Water resources management in Gujarat

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WATER RESOURCES MANAGEMENT IN GUJARAT

A Sustainable Water State

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

Narmada, Water Resources, Water Supply & Kalpsar Department
Government of Gujarat
WATER PROFILE OF GUJARAT
## Irrigation Scenario: Gujarat State with reference to Nation

<table>
<thead>
<tr>
<th></th>
<th>National</th>
<th>Gujarat State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geographical Area ( Million Ha)</strong></td>
<td>311.0</td>
<td>19.6 (6.30%)</td>
</tr>
<tr>
<td><strong>Available Water ( Billion Cum)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Water</td>
<td>690</td>
<td>38 (5.50%)</td>
</tr>
<tr>
<td>Ground Water</td>
<td>433</td>
<td>17 (3.92%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1123</td>
<td>55 (4.90%)</td>
</tr>
<tr>
<td><strong>Irrigation Potential ( Million Ha)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultimate</td>
<td>139.0</td>
<td>6.75 (4.86%)</td>
</tr>
<tr>
<td>Developed</td>
<td>93.95</td>
<td>6.00 (6.38%)</td>
</tr>
<tr>
<td>Actual Utilized</td>
<td>80.06</td>
<td>5.01 (6.25%)</td>
</tr>
</tbody>
</table>

|                |          |               |
| **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

<table>
<thead>
<tr>
<th>Region</th>
<th>Annual Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central &amp; South Gujarat</td>
<td>80 – 200 cm</td>
</tr>
<tr>
<td>North Gujarat, Saurashtra</td>
<td>40 – 80 cm</td>
</tr>
<tr>
<td>Kachchh</td>
<td>&lt; 40 cm</td>
</tr>
</tbody>
</table>
Perennial rivers are located in only 20% area of the State which accounts for 80% of the surface water of the State.
### Gujarat State Water Resources

<table>
<thead>
<tr>
<th>Region</th>
<th>Surface Water</th>
<th>Groundwater</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North Gujarat (11%)</strong></td>
<td>2100 MCM</td>
<td>4200 MCM</td>
<td>6300 MCM</td>
</tr>
<tr>
<td><strong>Kachchh (3%)</strong></td>
<td>650 MCM</td>
<td>800 MCM</td>
<td>1450 MCM</td>
</tr>
<tr>
<td><strong>Saurashtra (17%)</strong></td>
<td>3600 MCM</td>
<td>6100 MCM</td>
<td>9700 MCM</td>
</tr>
<tr>
<td><strong>Central &amp; South Gujarat (69%)</strong></td>
<td>31750 MCM</td>
<td>6350 MCM</td>
<td>38100 MCM</td>
</tr>
</tbody>
</table>

**Gujarat State**

- **Surface Water**: 38100 MCM
- **Groundwater**: 17500 MCM
- **Total**: 55600 MCM
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 in 2011 (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 Structures - 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

<table>
<thead>
<tr>
<th>Water Resources in MCM</th>
<th>Surface water</th>
<th>Ground Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>38100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INNOVATIVE APPROACH
Integrated approach adopted for sustainable and efficient water resources development and management

## Includes

<table>
<thead>
<tr>
<th>Water conservation</th>
<th>Inter-basin water transfer by interlinking</th>
<th>Strengthening of existing canal system</th>
<th>Participatory irrigation management</th>
<th>Micro irrigation</th>
</tr>
</thead>
</table>
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
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
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

About 25,000 deepened to enhance capacity
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

Intra linking Projects under progress

Ukai Purna High Level canal
Est. Cost Rs. 159 Cr. Area 9900 Ha.

Spreading Channels to prevent salinity ingress in coastal region

SAUNI project-10860 Cr
To fill 115 reservoirs of Draught Prone Rea

Inter Linking Projects under planning

Par Tapi Narmada Link

Damanganga Sabarmati Chorvad link
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
SUJALAM SUPHALAM PROJECT

14 lift irrigation pipelines planned (1 MAFT.)

LIFT IRRIGATION SCHEME TO UTILISE EXCESS FLOOD WATER

10 pipelines completed (2475 Cusecs)

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

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

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
  - 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

152300 Ha area benefitted
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
## SALIENT FEATURES (Tentative)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>River gorge width</td>
<td>1600 m</td>
</tr>
<tr>
<td>Sub-soil strata</td>
<td>mostly silty sand</td>
</tr>
<tr>
<td>Total length of barrage</td>
<td>1663 m</td>
</tr>
<tr>
<td>Storage capacity</td>
<td>500 MCM</td>
</tr>
<tr>
<td>FRL</td>
<td>(+) 7.50 m</td>
</tr>
<tr>
<td>Nos. of gates</td>
<td>90 (Vertical)</td>
</tr>
<tr>
<td>Size of gates</td>
<td>15.5 m x 9.5 m</td>
</tr>
<tr>
<td>Top width of road bridge</td>
<td>30 m (6-lane road)</td>
</tr>
<tr>
<td>Approach road on left &amp; right bank</td>
<td>10.5 km long</td>
</tr>
<tr>
<td>Left flood protection embankment</td>
<td>24 km long</td>
</tr>
<tr>
<td>Type of embankment</td>
<td>Rock fill type</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Over Exploited</strong></td>
<td>40</td>
<td>23</td>
</tr>
<tr>
<td><strong>Dark</strong></td>
<td>10</td>
<td><strong>Critical</strong></td>
</tr>
<tr>
<td><strong>Gray</strong></td>
<td>63</td>
<td><strong>Semi-Critical</strong></td>
</tr>
<tr>
<td><strong>White</strong></td>
<td>103</td>
<td><strong>Safe</strong></td>
</tr>
<tr>
<td><strong>Saline</strong></td>
<td>07</td>
<td><strong>Saline</strong></td>
</tr>
</tbody>
</table>
Level of Ground Water Development in different parts of the State in 1997 and 2013

<table>
<thead>
<tr>
<th>Particulars</th>
<th>1997</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Exploited &gt;100 %</td>
<td>40</td>
<td>23</td>
</tr>
<tr>
<td>Dark 90-100%</td>
<td>10</td>
<td>06</td>
</tr>
<tr>
<td>Saline &gt;2500 PPM</td>
<td>7</td>
<td>10 (Due to Bifurcation of 7 Talukas)</td>
</tr>
<tr>
<td>Grey 70-90%</td>
<td>63</td>
<td>09</td>
</tr>
</tbody>
</table>
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