Sustainable Water Management
- Goa Initiatives

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PROJECT DIRECTOR
JICA Project. PWD
Goa
## About Goa

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (2011 Census)</td>
<td>14.57 Lakhs</td>
</tr>
<tr>
<td>Urban Population</td>
<td>62.17%</td>
</tr>
<tr>
<td>Area</td>
<td>3702 sq. km</td>
</tr>
<tr>
<td>No. of Districts</td>
<td>2</td>
</tr>
<tr>
<td>No. of Talukas</td>
<td>12</td>
</tr>
<tr>
<td>No. of Towns</td>
<td>14</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>₹ 1.9 Lakhs</td>
</tr>
<tr>
<td>Literacy</td>
<td>87.40%</td>
</tr>
<tr>
<td>Average Rainfall</td>
<td>200-250 cm</td>
</tr>
<tr>
<td>Tourists</td>
<td>28 Lakhs/annum</td>
</tr>
</tbody>
</table>
Present Water Supply Scenario

- 92% supply through these regional piped water supply schemes, balance 8% from spot sources.
- Domestic Consumption ------------------ 80%
- Non-Domestic Consumption --------------- 20%
  (Hotel, Industries, Commercial,
   Defense, Institutions etc.)
## Indicator Benchmarks

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Indicator</th>
<th>As per GOI</th>
<th>Status in Goa state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Coverage of water supply connections</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2.</td>
<td>Per Capita supply of water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Urban Sewered areas</td>
<td>135 lpcd</td>
<td>143 lpcd (average)</td>
</tr>
<tr>
<td></td>
<td>b) Urban Non-Severed areas</td>
<td>70 lpcd</td>
<td>143 lpcd (average)</td>
</tr>
<tr>
<td></td>
<td>c) Rural areas</td>
<td>40 lpcd</td>
<td>82 lpcd (average)</td>
</tr>
<tr>
<td>3.</td>
<td>Extent of metering of water connections</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>4.</td>
<td>Extent of Non Revenue Water (NRW)</td>
<td>20%</td>
<td>42%</td>
</tr>
<tr>
<td>5.</td>
<td>Continuity of Water Supply</td>
<td>24 hours</td>
<td>2-22 hours</td>
</tr>
<tr>
<td>6.</td>
<td>Quality of Water Supply</td>
<td>100%</td>
<td>100% complies CPHEEO standards or above</td>
</tr>
<tr>
<td>7.</td>
<td>Efficiency in redressal of customer complaints</td>
<td>80%</td>
<td>85%</td>
</tr>
<tr>
<td>8.</td>
<td>Cost recovery in water supply services</td>
<td>100%</td>
<td>60%</td>
</tr>
<tr>
<td>9.</td>
<td>Efficiency in collection of water supply charges</td>
<td>90%</td>
<td>95%</td>
</tr>
</tbody>
</table>
Vision

Vision 2025

Optimum utilization of water infrastructure.

Provide 24 x 7 sustainable water supply to all

Supply levels – 100 lpcd to rural areas and 150 lpcd to urban areas
NRW Status in Goa

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present water treatment</td>
<td>464 MLD</td>
</tr>
<tr>
<td>Present level of NRW</td>
<td>42% - 50%</td>
</tr>
<tr>
<td>Non Revenue water/day</td>
<td>195 MLD – 200 MLD</td>
</tr>
<tr>
<td>If NRW Managed within 20%</td>
<td></td>
</tr>
<tr>
<td>NRW quantity</td>
<td>93 MLD</td>
</tr>
<tr>
<td>Additional water available about</td>
<td>110 - 150 MLD</td>
</tr>
</tbody>
</table>
NRW Management

Short Term Measures: one of the experiences

- Monthly meetings with field officers to bring awareness amongst them.
- Replacement of Non-working Water Meters
- Repairs of leaking valves.
- Immediate repairs of pipeline breakdowns.
- Repair of leaking service reservoirs.
- Closure of public taps by giving free tap connections (More than 13,000 nos. of public taps are closed as on today out of 15,000 nos. existing earlier.)
NRW Management
Short Term Measures: Results achieved

- One of the experience with short term measures
- About 16,000 nos. of Non-working Water Meters replaced.
- Number of Leaking pipes, valves, sumps, tanks were repaired.
- Reduction of NRW by 8%.
- Increase in revenue by 12-15%.
NRW Management

Long Term Measures

Capacity building for NRW reduction under Technical Co-operation Project of JICA

- NRW reduction is not one time job, the process is to be institutionalized
- It is a tedious and time consuming process including leakage survey during midnight etc requiring high skills and patience
- In India, this aspect is neglected and no skill and expertise is available
- Training and capacity building of PHE staff through Japan’s Technical Co-operation project is availed by Goa state. In this

- Japanese experts are training the PHE staff for three years.
- A team of 56 Nos. of field staff is formulated
- Three pilot projects are selected having 2000 water connections each
- On the job training is in progress
- The following stage wise processes are being followed
  - Isolation of the pilot area
  - Installation of Flow Meters at strategic locations
  - Calculation of existing NRW in pilot area
  - Identifying leakages in pilot area
  - Rectification of leakages
  - Rechecking NRW in pilot area to ascertain extent of success.
NRW Management

