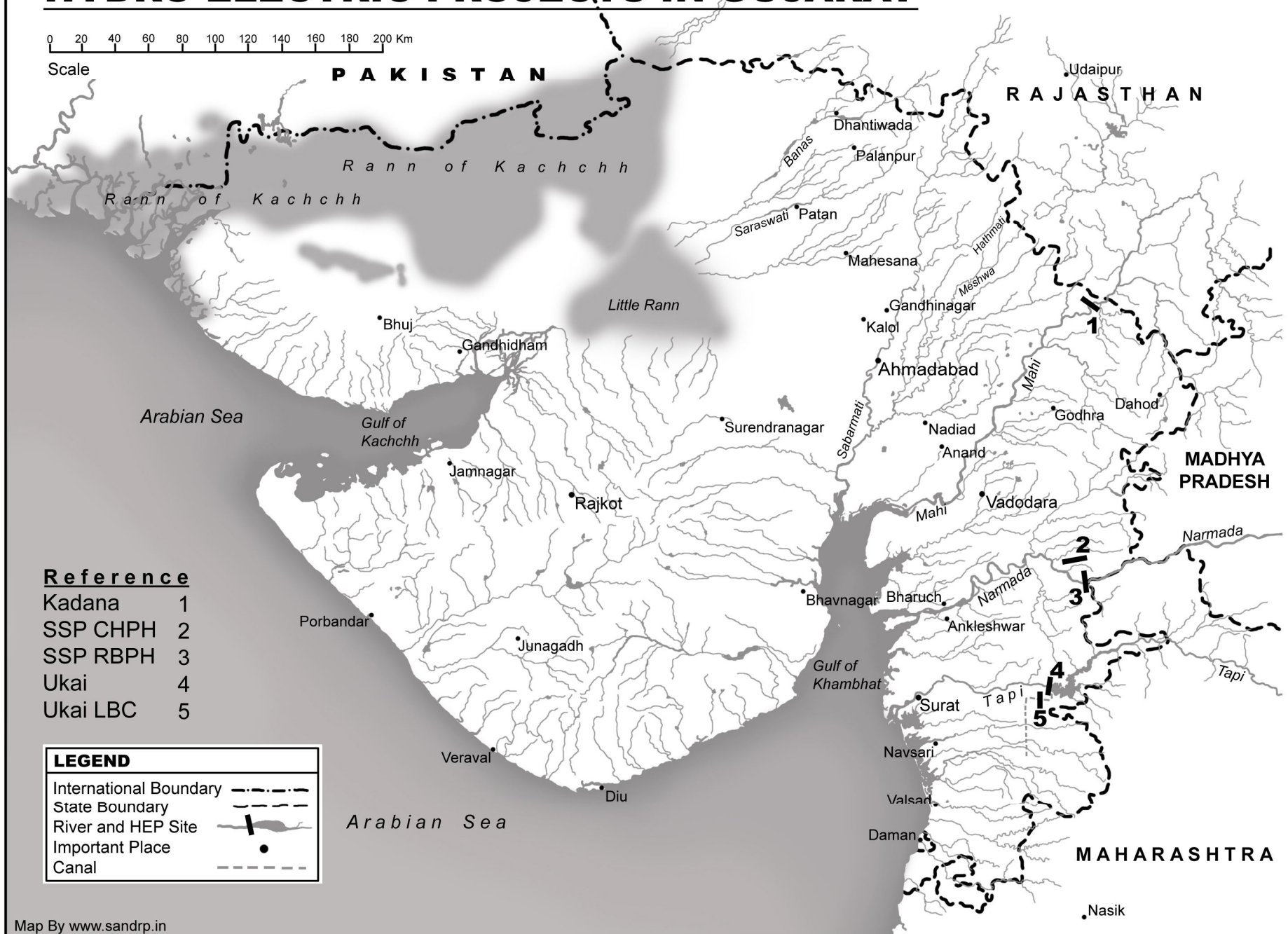
Area	Total in MCM	Surface Water	Ground Water	%
South Gujarat Region (South of sabarmati River)	35700	31750	3950	71.40
North Gujarat (North of Sabarmati river)	5300	2000	3300	10.60
Saurashtra	7900	3600	4300	15.80
Kutchh	1100	650	450	2.20
Total :	50000	38000	12000	100



# HYDRO ELECTRIC PROJECTS IN GUJARAT

0 20 40 60 80 100 120 140 160 180 200 Km

Scale



## Reference

- Kadana 1
- SSP CHPH 2
- SSP RBPH 3
- Ukai 4
- Ukai LBC 5

**LEGEND**

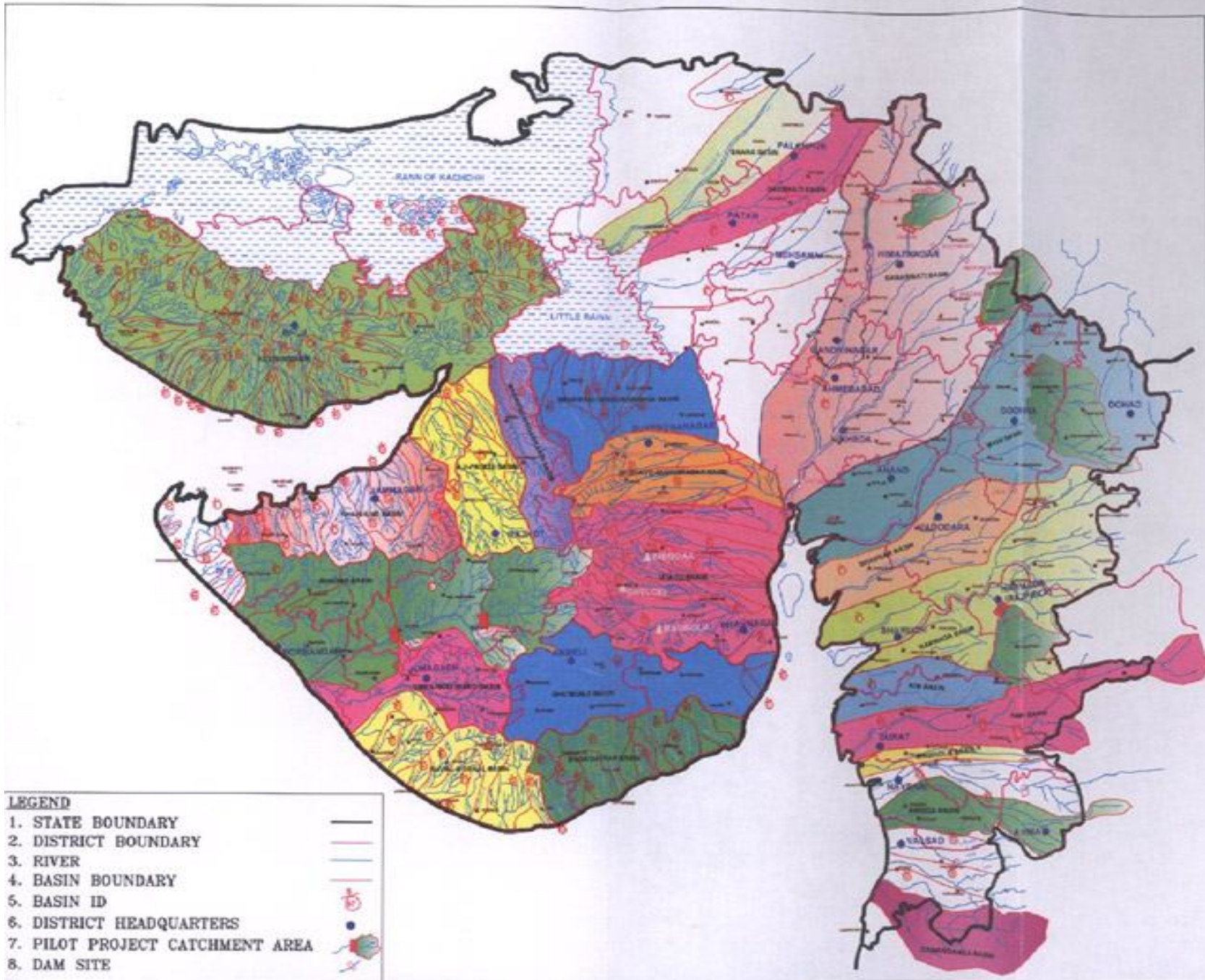
- International Boundary
- State Boundary
- River and HEP Site
- Important Place
- Canal



# Major rivers of Gujarat

- **Banas** in the north, originating in the Siranva hill in Sirohi in Rajasthan, flows by the foot hills of Abu and disappears in the desert.
- **Saraswati** takes its birth at Koteshtar near Ambaji, flows by Siddhpur and Patan and merges into the desert.
- **Sabarmati**, one of the biggest rivers of north Gujarat, originates from the Dhebar lake in Rajasthan and flows towards the Gulf of Cambay.
- Hathmati, the Vatrak, the Mazam, the Meshvo, the Shedhi, the Khari and the other rivulets join it. The three "virgin" rivers of the north and the Sabarmati with its tributaries come from the Aravalli ranges, while the Mahi and the Narmada with their families originate from Madhya Pradesh, the former in the big lake near Amzara and the latter in the Amarkantak.
- **Mahi** is joined by the Bhadar, the Anas, the Panam and the Meshri.
- **Narmada** one of the biggest and most revered river along with the only tributary, the Karjan, meets the sea, about 16 km from Broach.
- **Tapi** comes from the Satpura ranges near Betwa and enters Gujarat at Kakrapar. It flows around Surat and Rander and falls into the sea.
- Mindhola, the Purna, the Ambika, the Vanki, the Auranga, the Vapi, the Par, the Kolak and the Damanganga are the rivers of south Gujarat, which originate in the Sahyadri.
- Most of the rivers of Saurashtra and Kutch dry up in the summer. The river which originate in the central Saurashtra in the Chotila range flow to the south into the desert of Kutch. Only the Aji, the Machhu and the Brahmani are northward flowing rivers. The rivers originating in the Girnar and the Gir namely the Ojhat, the Kamb, the Surekh, the Somal, the Sangwada, the Hirani, the Kpila and the Saraswati flow into the sea.
- Though Kutch has many small rivers. Those flowing in the north disappear in the desert, while those flowing in other directions join the sea. The Khari flowing by Bhuj meets the desert and the Magh and the Tara empty their waters in the Gulf of Cambay.

