New Trends in Water Management

M.MURALIDHAR
DEPUTY EXECUTIVE ENGINEER
WRD,BAPATLA
WATER MANAGEMENT IS THE ACTIVITY OF PLANING, DEVELOPING, DISTRIBUTING AND OPTIMUM USE OF WATER RESOURCES UNDER DEFINED WATER POLICIES AND REGULATIONS.

IT INCLUDES MANAGEMENT OF

- DRINKING WATER
- INDUSTRIAL WATER
- SEWAGE OR WASTE WATER
- WATER RESOURCES
- FLOOD PROTECTION
- IRRIGATION
- GROUND WATER TABLE
India’s Resources

1) One Sixth of Worlds Population i.e. 16.7%
2) One Sixth of Worlds Live Stock
3) One fortieth of world land area(2.45%)

Supported by 4% of World’s Water Resources
India’s Water

మాట దీనిలో వాటి వనరలు

- Water is finite - వాటి వనరలు మినము
- Annual precipitation 4000 BCM
- Monsoon months precipitation 3000 BCM
- 75% of the total precipitation occurs in just 4 months and even 50% of the precipitation occurs in about 15 days and in less than 100 hours
- Average annual flow available is 1869 BCM with 1123 BCM as utilizable
Water Availability - విధానాలు

Total Precipitation - వర్ష వంతం 4000 BCM

Average Natural run-off సాస్తి విద్యుత్ ప్రయోగం 1869 BCM

Total utilizable water resources 1123 BCM

Surface water ఉపాయ వాయ 690 BCM

Current utilization 450 BCM (65%)

Ground Water భక్ర ప్రయోగం 433 BCM

243 BCM (58%)
PROBLEM OF WATER STRESS

• As per existing water resources per capita availability of water varies from 300 to 13754 (Cum)

• National per capita availability in 2001 is 1092 Cum

• Now in 2016 this national average is 851Cum

• By 2050 it may further reduce to 661 Cum
WHAT SCARES US?

- *Water Scarcity/Stress arises from-*
  - Ever-rising & Competitive Demand of Water from multiple sectors;
  - Prediction of Climatic Change;
  - Indiscreet use of Water;
  - Disposal of untreated effluents into water bodies;
WATER DEMAND

• About 80% of the developed water for agriculture

• 56% of the food grain production through irrigated agriculture

• With increase in water use efficiency and competing demands for other sectors the demand pattern is likely to change over years
# Changing Water Demand

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Uses</th>
<th>Year 1997-98 (Km³)</th>
<th>Year 2010 (% of total demand)</th>
<th>Year 2025 (% of total demand)</th>
<th>Year 2050 (% of total demand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Irrigation</td>
<td>524</td>
<td>78</td>
<td>72</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>Domestic</td>
<td>30</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Industries</td>
<td>30</td>
<td>5</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Power</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Inland Navigation</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Flood Control</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Environment (Afforestation)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Environment (Ecology)</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Evaporation losses</td>
<td>36</td>
<td>2</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>629</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Irrigation Development

- Geographical Area: 328.73 Mha
- Total Cultivable Land: 181.98 Mha
- Ultimate Irrigation Potential: 139.89 Mha
- Potential Created (Mar 12): 113.53 Mha
  - Major & Medium: 47.97 Mha
  - Minor: 65.56 Mha
- Gross Sown Area: 195.25 Mha
- Gross Irrigated Area: 91.53 Mha
- Net Sown Area: 140.80 Mha
- Net Irrigated Area: 65.26 Mha
- Rainfed cultivated Area: 86.42 Mha
Sources of Irrigation

(Area in Mha)

- 21.72 (40%)
- 11.55 (21%)
- 15.98 (29%)
- 2.89 (5%)

- Canals
- Tanks
- Tube Wells
- Other Wells
- Other Sources
• IN ANDHRAPRADESH NEARLY 2 CR. ACERS OF FERTILE LAND IS AVAILABLE.

• OUT OF WHICH ONLY 1 CR. ACERS OF LAND GETTING SUPPLY OF IRRIGATION WATER.

