Mapping & Auditing Multiple Uses of Water Services in Krishna Western Delta, AP, India using MASSMUS Methodology

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Andhra Pradesh
- 27.4 m ha geographical area
- 90 million population
- 70% depends on agriculture
- 1300 cu m per capita availability
- 3 million pump sets

World >>> India >>> Andhra Pradesh

MATHADIVAGU PROJECT
PEDDAVAGU (NEELWAI) PROJECT
GOLLAVAGU PROJECT
RALIVAGU PROJECT
POLAVARAM PROJECT
MUSURUMILLI RESERVOIR SCHEME
PUSHKARAM LI SCHEME
TADIPUDI LI SCHEME
MADHAVABABU LIS
ORISSA
MAHARASTRA
SRSP
NIZAM SAGAR
DUMMUGUDEM HE PROJECT
GLIS
YELLAMPALLY LIS
PULICHINTALA PROJECT
JURALA PROJECT
BHIMA LIS
THOTAPALLI BARRAGE
PEDDAGEDDA RESERVOIR
TARAKARAMA THIRTHA SAGARAM
JANJAVATHI RESERVOIR
VAMSHADHARA PROJECT
INCHAMPALLI PROJECT
SINGAREDDYPALLI HEP
ANDHRA PRADESH
GUNDLAKAMMA RESERVOIR SCHEME
RIVER SRISAILAM BARRAGE
TAMIL NADU
POLAVARAM PROJECT
PUSHKARAM LI SCHEME
TADIPUDI LI SCHEME
GUNDLAKAMMA RESERVOIR SCHEME
VAMSHDHARA PROJECT
HANDRI NIVA SUJALA SRAVANTHI
galeru nagari sujala srauvathi
KALWAKURTHY LIS
NETTEMPADU LIS
THOTAPALLI RESERVOIR SCHEME
BHIMA LIS
PULICHINTALA
ALISAGAR LIS
GUTHAPA LIS
PENDING PROJECTS IN KRISHNA, GODAVARI AND OTHER BASINS

VISION OF THE IRRIGATION SYSTEM AND FUTURE SCENARIO

(1) PLAN FOR MODERNISATION ANDバレーション
(2) INTEGRATING SOM OPTIONS
(3) WATER SERVICES
(4) OPERATION IMPROVEMENTS
(5) DEMAND for OPERATION
(6) MANAGEMENT UNITS
(7) USERS & SERVICE TO USERS
(8) WATER SHARES and BENEFITS
(9) COST of OPERATION

(0) RAP
(1) CAPACITY & SENSITIVITY
(2) PERTURBATIONS
Accounting for rainfall

Drainage input

- Nallamada drain is the more important for external inputs from the NSP CA.
- One point of measurement inside the KWD CA.
- Discharge at this point was 1542 MCM 54 TMC [June 2008 May 2009]
- Conservative figure for external input taken as 1000 MCM 35 TMC
Water inputs

Gross command area: 272000 ha.
Utilisable Rainfall: 800 mm
(out of 1070 mm average last 10 years)

i. Rainfall of: 2176 MCM – 77 TMC
ii. Irrigation actual: 3400 MCM – 120 TMC
iii. Drainage from upstream: 1000 MCM – 35 TMC

Total: 6576 MCM – 232 TMC

Share of water use for different services in Krishna Western Delta

<table>
<thead>
<tr>
<th>Service</th>
<th>Water use (MCM)</th>
<th>Water use (TMC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>1565.1</td>
<td>55.5</td>
</tr>
<tr>
<td>Domestic water</td>
<td>76.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Fisheries</td>
<td>7.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Homestead garden</td>
<td>58.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Perennial vegetation</td>
<td>37.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Animals</td>
<td>47.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Environmental flows</td>
<td>115</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Total (Surface + Ground)</strong></td>
<td><strong>1914</strong></td>
<td><strong>67.6</strong></td>
</tr>
</tbody>
</table>

WATER BALANCE in KWD, MCM, (%)
**Net water uses**

Total Water Uses = 1914 MCM 67.6 TMC
(irrigation, animals, domestic, perennial vegetation, environmental flow)

Water not used 4662 MCM 165 TMC

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**Calculated ground water recharge**

- Drop of water table month after canal closure = 58 mm per day
- Clay-loam to Sandy-clay-loam: porosity 8%
- Daily recharge = 58x0.08 = 4.6 mm day
- Duration of recharge during Kharif paddy: 100 days.
- Total cropped area: 220,000 ha
- Volume = 4.6x100x220,000ha x 10 = 1012 MCM 35.7 TMC

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**Groundwater recharge**

Groundwater recharge 1012 MCM 35.7 TMC
partition between:

- containing salinity on the coastal strip 115 MCM 4 TMC
- beneficial for domestic use 10%
- NON BENEFICIAL (water logging & real losses) = 796 MCM 28.1 TMC

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**Share of Values, Benefits in USD Million**

- Fishery in large water bodies, 103.54, 13%
- Environmental flows, 25.00, 3%
- Animals, 147.32, 18%
- Perennial natural vegetation, 2.05, 0%
- Domestic water, 20.69, 3%
- Fields (crops), 512.23, 62%
- Homestead garden, 6.13, 1%
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**LAND & WATER PRODUCTIVITY**

- Land Productivity has increased from 988$/ha in 2005 to 2300$/ha (Price 7.3 to 12.7 IRs kg + 73% and introduction of Maize)
- With approx the same input 2180 MCM in 2005 and 1956 MCM in 2009, water productivity has increased from 0.0914 $/m3 to 0.26 $/m3 in 2009.

**COSTS INVOLVED TO PRODUCE SERVICES IN KWD**

- Budget = 280 Rs/year/ha
- 5.24 $/year/ha
- Tax collected = 110 Rs/year/ha
- Modernization works = 1366 Rs/year/ha
Results of crop water management experiments in rice

Increase in yield: 8 – 28%
Reduction in water use: 33 – 60%
Increase in water productivity: 61 – 167%

Irrigation Performance Assessment Krishna Western Delta

- Water allocation should take into account crop water demand and average effective rainfall, based on 20-year average meteorological data.
- On an average, the following water savings can be achieved in Krishna Western Delta:
  - Krishna Western Bank canal command: 40%
  - Nizampatnam canal command: 33%
  - Komnamur canal command: 55%
  - High Level canal command: 16%
  - Appapuram Main canal command: 22%
Irrigation Efficiency on Monthly Basis in KWD

Reclamation of Saline & Water Logged Lands

Water measurement structures
The existing structures have been designed to regulate the canal water and work properly.
These structures are however completely unsuitable to quantify the amount of canal water released in major irrigation canals.

The Vision
System: Sustainable intensive agriculture with service oriented approach with a broad vision to derive assured water for Rabi needs.
Basin: Water transfer from KWD water savings to water deficit commands under proper state arrangements and with compensation.

With Holistic Cost effective Structural and Management Modernization.
RECOMMENDATIONS

1. Focused study with recheck on the data collection and analysis for further revalidation.
2. Modernization of hardware and management for sustainability of irrigated agriculture.
3. Effective management is the need of the hour for assured water supply for rabi needs to achieve 200% Irrigation Intensity.
4. Studies relating to equity in different parts of KWD to monitor supply to tail ends
5. To establish relationships with other agencies to explore potential development of schemes for waste water reuse.