# Basin Map of Gujarat



• 17 major river basins in N and S Gujarat,

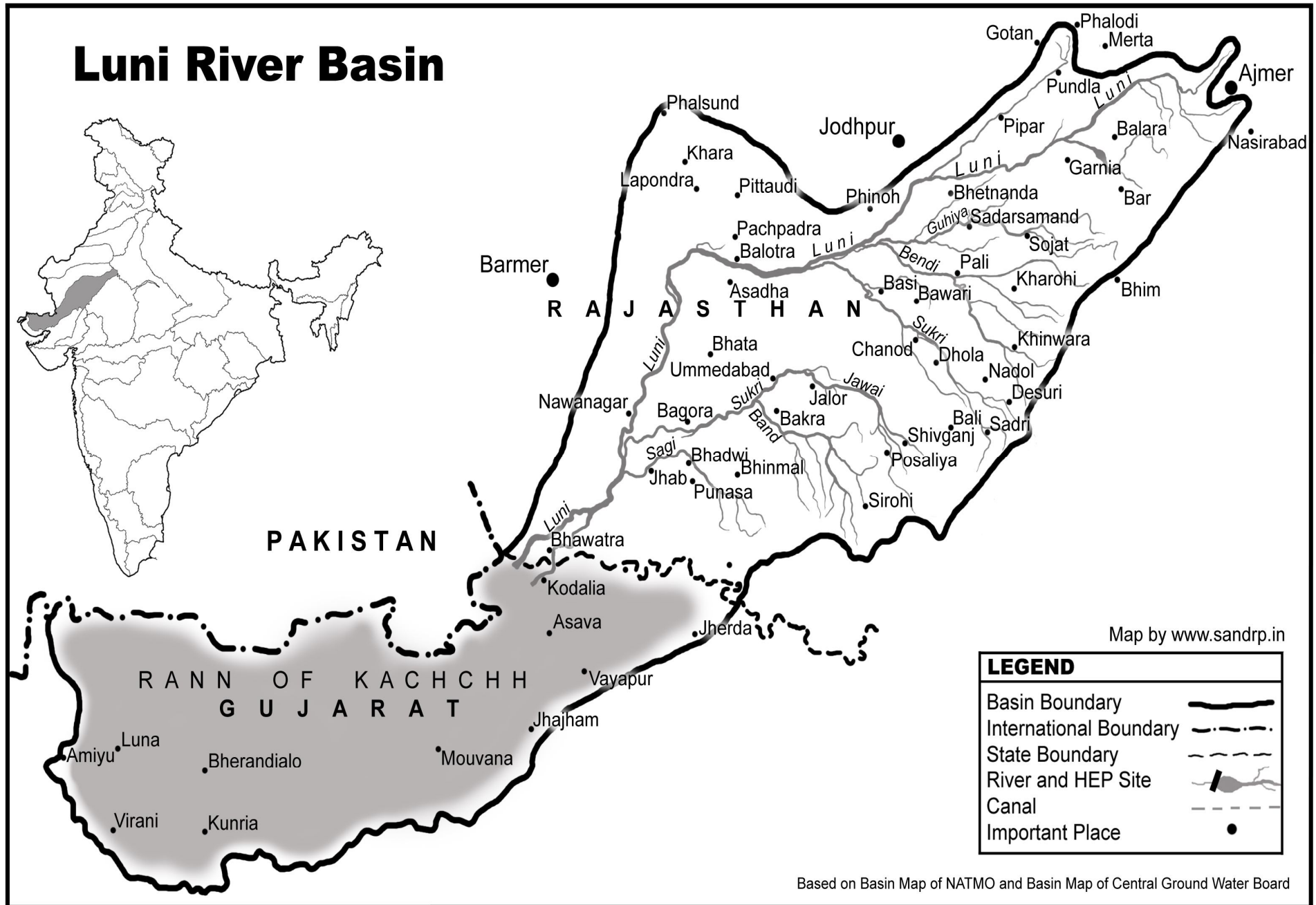
71 river basins in Saurashtra &

97 river basins in Kachchh.

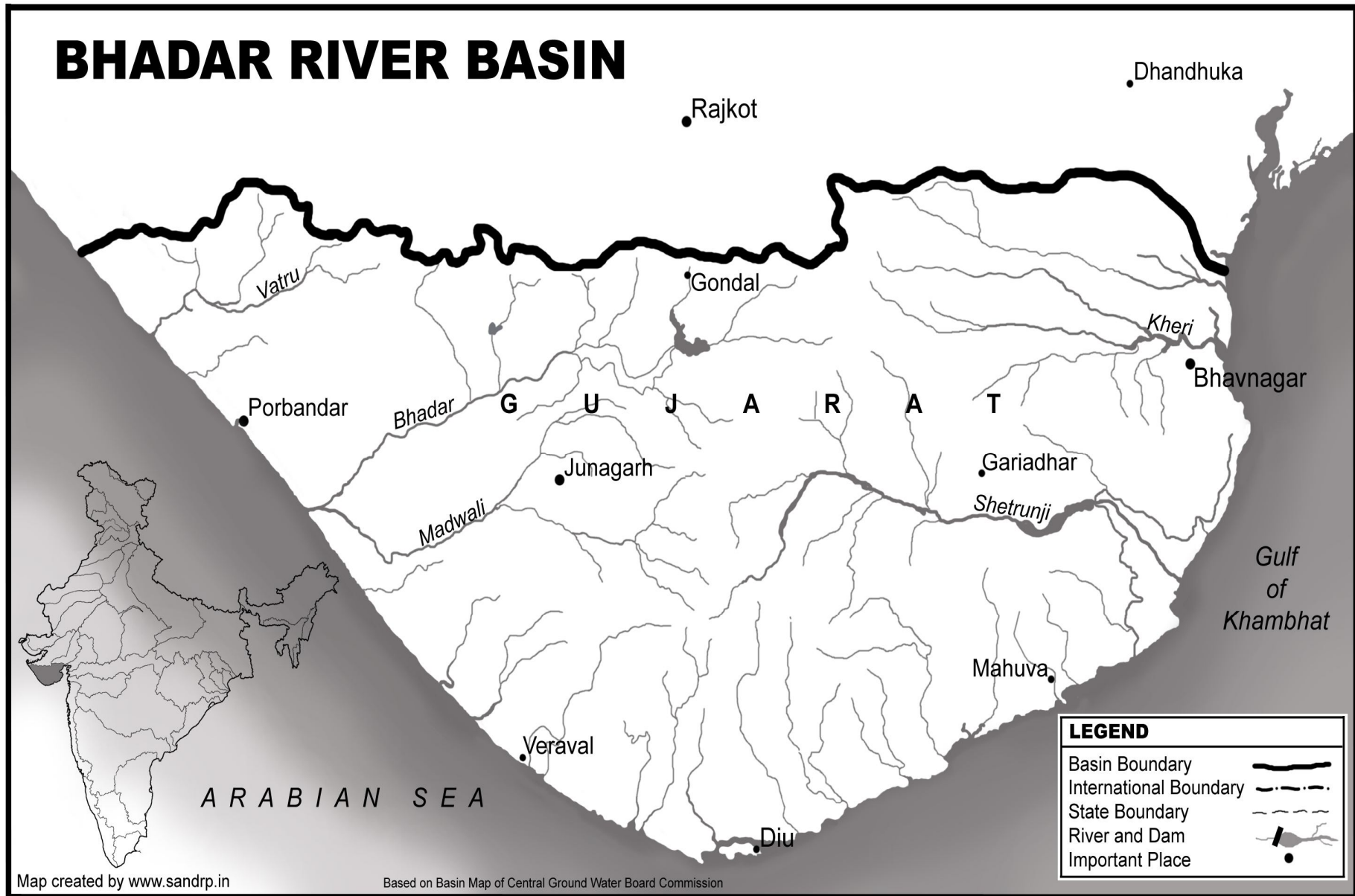
# Large Dams in Gujarat

- As per CWC register of large dams (2009), Gujarat has 665 large dams, including 68 under construction. 122 are more than 50 years old.
- Gujarat is third largest dam builder state of India after Maharashtra and MP.
- One of the worse large dam disaster of India happened in Gujarat when Morbi dam burst.