• Additional 10 Nos. of pilot areas are selected to multiply the exercise.
• 31 number of staff availed training in Japan.
• Trainers will train the other staff and NRW control all over Goa will be achieved.
• NRW management to be made as culture and habit of PHE field staff.
• NRW Management Manual is being prepared.
• Long Term NRW management plan is being proposed.
• Incentive scheme is being worked out.
# NRW Management Plan

1. Improvement of measurement system.
2. Water Auditing.
3. Zoning of distribution system and pressure control.
4. Introduction of DMA system.
5. SCADA and Asset management.
6. Good quality water meters.
7. Introduction of latest Technology
   - Spot Billing
   - AMR System
   - Computerized billing service connection material.
8. Awareness
9. Dedicated Organizational setup
Fundamentals of a Zoned System

Water Flows From Lower level to Higher level
Spot Billing
# NRW Management Plan

Awareness among the stake holders is required for the following:

- Process and costs involved in supply of treated water at door step of the user and extent of Subsidy received by them.
- Repair of lacking taps, valves, sumps, tanks etc.
- Avoiding excessive use of water and Judicious use of water.
- Awareness amongst consumers, regarding the service levels norms including supply level to be expected by
- Maintaining hygienic conditions of the service pipeline and to avoid contamination.
- Awareness amongst other utility authorities such as Electricity, Telephone cables, Drainage etc. for not breaking the pipeline network while digging in connection with their utilities.
- Awareness amongst the public to avoid illegal connections and illegal tapping.
- Awareness regarding requirement of the water tariff policy. In order to increase and maintain the service level water utility is required to be self sufficient.
- Awareness amongst the officers of the utilities regarding advantages of controlling NRW.
- Awareness amongst the peoples’ representatives for the above aspects.

Awareness campaign being implemented with the help of press release, radio, TV, cinema theatres, poster, hoardings at bus stands, on buses, BDO meetings etc. Further through JICA Project special awareness programme is taken up.
NRW Management Plan
Dedicated organizational setup

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<tr>
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<tbody>
<tr>
<td>a)</td>
<td>Establishment of central NRW control unit (CNCU) handled by SE under control of CE (PHE).</td>
</tr>
<tr>
<td>b)</td>
<td>Establishment of Regional NRW reduction cells at subdivision level handed by JE/TA (RNRC)</td>
</tr>
<tr>
<td>c)</td>
<td>For 10,000 connections one RNRC.</td>
</tr>
<tr>
<td>d)</td>
<td>Incentive for efficient functioning staff.</td>
</tr>
</tbody>
</table>
NRW Management Plan

• Targeted to reduce NRW levees to 20% from present 40 to 50% within 6 years.
• Reduction of NRW from 20% to 15% in next 5 years and maintain reduced NRW levels on sustainable basis.
• Cost involved in salary of dedicated staff and leak repairs including required material and equipment is recovered within 3 years. Additional revenue generated to the tune of Rs.122 Crores on cumulative basis within 11 years.
NRW Management Plan

• JICA is requested to grant second phase of Technology transfer for strengthening the capacity of the PHE staff for NRW management and control on sustainable basis.
## Water Bill with users & LPCD

<table>
<thead>
<tr>
<th>DIV.</th>
<th>SUB. DIV.</th>
<th>BILL NO.</th>
<th>ISSUE DATE</th>
<th>FROM DATE</th>
<th>AVG. UNITS</th>
<th>CURRENT/FAULT METER READING</th>
<th>PREVIOUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>XVII V</td>
<td>PRK/0165</td>
<td>01/09/06</td>
<td>26/05/06</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>330674</td>
<td>0.75”</td>
<td>06/05/05</td>
<td>11/07/06</td>
<td>100</td>
<td>100</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>CONSUMER CODE</td>
<td>METER SIZE</td>
<td>METER FIX DATE</td>
<td>TO DATE</td>
<td>MIN. UNITS</td>
<td>SEC. DEPOSIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRK 01 0055 A</td>
<td>DO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MR. PANDURANG S. NARVEKAR  
H. NO. 639, INALIM BETIM  
PENHA-DE-FRANCE

**USERS:** 2  
**DAYS:** 46  
**LPCD:** 163

**RECEIPT NO.**  
**DATE**  
**CHEQUE NO.**  
**DATE**  
**TOTAL**

**RUPEES SEVENTY SEVEN ONLY**  
**RECEIVER’S SIGNATURE**  
(Please see overleaf for water tariff & meter rent)

**WARNING:** IF ARREARS EXCEED THE SECURITY DEPOSIT, THE SUPPLY IS LIABLE TO BE DISCONNECTED.
Low revenues → Weak finances
Customer dissatisfaction → Deterioration of assets
Poor services → Neglect of maintenance
By creating awareness regarding the water supply service levels, Judicious use of water, by effective control and management of NRW levels on sustainable basis, Goa state is in position to achieve the goal of 24 x 7 water supply for all population on sustainable basis within a span of 3 years and become a model state in water supply sector with the support of all the stakeholders.
THANK YOU