WATER IS STATE SUBJECT

- India has 29 States and 7 Union Territory Areas
- As per the Constitution of India, India is an "Union of States" with State & Central Government in Power.

- Water including irrigation & canal, drainage and embankments, water storage and water power
- Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest.

ADMINISTRATIVE STRUCTURE

- MoWR, GoI
- State Government
- Local Self Governments

- Policy Matters
- Interstate Rivers / Projects
- Water Resources Department
- Ground Water Board
- Projects having Irrigable Command less than 100 ha
• 0.7% of surface of earth is covered with water.
  • Out of which 3% is Fresh Water
  • Out of which, 0.3% is Surface Water
  • Out of which, 2% is available in Rivers

• Receives Only 4% (4000BCM) water, of which available is 1869 BCM
  • Of Which utilizable water is 11238CM (Surface=690 & Ground=433)
  • On which 2.45% land and 17.5% population of world is dependent

• Only 4% (163.82 cubic km) of that belongs to Maharashtra
  • Of which 77% (125.94 cubic km) is available as per WDT awards
  • Ground Water Resource is 33.8 cubic km
  • On which 9.4% land & 9.3% population of India is dependent.

• 70% surface of earth is covered with water.
  • Out of which 3% is Fresh Water
  • Out of which, 0.3% is Surface Water

FACTS RELATED TO MAHARASHTRA

Area = 30.77 million ha
• 9.4% of India
• ~ area of Italy (30.10 mha)

Population of State = 115 million
• 9.3% of India
• ~ population of Mexico (117 million)

GDP = $370 billion
• 14.5% of India
• ~GDP of United Arab Emirates ($378 billion)

Water Availability = 1.64 cub km
• 4% of India
• ~Water available in UK

### WATER AVAILABILITY IN STATE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the River Basin</th>
<th>Geographical Area (Mha)</th>
<th>% of State’s Cultivable Area (Mha)</th>
<th>Cultivable Area (Mha)</th>
<th>Average Annual Availability</th>
<th>% dependable Yield (MCm)</th>
<th>% W.R.T. State</th>
<th>Permissible Use as per Tribunals (MCm)</th>
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<tbody>
<tr>
<td>1</td>
<td>Godavari</td>
<td>15.43</td>
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<td>Tapi</td>
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</tbody>
</table>

### WATER USE

#### Water Use at State Level

- Domestic: 22%
- Industrial: 22%
- Agricultural: 62%
- Drinking: 1%
- Irrigation: 1%
- Power Generation: 1%

### BASIN PLANNING - IDC TO RBA

- Maharashtra Krishna Valley Development Corporation, Pune (1996)
- Vidarbha Irrigation Development Corporation, Nagpur (1997)
- Tapi Irrigation Development Corporation, Jalgaon (1998)
- Konkan Irrigation Development Corporation, Thane (1998)
- Godavari Marathwada Irrigation Development Corporation, Aurangabad. (1998)

- Construction and Management of Irrigation Projects is done by IDC’s.
- Recovery of O&M from Revenue of I & NI is expected
Hydro Electric Projects:
- Installed Capacity = 3600 MW
- Small Hydro Policy – PPP Based Projects upto 25MW
- Koyna Hydro Project
  - 1960 MW
  - Lake Tapping
- Ghatghar Hydro Project
  - Reversible Turbines
  - Roller Compacted Concrete Dam

Kharland Organization:
- Costal Area = 720 km length
- Issues = Salt water intrusion
- Works of Kharbhumi Protection Works
- Small Embankments

DIRD Organization:
- Established in 1916
- Study of Water logging and land reclamation works
- Study of soil Salinity
- Irrigation Research
- Monitoring Ground Water in command Area

Reforms in Water Management
1. Policy and Legal Framework

- Bombay Irrigation Act, 1879
- Bombay Canal Rules, 1935
- Maharashtra Irrigation Act, 1976
- Irrigation Development Corporation Acts (5 No’s)
- MMISF Act, 2005 & Rules, 2006: Participatory Irrigation Management
- MWRRA Act, 2005 – MWRRA – Apex Quasi-Judicial Body
- Clearance of Projects wrt ISWP
- Water Entitlements for Drinking & Industrial Use
- Volumetric water tariff for I & NI water use
- Telescoping Rate structure for NI Use
- Dispute Resolution

- As per NWP & SWP-Basin development approach
- Integrated multi-disciplinary approach:
  - Geography, demography, Topography, Soils, Geology, Hydrogeology, Agriculture, Hydrology and hydrometeorology, Irrigation, Water Conservation, drinking water, Industrial use, Import and export of water into/ outside basin, Environment (water quality, sanitation), Hydro power, Ground water, Natural disasters (flood, seismicity, droughts), Legal (inter State agreements, Tribunals)
  - Involvement of all stakeholders (Government Organizations, Farmers, Industries etc.)
  - Demand and supply for present and future
  - Ecological needs
- 5 River Basins – ISWP Ready for Godavari & Krishna Basin
2. Water Resources Management