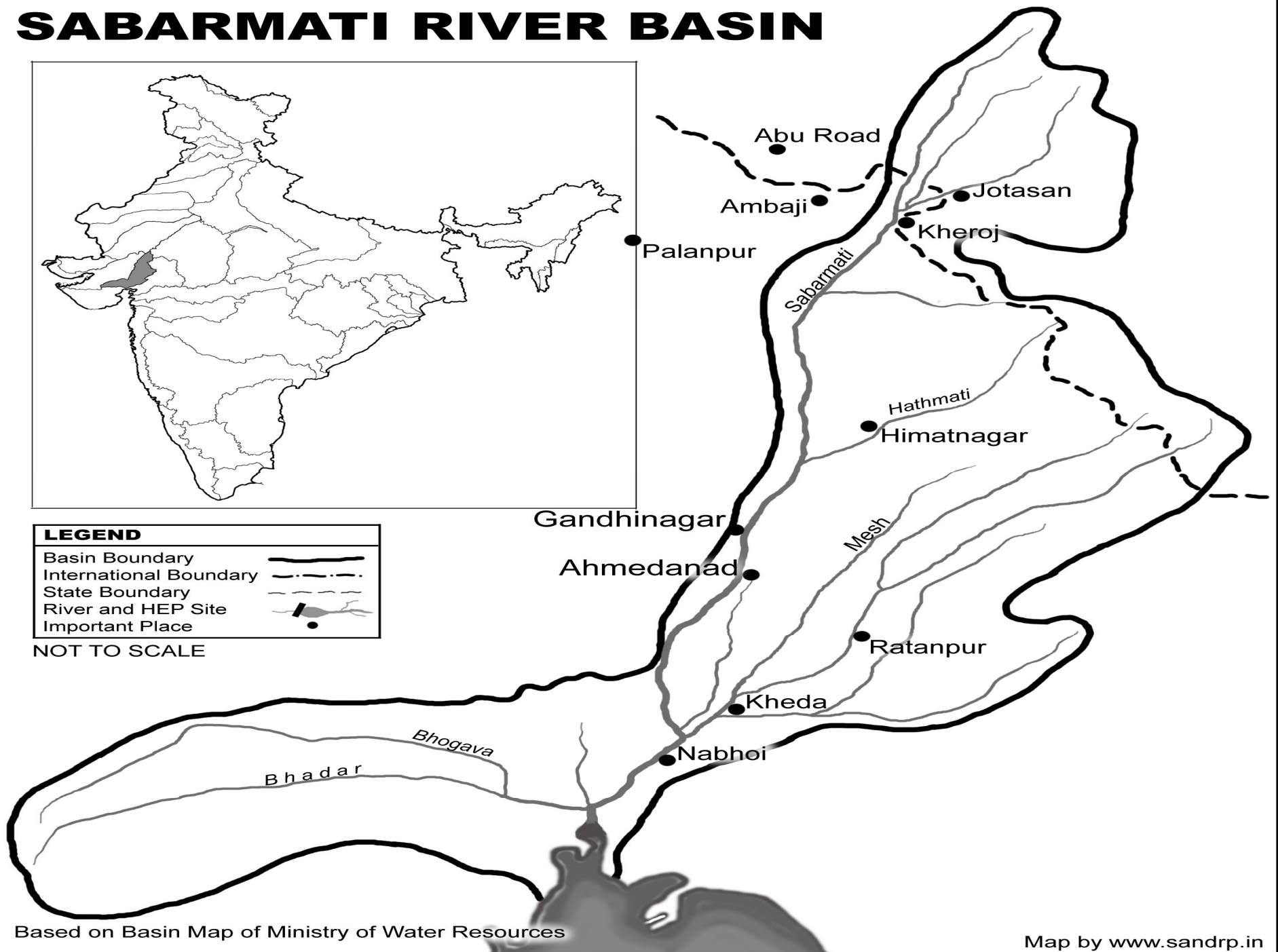
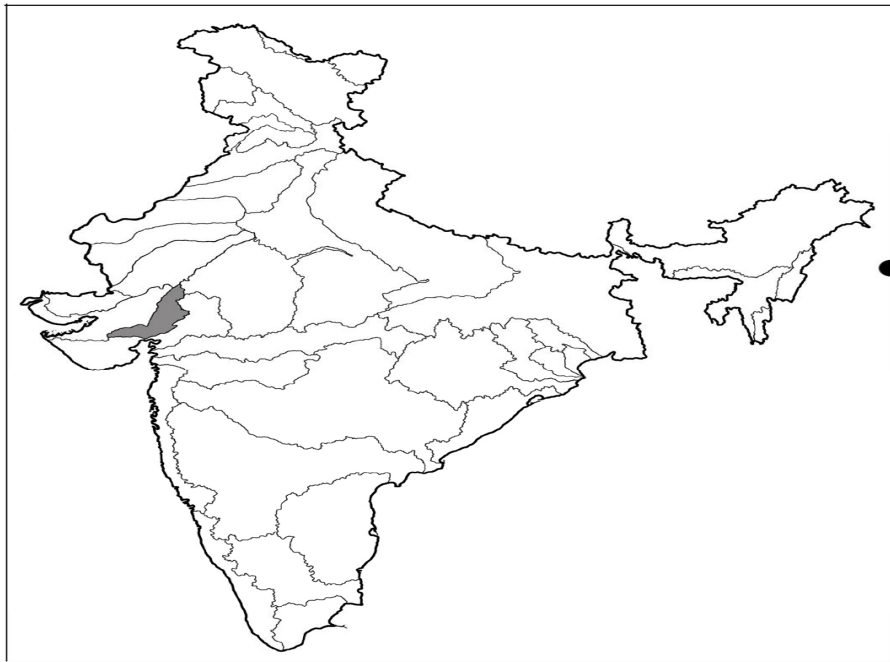
# Luni Basin



# Bhadar, other South Saurashtra basins



# SABARMATI RIVER BASIN



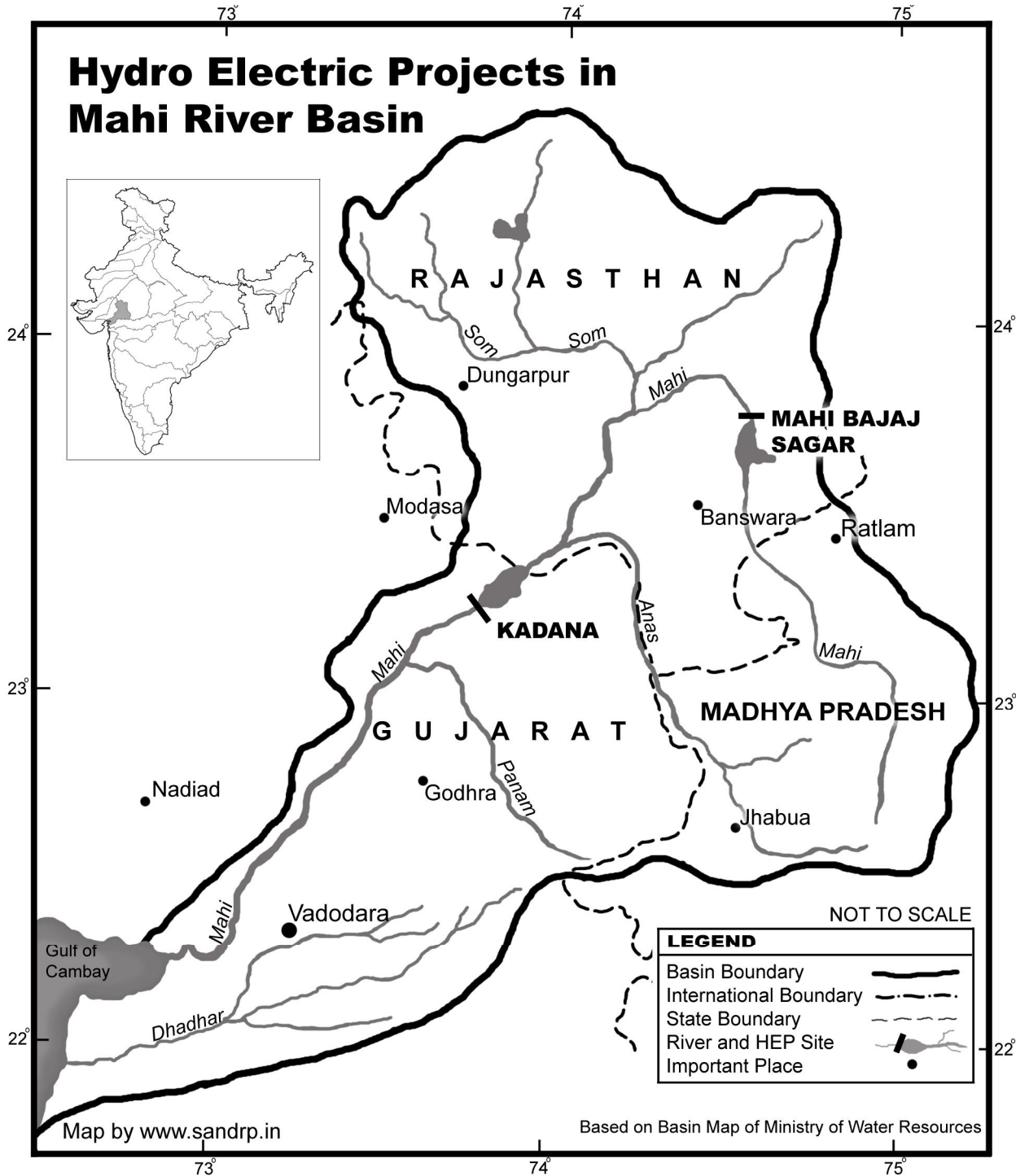
LEGEND	
Basin Boundary	
International Boundary	
State Boundary	
River and HEP Site	
Important Place	

NOT TO SCALE

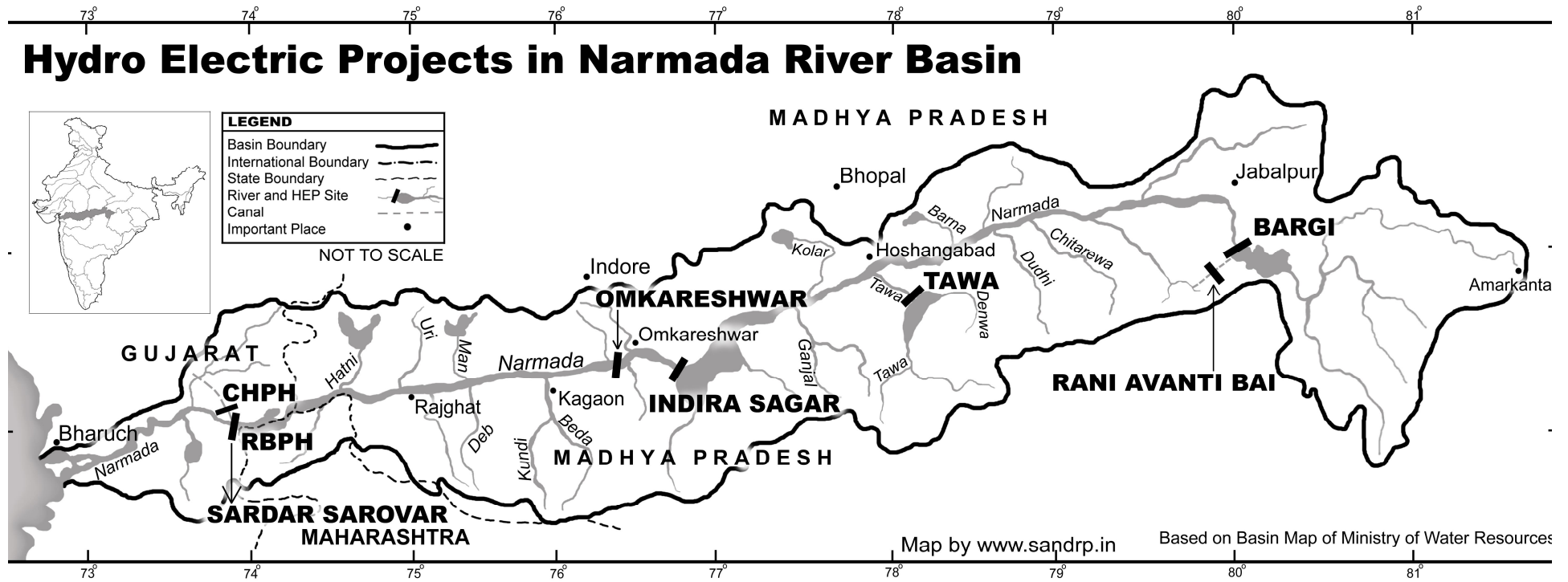
Based on Basin Map of Ministry of Water Resources

Map by [www.sandrp.in](http://www.sandrp.in)