• DUE TO THE CLIMATE CHANGES AND SCANTY RAINS WE ARE UNABLE TO SUPPLY IRRIGATION WATER TO 30 LAKH ACRES NEARLY
• DUE TO THE INCREASED IRRIGATION, INDUSTRIES, DRINKING WATER NEEDS, PEOPLE ARE MORE DEPENDENT ON GROUND WATER

• THERE BY RESULTING DEPLETION OF GROUND WATER RATE INCREASED A LOT IN RECENT YEARS

• AT SOME LOCATIONS THE GROUND WATER TABLE IS AT 1000 FT DEPTH.
• IN OUR ANDHRAPRADESH AVAILABLE WATER IS LIKE THIS

• SURFACE WATER 1557 TMC AMONG THIS 1299 TMC ARE IN USAGE, BALANCE WATER AVAILABLE IS ONLY 258 TMC

• AVAILABLE FLOOD WATER 3525 TMC AMONG THIS ONLY 50 TMC IS IN USAGE.

• GOVT HAS PREPARED PLANS TO USE 500 TMC OF FLOOD WATER
• THE AMOUNT OF GROUND WATER RECHARGED YEARLY IS 661 TMC

• OUT OF WHICH 245 TMC ARE USING FOR DIFFERENT PURPOSES LIKE DRINKING WATER, INDUSTRIES, AND FOR IRRIGATION

• TO OVERCOME THIS SCANTY OF WATER GOVT OF A.P TAKEN FOLLOWING STEPS.
• FOR ANY SURFACE WATER RAIN IS THE MAIN SOURCE

• FOR THIS WE NEED TO PLAN CATCH EVERY RAIN DROP AND STORE IT IN GROUND

• WE CAN USE IT WHEN EVER NECESSARY THROUGH BOREWELLS AND OPEN WELLS
• THE RAINFALL RECEIVED CAN BE ANALYSED AS follows

• 50% WASTED DUE TO EVOPORATION, INTERCEPTION AND SOIL MOISTER.

• 40% CONVERTED AS SURFACE WATER AND AVAILABLE IN RIVERS AND VAGUS

• 10% IS CONVERTED AS GROUND WATER
• FROM THE 40% OF SURFACE WATER, IF WE STORE 20% IN BIG TANKS AND RESERVOIRES.

• AND THE REMAINING 20% IF WE STORE IN RECHARGE UNITS AND IF WE FURTHER INFILTRATE 10% MORE IN TO GROUND THROUGH RECHARGE UNITS, THEN WE CAN OVERCOME FROM THE PRESENT SITUATION.
• DESILTING OF TANKS
• WATERSHED APPROACH
• CHECKDAMS
• FARM PONDS
• REINSTATE THE LIFT IRRIGATION SCHEMES
• REAL TIME GROUND WATER READINGS
• INTER LINKING OF RIVERS
• REPAIRS TO MI TANKS
• PERCOLATION PITS
CHECK DAMS

Water conservation and groundwater recharge techniques

Water harvesting cum supplementary irrigation techniques
• IMPROVES GROUND WATER TABLE

• PREVENTS ENTRY OF SILT IN TO MAIN RESERVOIRES

• USEFULL FOR SMALL SCALE IRRIGATION
FARM POND
• DEPENDING ON THE AREA, THERE IS A BOREWELLS WHICH CAN SUPPLY 5000 TO 100000 LAKH LITERS OF WATER PER HOUR

• ASSUME A BOREWELL WHICH GIVES 10000 LITERS PER HOUR, FROM THIS NOW WE CAN CALCULATE HOW MUCH QUANTITY HE CAN USE FOR HIS PER ONE CROP SEASON
• FOR PADDY CROP PERIOD IS 120 DAYS
• AFTER DEDUCTING RAINY DAYS, ASSUME IF WATER IS USED FOR 30 DAYS
• POWER AVAILABLE PER DAY IS 7HRS
• 7x10000 = 70000 LITERS PER DAY
• 30x70000 = 21 LAKH LITERS
• BUT WE ARE NOT TAKING ANY MEASURES FROM OUR SIDE TO RECHARGE THE USED GROUND WATER.
• FOR THIS A FARM POND IS A BETTER CHOICE TO RECHARGE THE GROUND WATER TO SOME EXTENT.
• FARM POND CAN BE OF SIZE 6x8, 12x4, AND 7x7 AND DEPTH CAN BE OF SIZE 1 METER
• FOR THE ABOVE FARM POND SIZES WE CAN STORE UP TO 50000 LITERS
• IF IT FILLS 10 TIMES IN ONE YEAR IT CAN HOLD 5 LAKHS LITERS OF WATER
• OUT OF 5 LAKHS IF 2 LAKHS EVAPORATED, REMAINING 3 LAKHS MAY BE RECHARGED AS GROUND WATER
REPAIRS TO MI TANKS
## District Wise Minor Irrigation Tanks with Ayacut in Acres