- Tank and Well Irrigation – Bara Motechi Vihir (Satara), Malgujari Tanks (Bhandara)
- Nira, Khadakwasala, Godavari Irrigation System (1885 to 1930)
- Canals and Water Aqueduct
- Post-Independence Development (After 1947) – Ujani, Jayakwadi, Gosikhurd

Water Resources Department (WRD) ICA > 250 Ha

- Major Projects = ICA > 10,000 Ha
- Medium Projects = ICA 2,000-10,000 Ha
- Minor Projects = ICA < 2000 Ha

28+66 = 94 Projects
188+82 = 270 Projects
2987+311 = 3198 Projects
3203 Completed + 359 Ongoing = 3562 Projects

Maharashtra having highest number of dams (1693+152 = 1845) out of 5,192 dams

Source: National Register of Large Dams 2014
STATE IRRIGATION POTENTIAL

LIFT IRRIGATION - NECESSITY

LIFT IRRIGATION

- Purandar LIS
  - 29,496 ha; 4 TMC
  - 359m, 6 Stage Lift
- Tembhu LIS
  - 80,472 ha; 22.13 TMC
  - 271m, 5 Stage Lift
- Krishna-Koyana LIS
  - 105,127 ha; 26.78 TMC
  - Takari (219m, 4 Stage)
  - Mhaisal (269m, 5 Stage)

WATER AUDIT (SINCE 2003-04)

- systematic & scientific examination of water accounts
- determining water used in different sectors and losses.
- Effective tool for realistic understanding & assessment of performance of water use against planning.
- Identifying causes for low Irrigation System Performance & take remedial action
- Office of “Chief Auditor, Water and Irrigation” is created in 2017 for Water Audit of all types of water use. (Irrigation, Drinking, Industrial etc)
- Annual Report is being prepared and submitted to State Legislature
**Benchmarking (Since 2002-03)**

- Systematic process for securing continual improvement through comparison with relevant and achievable internal or external norms and standards.
- Maharashtra: Carry out benchmarking of Major Projects
- **Indicators**
  - System Performance: Annual Irrigation Water Supply per unit Irrigated Area
  - Financial Indicators: O & M Cost per unit Area
  - Agricultural Productivity: Output per unit Irrigated Area
  - Environmental Aspects: Land Damage Index
  - Social Aspects: Equity Performance: Head, Middle & Tail

**Participatory Irrigation Management**

- WUA Mandatory for all ongoing projects
- WUA, DLA, CLA & PLA
- WUA Size = 500 ha
- Tail to Head Irrigation
- Concessional Water Rates
- Volumetric Water Supply; 50% Refund of water charges
- Women Participation
- Training at WALMI
- Crop Freedom
- Waghad Project is handed over to PLA
- Maharashtra Won Many awards for PIM

**Upcoming Areas**

- River Front Development Projects
- Water Transportation
- River Linking
- Upgradation and Modernization of Old Irrigation Infrastructure
3. Information and Communication Technology

- Pilot in Krishna Basin
- AWS installed
- Reservoir Water Level and Discharge Recorders
- River Gauge Stations
- Get prior information of rainfall, runoff
- RoS & GoS Prepared
- Integrated Basin Flood Management

### USE OF DRONES
- Crop Assessment
- Asset Management
- River Encroachment
- Sedimentation Survey

### DRONE SURVEY METHODOLOGY
- Identify Survey area and purpose
- Flight Planning – Lat-Long, Flight Route, Accuracy, GCP
- Drone Survey
- Image Processing, creating orthomosaic, geo-referencing, DEM
- Addition of Layers e.g.: Village Map, Contour map etc.
- Carry out Analysis e.g. Crop Assessment, Sedimentation
- Submission of Reports and Maps
Unauthorized Motor in Canal

Unauthorized Pipeline in Submergence Area

Unauthorized Wells in Submergence Area

Unauthorized storage along Submergence (encroachment)

**BENEFITS OF DRONE**

- Drone Survey is, Fast, Accurate, Transparent, Less costly and Effective
- Real Time control on Irrigation Rotation
- Capturing of evidence
- Control on unauthorized water use
- Control on filed staff
- Realistic assessment of crop and area; increase in revenue collection
MWRRA made mandatory micro irrigation for perennial crops such as sugarcane, banana and horticulture.

Initially notification is applicable to following eight projects: 1) Tembhu LIS 2) Bhima(Ujani) 3) Mula 4) Lower Manar 5) Hatanur 6) Upper Pus 7) Kanholi(nala) 8) Amboli (Sindhudurg)

After June-2018, water for perennial crops will be provided through micro irrigation only in these projects.

Based on this experience, micro irrigation will be made mandatory to other projects after June-2019.