# Hydro Electric Projects in Mahi River Basin



# Hydro Electric Projects in Narmada River Basin



GUJARAT

MADHYA PRADESH

MAHARASHTRA

**CHPH**  
**RBPH**

**OMKARESHWAR**

**INDIRA SAGAR**

**TAWA**

**BARGI**

**RANI AVANTI BAI**

**SARDAR SAROVAR**

Bharuch

Indore

Omkareshwar

Bhopal

Hoshangabad

Jabalpur

Amarkanta

Hatmi

Rajghat

Kagaon

Kolar

Ganjal

Barna

Narmada

Dudhi

Chiterewa

Tawa

Tawa

Tawa

Denwa

Uti

Man

Narmada

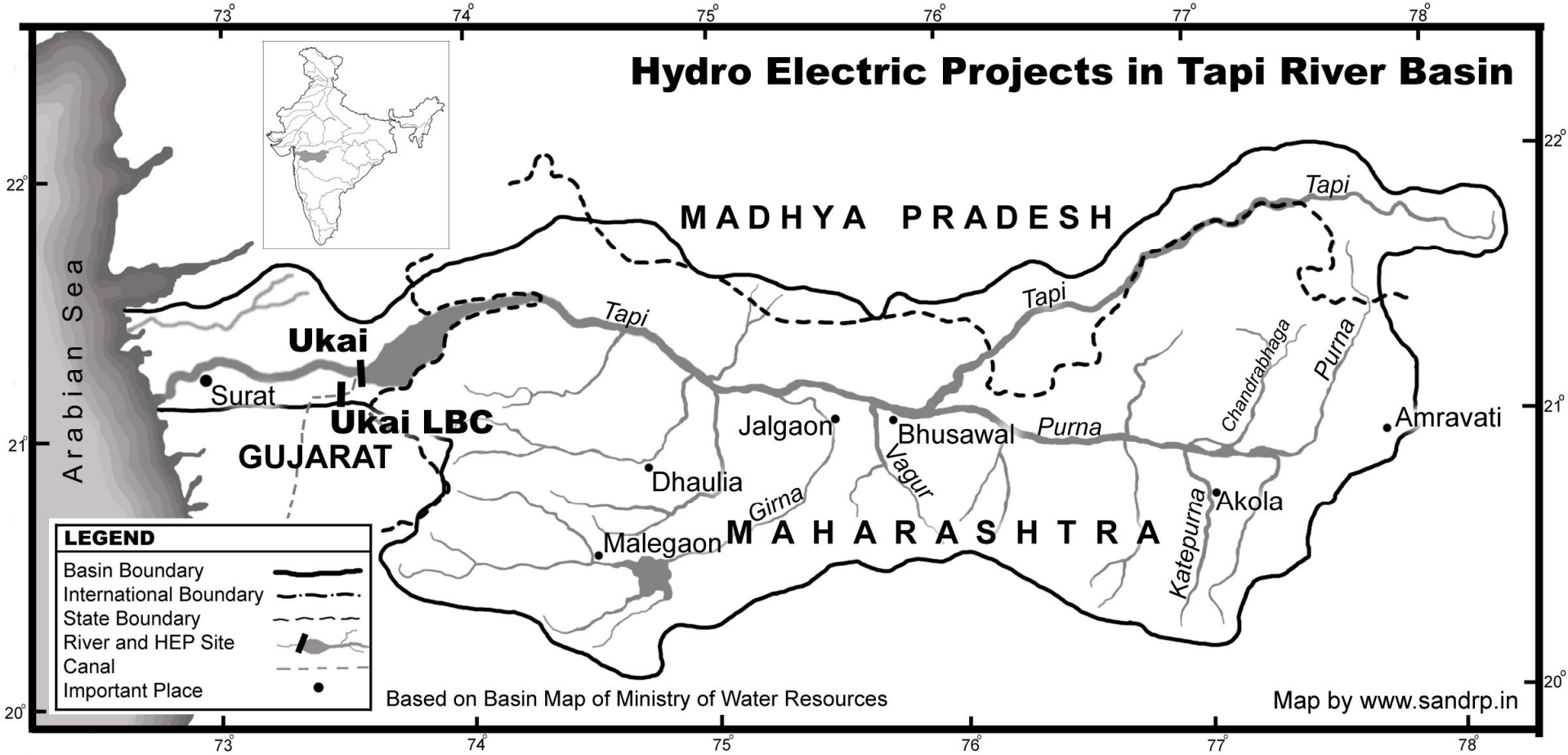
Deb

Kundi

Beda



# Hydro Electric Projects in Tapi River Basin



## GROUNDWATER: Increasing use, falling levels



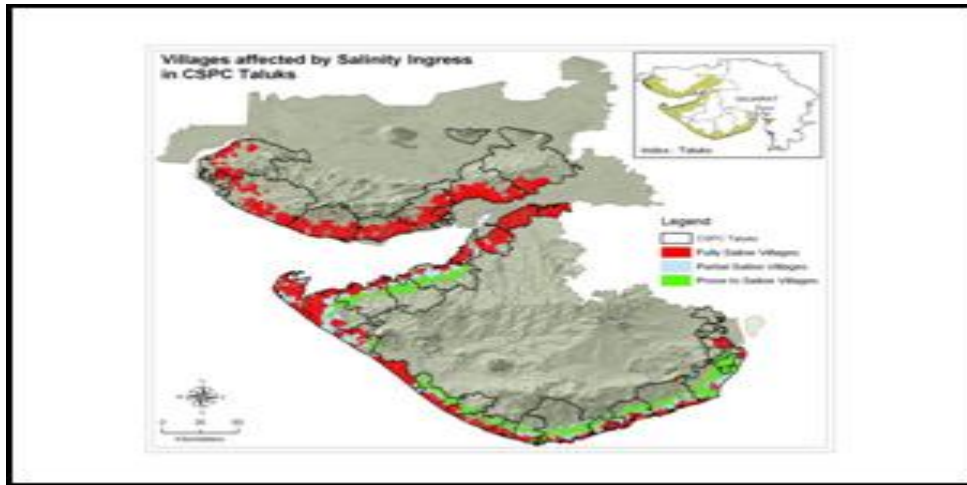
- The tube wells and open wells in north Gujarat pump out about 3,000 mcm groundwater annually against an annual replenishment of 2,400 mcm, annual deficit of about 600 mcm.
- The direct cost of groundwater depletion to the economy is to the tune of Rs 300 crore per year, as per one estimate.
- About 90% of irrigation in Gujarat depends on groundwater, as per one estimate.
- Excessive groundwater use has led to increasing salinity ingress in coastal areas.
- Out of 223 talukas in the state, 31 units are over exploited (level of GW development > 100%), 12 are Critical (level of GW development between 90 & 100%) and 42 are Semi Critical (level of GW development between 75 & 90%).
- Over exploited talukas are mostly located in north Gujarat Alluvial plain area, where the predominance of **fluorosis** due to high levels of fluoride in groundwater (> 10ppm in Banaskantha) is recorded.
- 80% of the state's total canal irrigated area falls within only 20% of talukas.

# The Groundwater crisis

- A recent report of Columbia Water Centre pointed out that: Water tables in the study area have been falling steadily over the last 15-20 years, and have reached about 600ft below ground level, risking irreversible salinization of aquifers.
- The rate of decline is anywhere between 9 feet per year (based on observation wells) to 20 feet per year (based on farmer recollections) in extreme sites.
- This steep decline has occurred during a relatively wet period. In the next decadal period of low rainfall this rate could more than double, especially if farmers increase cropping intensity.
- Despite of the electricity subsidy and the Energy use appears to have increased over the last two decades without a matching increase in irrigated area. In other words, the “drop per unit of energy consumed” continues to deteriorate.
- Systematic studies have not yet been made of the impact of the groundwater recharge movement in Gujarat, the popular science of rainwater harvesting, and decentralized recharge that have emerged as a result of farmers’ experiments.
- However, indicative evidence suggests that in regions critically afflicted by groundwater depletion, only popular mass action on a regional scale appears adequate to remedy the situation.
- In the city of Rajkot in the water-scarce Saurashtra region of western India, 1500 new houses and apartments were built in 1997, incorporating a new design for rainwater harvesting and storage, modelled on old houses in the region— reviving a forgotten technique (Shah, 2000).

## Salinity Ingress in Coastal Areas

The entire coastline of Gujarat has been facing severe issues with salinity ingress. This is especially serious in Saurashtra and also Mahi, Sabarmati and Narmada estuaries. According to Gujarat Water Resources Dept, **7 lakh ha**, 534 villages, 10,79,733 persons and 32,750 wells has been affected due to salinity ingress and rising saline levels in groundwater.



- 2011 CAG report has said that there has been an increase of **15 %** in salinity ingress area, involving an additional affected area of 88,947 ha when compared with the base data for 1977-1984.
- About 5 to 7.5 km wide strip of the inland area had been rendered saline till 1996. The groundwater quality has been deteriorated to more than 2000 ppm of TDS in many places of coastal Gujarat (Barot 1996).
- According to 2011 CAG Report, "A baseline study carried out (2007-08) in 1165 villages by CSPC indicated that 890, 753 and 337 villages reported high number of cases of kidney stones, gastric problems and fluorosis respectively"
- **While there is an immense evidence that salinity ingress, loss of estuarine biodiversity, fish & mangroves had been happening due to no freshwater flows from the upstream reservoirs, the Gujarat WRD refuses to believe these facts and states that the major reasons are less rainfall, weak land management and excessive water groundwater lifting by farmers.** (<http://guj-nwrws.gujarat.gov.in/showpage.aspx?contentid=1470&lang=English>)
- **Along with Salinity ingress, coastal erosion is found in 449 villages, which accelerates just before monsoon. Many studies have established the links between upstream dams which trap sediments and water and their direct impact on coastal erosion.**

## Management of Existing Large dams in Gujarat: The Ukai Experience

Tapi is one of the major rivers of peninsular India with a length of around 724 km. It is one of 3 rivers in peninsular India that run east to west - others Narmada and Mahi



- The river rises in the eastern Satpura Range of southern Madhya Pradesh, and flows westward, draining Madhya Pradesh's Nimar region, Maharashtra's Kandesh and east Vidarbha regions in the northwest corner of the Deccan Plateau and south Gujarat, before emptying into the Gulf of Cambay of the Arabian Sea, in the Surat District of Gujarat.
- The Western Ghats or Sahyadri range starts south of the Tapi River near the border of Gujarat and Maharashtra. The 80 m tall Ukai Dam with a gross storage of 8511 MCM is situated in the Songadh Taluka of Surat



- On the 7<sup>th</sup> Aug 2006, a massive flood engulfed Surat after release of water from Ukai dam on the Tapi river in the upstream, causing a major human tragedy and property damage estimated at Rs 22,000 cr.
- 150 people died directly due to flood, 100 died due to Leptospirosis epidemic, 30,00,000 people affected, 1500 cattle died, direct industrial loss of 16,000 cr, loss of production 6,500 cr, loss of public infrastructure 2,500 cr, loss to diamond processing industries 2,600 cr, loss to textile processing industry 2,000 cr, loss to around 70,000 small and big shops 1,000 cr, structural damage to 6559 houses and 1262 houses completely destroyed.
- However an analysis of the dam operation and rainfall pattern in the catchment of the reservoirs makes it amply clear that this was a completely avoidable, man-made mishap.
- The underlying issues that caused the UKAI mishap are still not being addressed.
- Similar conditions led to flood in Orissa from Hirakud in 2008 and again in 2011
- Due to lack of timely release of water by the Gujarat water resources dept, the storage in the Ukai reservoir was allowed to go up beyond the levels it should have, leading to sudden release of unmanageable quantities from Aug 7, for prolonged periods.
- Since this coincided with the days of high tide when the river's drainage capacity is further reduced, the floods brought catastrophic results.