<table>
<thead>
<tr>
<th>Sno.</th>
<th>District</th>
<th>Tanks having ayacut &gt; 100 Ac.</th>
<th>Tanks having ayacut &lt; 100 Ac.</th>
<th>Total</th>
<th>Ayacut Irrigated in Kharif 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>Ayacut</td>
<td>No.</td>
<td>Ayacut</td>
</tr>
<tr>
<td>1</td>
<td>SRIKAKULAM</td>
<td>915</td>
<td>96431</td>
<td>7639</td>
<td>178955</td>
</tr>
<tr>
<td>2</td>
<td>VIZIANAGARAM</td>
<td>944</td>
<td>110943</td>
<td>8318</td>
<td>157376</td>
</tr>
<tr>
<td>3</td>
<td>VISAKHAPATNAM</td>
<td>232</td>
<td>157798</td>
<td>3111</td>
<td>72867</td>
</tr>
<tr>
<td>4</td>
<td>EAST GODAVARI</td>
<td>263</td>
<td>91012</td>
<td>1253</td>
<td>39403</td>
</tr>
<tr>
<td>5</td>
<td>WEST GODAVARI</td>
<td>335</td>
<td>81246</td>
<td>1054</td>
<td>31409</td>
</tr>
<tr>
<td>6</td>
<td>KRISHNA</td>
<td>248</td>
<td>78790</td>
<td>663</td>
<td>24903</td>
</tr>
<tr>
<td>7</td>
<td>GUNTUR</td>
<td>81</td>
<td>22478</td>
<td>213</td>
<td>9230</td>
</tr>
<tr>
<td>8</td>
<td>PRAKASHAM</td>
<td>339</td>
<td>121949</td>
<td>551</td>
<td>18293</td>
</tr>
<tr>
<td>9</td>
<td>SPSR NELLORE</td>
<td>722</td>
<td>246524</td>
<td>984</td>
<td>36328</td>
</tr>
<tr>
<td>10</td>
<td>YSR KADAPA</td>
<td>234</td>
<td>75593</td>
<td>1542</td>
<td>32279</td>
</tr>
<tr>
<td>11</td>
<td>KURNOOL</td>
<td>157</td>
<td>68342</td>
<td>454</td>
<td>11818</td>
</tr>
<tr>
<td>12</td>
<td>ANANTAPUR</td>
<td>303</td>
<td>89897</td>
<td>2199</td>
<td>52039</td>
</tr>
<tr>
<td>13</td>
<td>CHITTOOR</td>
<td>668</td>
<td>163753</td>
<td>7395</td>
<td>136554</td>
</tr>
<tr>
<td></td>
<td>SUB TOTAL</td>
<td>5441</td>
<td>1404756</td>
<td>35376</td>
<td>801454</td>
</tr>
<tr>
<td></td>
<td>Anicuts &amp; open head channels</td>
<td>661</td>
<td>354234</td>
<td>661</td>
<td>354234</td>
</tr>
<tr>
<td></td>
<td>GRAND TOTAL</td>
<td>6102</td>
<td>17,58,990</td>
<td>35,376</td>
<td>8,01,454</td>
</tr>
</tbody>
</table>
Roof Rain Water Harvesting

• Roof Rain Water Harvesting
• Land based Rain Water Harvesting
• Watershed based Rain Water harvesting
  • For Urban & Industrial Environment –
    • Roof & Land based RWH
      • Public, Private, Office & Industrial buildings
      • Pavements, Lawns, Gardens & other open spaces
Rain Water Harvesting – Advantages

1. Provides self-sufficiency to water supply
2. Reduces the cost for pumping of ground water
3. Provides high quality water, soft and low in minerals
4. Improves the quality of ground water through dilution when recharged
5. Reduces soil erosion & flooding in urban areas
6. The rooftop rain water harvesting is less expensive & easy to construct, operate and maintain
7. In desert, RWH only relief
8. In saline or coastal areas & Islands, rain water provides good quality water
ANDHRA PRADESH GROUND WATER DEPARTMENT
Types of Wells

- Dug Well
- Bore Well
- Tube Well
- Filter Point Well

Influence of Pumping on Ground Water
Groundwater Monitoring Network in Andhra Pradesh purpose built Piezometers

Legend
- Piezometer
- District HeadQuarter
- District boundary

Piezometer with DWLR

Piezometer Location

GROUND WATER DEPARTMENT
INTER LINKING OF RIVERS
THANQ