“The City the earth needs”

...is thirsty for

innovative water management
The Earth’s fresh water is limited.
Fresh water

is stored in aquifers, surface waters and the atmosphere.
The water from the oceans needs to be desalined before we can use it.

Today this technology is still very expensive.
The water cycle
• Solar energy drives evaporation of water from oceans, lakes, moisture in the soil, and other sources of water.

• Evaporation is a critical component of the water cycle, which is responsible for clouds and rain.

• In hydrology, evaporation and transpiration (which involves evaporation within plant stomata) are collectively termed evapotranspiration.

• Evapotranspiration is a significant water loss from a watershed. Types of vegetation and land use significantly affect evapotranspiration, and therefore the amount of water leaving a watershed.
Water covers about two-thirds of the Earth's surface.

3 km in height if spread over the earth.

Lakes, soil moisture, water vapour, wetlands, rivers, etc. constitute 0.389% of the total water.

Fresh water составляет 97.476% of the total water.

Of the fresh water, 69.56% is frozen, and 30.06% is groundwater.

Only 2.5% of the world's water is not salty.
About 20% is in remote areas, the rest arrives at the wrong time and place, as monsoons and floods.

Humans have available less than 0.08% of all the Earth's water. Yet over the next two decades our use is estimated to increase by about 40%.
Where is the scarcity?

Predicted water scarcity and stress in 2025
There are several reasons for the water crisis:

- Rise in population and living standards.
- Inefficient irrigation drains out water resources.
- Pollution reduces usable supply.
- Uneven distribution in space and time, much of the rain falls upon inaccessible spaces.
Visible results of the water crisis are:

- **Inadequate** access to safe drinking water by an estimated 1.1 billion people.

- Groundwater **over-extraction** leading to diminished agricultural yields and watertables drastically dropping.

- **Overuse** and pollution of water resources is harming biodiversity.

- Regional **conflicts** over scarce water resources sometimes resulting in war.

- **Worldwide unequal** distribution between countries, rural-urban & rich-poor.
### World wide pattern of Water Use

<table>
<thead>
<tr>
<th></th>
<th>Global</th>
<th>Industrialised Countries</th>
<th>Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>65%</td>
<td>46%</td>
<td>87%</td>
</tr>
<tr>
<td>Industry</td>
<td>25%</td>
<td>41%</td>
<td>7%</td>
</tr>
<tr>
<td>Domestic</td>
<td>10%</td>
<td>13%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Water Situation in India

• More than 60,000 villages without a source of drinking water.

• One million children die of diarrhoea every year due to bad water.

• Traditional tanks and ponds in disuse.

• Communities not in control of water.

• Ground water extraction far exceeds recharge.

• Farmers utilize 85% of water.

• Free electricity, subsidies, green revolution has doubled water needs.
Agriculture, Irrigation and Food Security

- Irrigation takes 65% of usable water (increasing 5 times within a century)

- More than 50% of food comes through irrigation in countries like China, India and Indonesia.

- Most new agricultural land depends on unsustainable water use.

- Land is lost due to:
  - salinity & silting of reservoirs,
  - large dams and displacement of people,
  - spiralling costs and environmental concerns,
  - growing demands from industry & cities and population explosion.
In India 3000 lts. of water is needed to produce 1 kg. of rice
A reminder

Civilizations have disappeared because of unavailability of fresh water supply.

🌞 Dolavira excavation site
Industrial Water Use in India

- 40 – 67 billion cubic meter per year.

- Discharge of wastewater pollutes good water.

- Increasing demand – Met by shift from agriculture.

- No incentive for reducing consumption:
  - Low prices
  - Pollution not taken into account
  - Opportunity cost not considered.
## Estimated water need for one individual – urban scenario, as per CPWD standards

<table>
<thead>
<tr>
<th>Use</th>
<th>Liters/day/person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking</td>
<td>3</td>
</tr>
<tr>
<td>Cooking</td>
<td>4</td>
</tr>
<tr>
<td>Bathing</td>
<td>20</td>
</tr>
<tr>
<td>Flushing</td>
<td>40</td>
</tr>
<tr>
<td>Washing clothes</td>
<td>25</td>
</tr>
<tr>
<td>Washing utensils</td>
<td>20</td>
</tr>
<tr>
<td>Other uses</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>137</strong></td>
</tr>
<tr>
<td>(Range: 50-135 l/day)</td>
<td></td>
</tr>
</tbody>
</table>

In reality less than 85 LPD is made available in most Urban centers
Estimated water need for one individual – urban scenario, as per CPWD standards

In Tamil Nadu Rural areas as per TWAD regulation standards:

45 LPD must be made available.

Due to the poor piping quality most end user only receive half this amount.