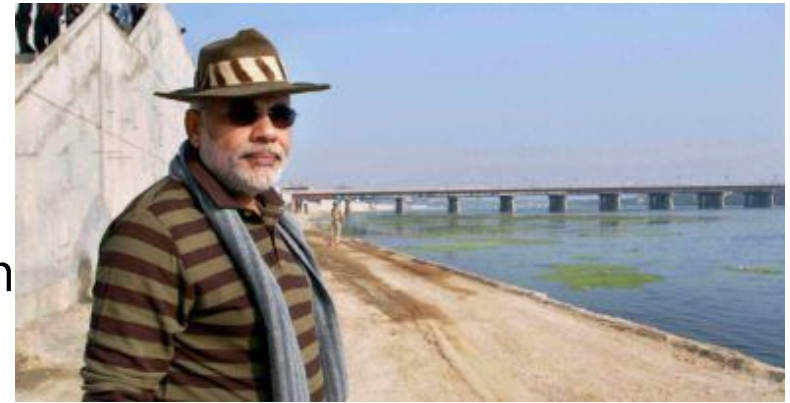


- 97.85% of the catchment u/s from the dam is in Maharashtra & MP 81.3 % in Mah.
- During 8 days preceding the 7<sup>th</sup> Aug, all the talukas of Nandurbar district had received over 25mm rainfall at least for 4-5 days including an instance of 260 mm rainfall in a day and seven instances when rainfall was over 100 mm. Surgana taluka in Nashik was also getting similar pattern of rainfall.
- As late as on Aug 6 evening, the water releases from Ukai were just 254 780 cusecs when the level had already built up to 102.57 m, that is reservoir was 83.6% full at 5.528 BCM live storage. A day earlier the releases were just 23640 cusecs.
- As per Ukai reservoir design, it is supposed to have a flood cushion of 1.332 BCM (which would be actually more now as the carrying capacity of the river has decreased over the years), for this 3 L cusecs had to be released before Aug 1, but this was not done
- One reason why the dam authorities tend to keep high storages at dams like Ukai is for maximization of power generation. But the figures we found from the Central Electricity Authority equally shocking.
- Even as the Ukai had unprecedented water storage and Gujarat was facing power deficit of up to 1500 MW, Ukai was not being used to generate power.
- And this situation continued right up to end of July 2006, when the power generation at Ukai was the lowest in 2006 till that date.

## Sabarmati River Front Development

*"We have provided access to the Sabarmati, which was denied earlier because of the **slums**."*

Ahmedabad Municipal Corp (AMC) set up the Sabarmati Riverfront Development Corp (SRFDCL) in May 1997, "to revivify the city centre by reconnecting it to the river"



- AMC appointed the Environment Planning Collaborative, an Ahmedabad-based urban planning consultancy firm, to prepare a plan.
- In the first phase, EPC identified a 9-km stretch of the riverfront extending from Subhash bridge to Vasna barrage and **proposed to reclaim 162 ha of the riverbed.**
- SRFDCL planned to sell or lease out a part of it to finance the project. In 2003, it extended the project to cover a 20-km stretch--from the Narmada main canal to Vasna barrage.
- As of now, SRFDCL is developing 190 ha of riverfront
- Constant change in the plans has escalated the project cost from Rs 361 crore in 1997 to an estimated Rs 1,100 crore today. It is unknown as to how SRFDCL plans to service its debts. ([www.downtoearth.org.in/node/5786](http://www.downtoearth.org.in/node/5786))
- According to the high court orders, at least 11,000 affected families were to be rehabilitated and resettled by AMC. ([www.livemint.com](http://www.livemint.com) 151211)
- That hasn't happened, but a demolition drive has been going on, > 3,000 people have moved on the outskirts of city
- THREE OF NEXT FOUR PHOTOGRAPHS ARE THANKS TO ALEX FOLLMANN.







# The much small rivulet, mostly sewage downstream of Vasna barrage in the same Sabarmati River



**Here you can see one of the sewage stream entering the Sabarmati River**





- Around 2,000 of these people are those whose houses and hutments have been demolished in the riverfront area.
- The HC had appointed a committee headed by retired judge D.P. Buch in May 2010 to examine the claims of the hutment dwellers affected. 5,000 applicants have claimed before the Buch committee that their names have not appeared in any lists accepted by the court for providing alternative accommodation.
- Not a single livelihood survey has been “carried out in the last 14 years to document all the different kinds of economically productive activity undertaken by vast numbers of mostly poor people- Prof Navdeep Mathur, IIM A
- A community organization & several NGOs argued that 30,000-40,000 households will be affected by the project, and they filed a case in the Guj HC in 2005.
- The civic body did not submit a resettlement policy to the court until 2008.
- Even at this time (2012) the full list of project-affected households according to a 2000-02 survey was not made public- Renu Desai
- The 2000-02 survey enumerated some 14,500 households, there were several reports by the AMC and project consultants between 2000-2006 that cited this survey, but gave different numbers for affected households

# Narmada Waters for Sabarmati Riverfront?

- “During last three years on an average, 600 to 1,200 MCM of water [From Narmada Canal] was released every year in the dry bed of river Sabarmati, which gets stored in a stretch of 10.6 km – right upto Vasna Barrage.” -Narendra Modi, convenient Actions. Sardar Sarovar, built at huge social, financial & environmental costs which are still being paid by the lakhs of affected was not built for the Riverfront project to have flowing water. The project made no allocation for this
- It was touted for Saurashtra, N Guj and Kutch, most of where water is yet to reach
- The Riverfront ‘beautification’ project conveniently ignores the fact that the Sabarmati River is not just 10.6 km long and does not end at Vasna Barrage of Ahmedabad but flows beyond this through various villages, where people are facing severe problems because of contamination of the river. The Sabarmati is 371 kms. long, the stretch from Ahmedabad to Vautha being 52 km long and Vasna Barrage to Vautha being identified as a polluted stretch. (Rohit Prajapati <http://www.sacw.net/article2157.html>)
- It is also important to note what made Sabarmati seasonal in the first place. No water release from the dams in the upstream like the Dharoi and Hatmati.
- Changing ecology of one river through destruction of an entire system of another great river is convolution of restoration.
- **Sabarmati Riverfront, as it stands now aims to profit only the real estate developers in Ahmedabad**
- Incidentally, the water quality in the beautified ‘Riverfront’ is still very bad, it stinks and mosquito problem is on a rise since the project  
([http://www.dnaindia.com/india/report\\_mosquitoes-sting-charm-out-of-sabarmati-riverfront-project\\_1654175](http://www.dnaindia.com/india/report_mosquitoes-sting-charm-out-of-sabarmati-riverfront-project_1654175))

## How much unaccounted water can the Narmada provide?

The Gujarat Water Resources Dept lists the following among use of Narmada Flood Waters:

**Undertaken projects:** SABARMATI-SARASWATI LINK This link off takes from Branch Canal No.1 of Right Bank Main Canal of Dharoi Project to Saraswati River.

**Planned Projects:** Narmada Main Canal based pipeline project for North Gujarat.

1233 MCM flood water of Narmada to be diverted to fill the reservoirs of N Gujarat namely, Dharoi, Hathmati, Guhai, Mazam, Meshwo, Watrak, Mukteshwar, Sipu, Dantiwada and more than 5000 village tanks.

PLANNING TO FILL THE RIVERS AND DAMS ALONG THE COAST OF SAURASHTRA WITH 1 MAF FLOOD WATER OF NARMADA RIVER

FIRST PHASE

Planning for allocation of 1 MAF Narmada flood water for filling rivers and dams in the coastal area of Saurashtra region.

Branch canal of SSP will cross 17 rivers.

Plan to construct 153 barrages across the rivers.

Estimated cost : Rs. 515 crores

SECOND PHASE

Storage of Narmada water in 25 schemes in the Coastal area

NARMADA WATER FOR KACHCHH

The planning to divert 1 MAF flood water of Narmada is on hand.

# The Narmada Saga....

- In many senses, what defines Gujarat of today is mirrored in the history of the Narmada project and the struggle against it.
- There are issues related to massive displacement, environment destruction, under estimated costs & impacts, lack of will, willingness or intention to take care of the displaced or the environment impacts, no attempt at options assessment when NBA and others showed real options existed (later proved by people of Gujarat), massive deception that the project was for Kutch, Saurashtra and N Gujarat, repression, human rights violations, arrests, use of the might of the state to repress the movement, but they did not succeed. Movement achieve a lot and the dam remains incomplete today, though many have written off the movement as lost. The story is long and will require a separate lecture.



# There is river downstream of SSP

On the lack of study of the downstream environment, the first paragraph from the chapter on this issue from the report of the Independent Review of the instituted by the World Bank is worth quoting in full

- **“From the Sardar Sarovar dam to the ocean, the Narmada River runs for 180 kilometers through a rich lowland region which represents about 10% of its catchment area. In the course of our environmental review we sought information that described the ecology of this lower reach of the river, the estuary, and near shore region in the Gulf of Cambay. We hoped to find a description of the aquatic ecosystem, including parameters indicating the quality and quantity of water and its seasonal changes, biological species, processes, and resource linkages. We looked forward to finding a systematic treatment of flow regimes and geomorphology. We expected to find systematic documentation of resource use, from drinking water to fisheries. We thought there would be documents establishing the kinds of physical, biological and socioeconomic changes to be expected as the Sardar Sarovar Projects are brought on stream and more and more of the natural flow is stored, used or diverted out of the river. We looked for a set of ameliorative measures that would be implemented to mitigate impacts. We thought these measures would be scheduled to begin with phased development of the Sardar Sarovar Projects. We hoped they would also be related to the cumulative effects of other developments on the Narmada further upstream, in particular the Narmada Sagar Projects, and to the expansion of industrial activity in the downstream river basin in Gujarat itself. *In all our expectations we have been disappointed.*” (emphasis added.)**
- **This was what Independent Review said about what is supposedly the most studied project of the world. The situation even today, two decades later is no different.**

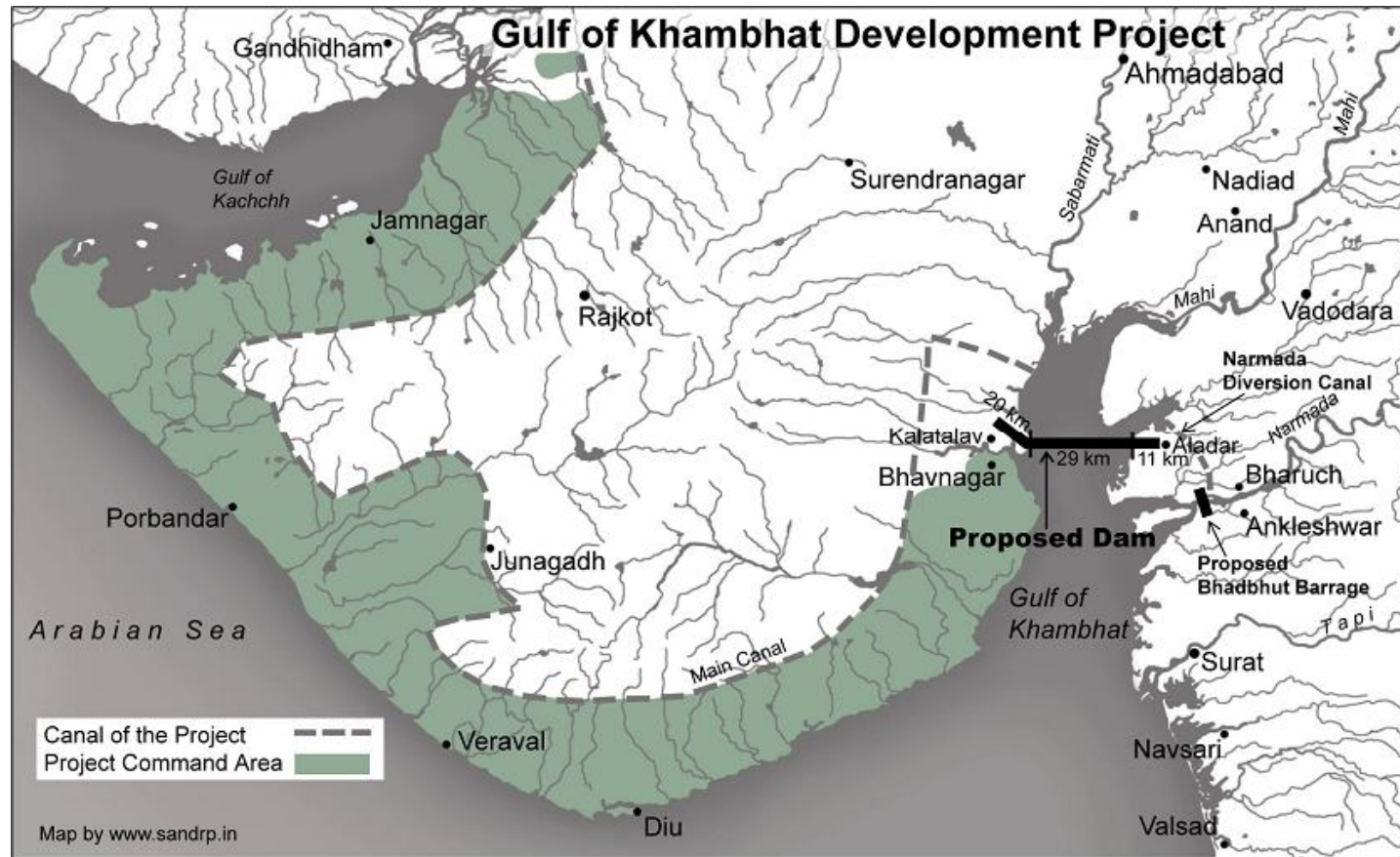
# Gujarat's future projects

- Kalpsar
- River Links: Damanganga Pinjal, Paar Tapi Narmada, Yamuna Sabarmati

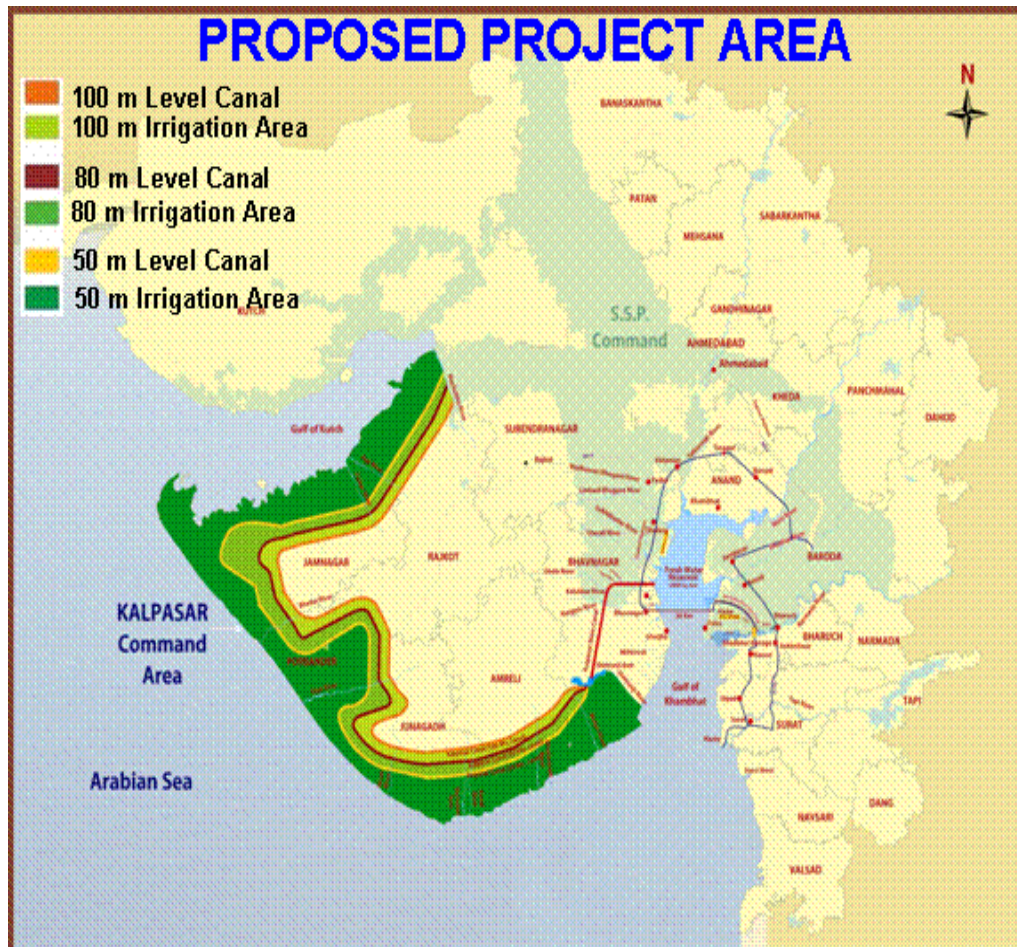
Other projects that will have major impacts:

- Thermal power projects in Kutch
- DMIC project
- Dholera Special Investment Zone ("may be so big that SSP may look like cottage industry"?)

## The Response: Kalpanic Sarovar project, or KALPASAR



**VISION AND PLANNING :** "To store State's 25% average annual surface water resources by constructing 30 km long dam across the Gulf of Khambhat. This reservoir will store about 10 BCM of surface water and will be the world's largest fresh water reservoir in sea."



- **Justification** Every year 38 BCM meter average surface water is available in the State.
  - However, even after SSP, *only* 20.48 BCM (54%) is possible to store.
  - **There is no suitable site of land in the State, available for the creation of river valley project to store surplus / untapped surface water.**
  - The Gulf of Khambhat is envisaged to be an eligible option to create a reservoir by construction of a Gulf closure dam which can store water inflows of 12 rivers (Narmada, Dhadhar, Mahi, Sabarmati and some of the Saurashtra rivers), which accounts for 25% of total surface water resources of Gujarat.
- <http://www.kalpasar.gujarat.gov.in/mainpage.htm>

# Kalpasar TOR rejected by MEF's EAC

- The basic proposal (the latest version) is to construct a 30 km long dam across the Gulf between Bharuch & Bhavnagar districts.
- It is expected to create a reservoir of **2000 sq km area**, over five times the area of Sardar Sarovar,
- The water from the reservoir whose level is expected to move between 5 m above mean sea level and 5 m below mean sea level and is supposed to be pumped over the height of 65 m to feed a 15000 cusec canal that is going to be 660 km long, the longest canal of India.
- Its claimed benefits include drinking water supply of 1400 MCM, providing irrigation to 10 lakh ha, reclamation of 2 lakh ha of saline land, filling up more than 60 existing dams, generation of tidal power, reducing road distance between South Gujarat and Saurashtra, tourism, among others.
- Nothing of this dimensions have ever been undertaken in India, nor possibly in the world.
- MEF's EAC has rejected the TOR for the project (sept 2010) when we also wrote to them raising questions about viability of the project. The EAC raised questions about feasibility, including lack of a pre feasibility study.

# BIG Project: BIGGER Issues

Even without going into the unprecedented impacts of the move on biodiversity and saline-freshwater balance of on the gulf of Khambhat, there are some basic feasibility issues about the project.

## 1. Hydrological feasibility:

- All the rivers that flow into the proposed reservoir area are already dammed and water is over committed from those rivers.
- About 80% of the water in the proposed Kalpsar is supposed to come from Narmada River.
- Narmada has only 23 Million Acre feet of water annually, but the Narmada Water disputes tribunal has allocated 9 MAF of water to Gujarat, assuming Narmada has 28 MAF Water.
- Gujarat has already planned to use about 15-20 MAF water from Narmada considering the command area, cropping patterns and non agriculture water use pattern planned
- even the surplus monsoon water from Narmada is not likely to be available for Kalpsar.

## 2. Whatever little water flows from these rivers that into Gulf is mostly **highly toxic**.

- The Kalpasar Dept itself has stated in a letter “the instance of a river of South Korea, whose polluted water converted a reservoir into a pool of effluents “due to uncontrolled industrial effluent discharges. **“The Supreme Court will not allow the use of fresh water reservoir, if untreated waste water of towns and cities is draining into the reservoir.”**

In its turn, the state Industries Dept quotes its officials as admitting that “there exists large industrial activity which is resulting in substantial pollution”. The dept underlines “Meeting the standards may be difficult by for the industrial units and it may result in closing down of several units as past experience shows”

3. Serious questions about the **geological feasibility** of constructing this earth and rock-filled, longest dam in the middle of the surging sea, the foundation is yet to be gauged, the issue of **salinity** that exists in the gulf water and the soil underneath and how much more will leak into the dam.
4. The reservoir with shallow depth and huge area will have **huge evaporation losses**, and pumping all the water into the canals through 65 m + height would be hugely energy intensive. The claims of project
  - As a first step in execution of the Kalpasar project, the state govt has decided to construct a barrage on the **Narmada** river near Bhadbhut village in Bharuch district
  - This barrage will divert Narmada water to the Kalpasar area, a move that will address the water requirement of Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs) and irrigation
  - The proposal of the Bhadbhut barrage project has been forwarded to the MEF for environmental clearance.
  - There will be partially operated under a **PPP** mode.

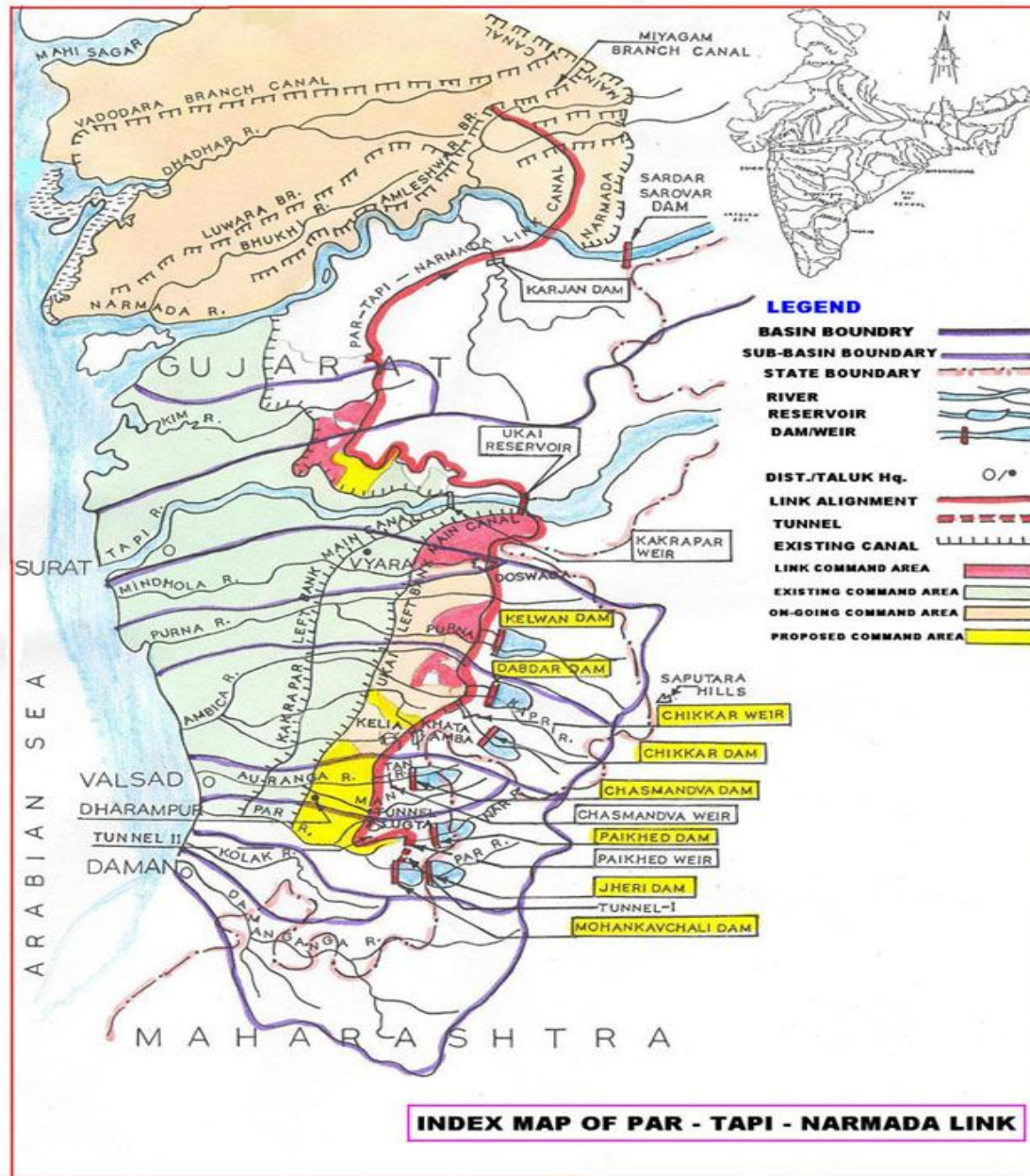
## DAMANGANGA - PINJAL LINK



- Damanganga Pinjal Link  
This link proposes to divert 'surplus waters' at Bhugad and Khargihill reservoirs in Damanganga basin to Pinjal dam across the river Pinjal in Vaitarna basin. It will transmit 909 MCM of water to Mumbai City for meeting the domestic & industrial demands. The submergence areas coming under the proposed Bhugad and Khargihill reservoirs will be 1,903 ha and 1,558 ha respectively. In the case of Pinjal reservoir the same will be 1,900 ha, of which 1,175 ha is forest.



**Index Map of Par - Tapi - Narmada Link**



This link proposes to transfer *surpluses* available between Par and Tapi to water *deficit* areas in N Guj, to transfer 1,350 MCM through a 401 km canal. The enroute irrigation benefits envisaged are 1.63 lakh ha in Gujarat by utilizing 460 MCM and 190 MCM for meeting the transmission losses. In addition, 700 MCM is to be provided to Saurashtra and Kutch. There is a provision for 32.5 MW of power. The seven proposed reservoirs in this link would submerge 7,559 ha of which 3,572 ha is forest. 14,832 people and 9,029 livestock would be affected by the submergence.



Left: Tribals against Par-Tapi-Narmada Struggle

In Jan 2011, a 7 day yatra was planned by community groups like the Par Nar Adivasi Sangathan and the 208 network with an aim of linking the affected communities of two states spread over three districts.

- The Yatra which spanned more than 50 villages concluded at the Chasmandva village meeting, which was attended by 3500 – 4000 people from all over the region.
- More than 4000 people were a part of this Yatra, which was denied the right to hold public meetings, use microphones, or even distribute leaflets.
- Many of these villages have not allowed a land survey to take place.

Par - Tapi - Narmada	Jheri	Par	Peint Taluk, Nasik Dist, Mah	203 (187)	FRL 246; MDDL 203.7	836 ha in Mah	14832; 75 villages (24 fully and 51 partially); 2247 houses; out of 7559 ha, 3572 ha is FL
	Mohankavchali	Par	Dharampur Taluka, Valsad Dist, Guj	372 (158)	FRL 158; MDDL 143	1494 ha (1372 ha in Mah; 122 ha in Guj)	
	Paikhad	Nar (T of Par)		229 (218)	FRL 248; MDDL 190.22	994 ha (894 ha-Mah, 100 ha-Guj)	
	Weir D/s of Parikhad					Crest level 143	
	Chasmandva	Tan (T of Auranga)		82 (75)	FRL 214; MDDL 75.08	615 ha (32 ha in Mah, 583 ha in Guj)	
	Weir D/s of Chasmandva					Crest level 132	
	Chikkar	Ambica	Ahwa Taluka, Dangs Dist, Guj	142 (130)	FRL 210; MDDL 130	1249 ha (Guj)	
	Weir D/s of Chikkar					Crest level 129	
	Dabdar	Kapri (T of Ambica)		223 (205)	FRL 169; MDDL 137.1	1629 ha (Guj)	
	Kelwan	Purna		284 (258)	FRL 164; MDDL 136.1		

# Some basic Questions about ILR

- Is the need for the ILR established?
- Has it been established if some basins are surplus or deficits?
  - Definitions of Surplus and Deficit
  - Is any basin really water surplus?
  - Question on hydrologic viability
- Is the feasibility of the proposal established?
- Is the Optimality of the proposal established? Is it the least cost option?
- Has the social, environmental viability been established?
- Is the economic and financial viability of the project established?
- Is ILR feasible in current constitutional set up?
- Is the project desirable?
- Has there been any democratic planning, decision making process?

## What about these floods in ILR recipient areas?

- The Central Gujarat region that experienced serious floods in 2006 were to receive MORE water from Paar-Tapi Narmada Link proposal.
- Mumbai that experienced unprecedented floods in 2005 was to receive more water from Damanganga Pinjal link proposal.
- In both cases, the floods in these recipient basins would have gone worse if the ILR were being implemented.

## **Severe River Pollution in Gujarat and absolute ineffectiveness of GPCB**

- According to CPCB 2009 and 2010, three of the five most polluted river stretches in the country are in Gujarat which are the **Amlakhadi** at Ankleshwar (714 mg/L), **Khari** at Lali village, Ahmedabad (320 mg/L) and **Sabarmati** at Ahmedabad (207 mg/L).
- A recent police complaint against the GIDC and GPCB has highlighted the corruption and ineffectiveness in these agencies to check water pollution in Ankleshwar
- According to 2002 Report of CPCB, Gujarat has maximum polluted stretches in 9 rivers, preceded only by Maharashtra
- In 2010, CPCB has reported highest volumes of faecal coliform (FC) — a bacteria present in human and animal excreta — **in the country** in **Sabarmati**.
- Amlakhadi, which meets Narmada near Bharuch, has been reduced to an effluent channel of over **1,500 chemical units** in Ankleshwar, Panoli, Vilayat, Dahej & Jhagadia.
- According to CPCB, the major reason for polluted river stretches in Gujarat is that effluents are directly discharged by the factories into these water bodies. Millions of litres of untreated effluents are dumped in major rivers like Narmada, Sabarmati, Mahi, Khari, Damanganga, Amalkhadi and in the Gulf of Khambhat.
- Convener of Gujarat Paryavaran Suraksha Samiti Rohit Prajapati says, "All the shocking figures had been obtained from GPCB and CPCB through RTI. In most cases, the presence of toxins are 300 - 1,000 % more than the levels set by the GPCB. Even the effluent treatment plants set up by the state and the Central govts are not functioning properly, adding to the problem."

# Some signs of severity of river pollution in Gujarat

According to info provided by GPCB, under RTI by **Rohit Prajapati**,

- Wastes discharged in the Damanganga from the Common Effluent Treatment Plant (CETP) of the industrial houses in Vapi contained **347 % more** Chemical Oxygen Demand, 432 % more Total Dissolved Solids and 196 % more Ammoniacal Nitrogen, a serious health hazard, compared to the GPCB-prescribed norms.
- Situation is worse in Ankleswar region
- Effluents dumped in the Sabarmati from the industrial estates in Vatva, Odhav, Narol and Naroda around Ahmedabad were found to be alarmingly toxic, 2,926 % more of COD, 2,520 % more of AN and 780 % more of TDS.
- Industries in and around Vadodara are dumping huge quantities of hazardous chemicals into river Mahi and the Gulf of Khambhat.
- The severe coastal pollution has all but destroyed estuarine fisheries like in Amlakhed, where there has been a **75.76 % fish catch reduction noted in five years in Bharuch District.** (Assistant Director of Fisheries Bharuch Dist.  
**State Fisheries Department. Govt of Gujarat.** (From :**M.S.H.SHEIKH**  
*President, Brackish Water Research Center*)

Sr	Name of Fish	1999-2000	2003-2004	Reduction % In 5 years
1	Catla catla	23,18,654	2,02,062	91.20%
2	Labeo rohita	24,96,327	3,11,189	87.50%
3	Cirrhina mrigala	15,14,284	23,449	98%
4	<b>Kalbasu</b>	2,88,253	0	100%
5	<b>Minor carp</b>	44,561	0	100%
6	<b>Bekti</b>	14,827	0	100%
7	Mahasheer	82,097	1,200	98.50%
8	Wallago attu	10,52,359	39,390	96.25%
9	Scorpion	1,26,662	150	99.80%
10	Murrel	8,34,873	66,260	92%





**Amla khadi the Most polluted creek of the India as per CPCB (M.S.H.SHEIKH)**

A photograph showing a small boat on a body of water. The boat is positioned in the middle ground, with several people visible on board. To the right of the boat, there is a large, green, netted structure, possibly a fishing net or a small enclosure. The background consists of a line of green vegetation along the shore. The sky is a uniform, light blue-grey color. The water in the foreground is dark and slightly rippled.

• More than 100 villages of Bharuch district and Over 50,000 people depend on fishing. (M.S.H.SHEIKH)



## **Stories of River Revival and sustainable water management from Gujarat**

**India's biggest and most unique people initiated and people driven movement for well recharging and check dam construction also happened in Gujarat.**

**There are also many other cases of exemplary work**

Community organizations and NGOs like AKRSP, DSC, Kutch Mahila Sangathan, Sambhav, Utthan, Charitable Trusts, Sadguru Foundation, Swadhyay Pariwar, swaminarayan etc., have also contributed towards exemplary local water related work, including groundwater recharging, rainwater harvesting, check dams development

**•Community Restoration of Multifunctional Mangrove Forests:** Mangroves perform a number of functions: Protect the river mouth from salinity ingress and erosion, Provide nursery for eustuarine and marine fish, Provide firewood and fuel, Protect against coastal storm, Refuge for biodiversity. In Gujarat expansion in mangrove cover has been mainly contributed by the community through Restoration of Mangroves project implemented by Gujarat Ecology Commission during 2002 - 2007. 22 villages have been a part of this exercise and have contributed funds, raised mangrove nurseries and planted mangroves along the coastline for more than 8326 ha (GEC, 2010). Benefits in terms of increasing fish catches, reduced salinity and protection against smaller storms is being felt. Main problems for mangrove restoration are pollution of the rivers from upstream, infrastructure activities near shore like thermal plants, Cement factories and reduced freshwater flows due to upstream Dams.

# **Optimum utilization and restoration of 62 rivulets in Tribal areas of Gujarat, MP and Rajasthan by local communities and organizations**

Like it has happened with many rivers of the country, In the Dahod District, River Kali had become seasonal, unlike its original perennial nature.

Local tribal community, with the help of Sadguru Foundation constructed a series of small check dams and allied water harvesting structures in the watershed. Since 2007, the river has regained its original perennial nature and villagers who crossed the dry river bed for 8 months have now built cause ways on the check dams for crossing the full river!

In Gujarat, this model has been implemented by the community through facilitating and guiding NGOs like Sadguru Foundation on rivers like Khan, Kali-I, Dudhimati, Machhan, Hadaf, Panam, Walwa, Welwa, Wankdi, Ujol, Chandroi, etc. In a radius of 75 kms, spanning three states of Gujarat, Rajasthan and Madhya Pradesh, **62 local rivers and rivulets have been optimally harvested and revived**, as per Foundation.

In 2005, the biggest check dam though small in technical definition was constructed on river Mahi on the border of Banswara and Dungarpur district at Baneshwardham at the cost of Rs 4.5 crores to store 310 mcft, a huge storage by the standard of small structure.

According to Sadguru Foundation, two persons selected by the community, one man and one woman, supervised the entire process of construction.

The post construction management is handed over to the local community.

The structures on which lift irrigation schemes are installed and managed by the lift irrigation co-operatives as the beneficiaries of the check dams and lift irrigation scheme are the same and where there is no lift irrigation scheme, the structures are managed by the community forming a group

Compared to the benefits accrued from these structures, Sadguru foundation claims that these are **built at 1/5th of the cost of conventional large structures.**

**And this has happened without uprooting any family from its place or clearing forests.**

Source: <http://www.nmsadguru.org/>

## Stories of River Revival and sustainable water management from Gujarat

Mithivirdi is a traditional coastal village on the Gulf of Khambhat, named after the numerous fresh water holes called virdas that have been the source of clean drinking water for many years. Until 50 years ago, such fresh water columns covered the entire region and even existed in the middle of the sea. But over the years, pollutants from the sea and the ports, salinity and reduced flows destroyed these virdas, leading to severe water scarcity.

- Under the guidance from organisations like Utthan and Sambhaav, Mithivardi and several villages from the Bhal region of Ahmedabad and Bhavnagar districts have been protecting their water security and reviving smaller rivers, like Chaya in Mithivardi through: using rainwater to regenerate and maintain the local water resources for the entire community; collecting rainwater through innovative collection storage schemes for individual households. Small check dams built across rivers help in conserving water, replenish groundwater and also protect the river against salinity ingress

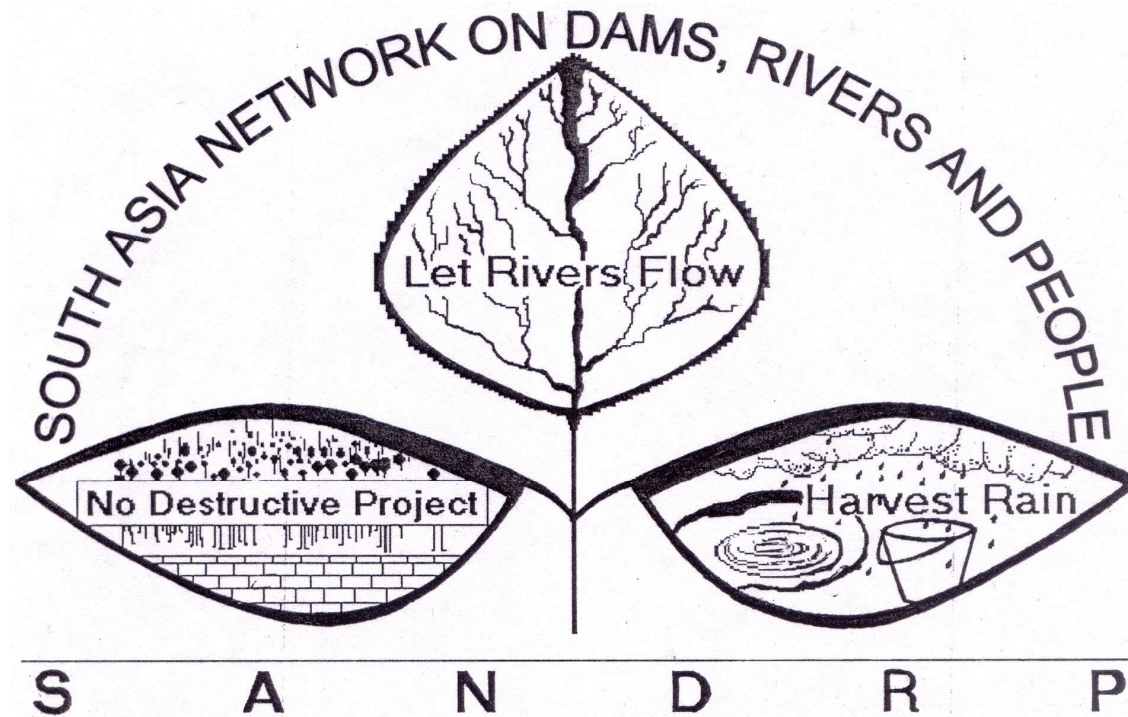
Between 1992 and 1998, 99,355 abandoned wells were voluntarily recharged and rebuilt 554 run-off ponds.



# So there is hope for Rivers?

- Narmada movement has been a watershed in Gujarat's history
- There are many more movements even now going on, to name a few: recently a movement could stop Nirma from encroaching a water body in Bhavnagar, there is a movement against thermal power plants in Kutch and Nuclear Power plant in Bhavnagar, against water pollution in central and south Gujarat, against sand mining in Ambika river in South Gujarat, against river linking proposals in Dangs and Valsad, among many others.
- Hopefully, rivers will also benefit from these.

# THANK YOU



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India International Centre, Delhi