
US 602 Project
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PROBLEM STATEMENT:

# WATER SCARCITY

ECONOMIC DEVELOPMENT OF WATER MANAGEMENT

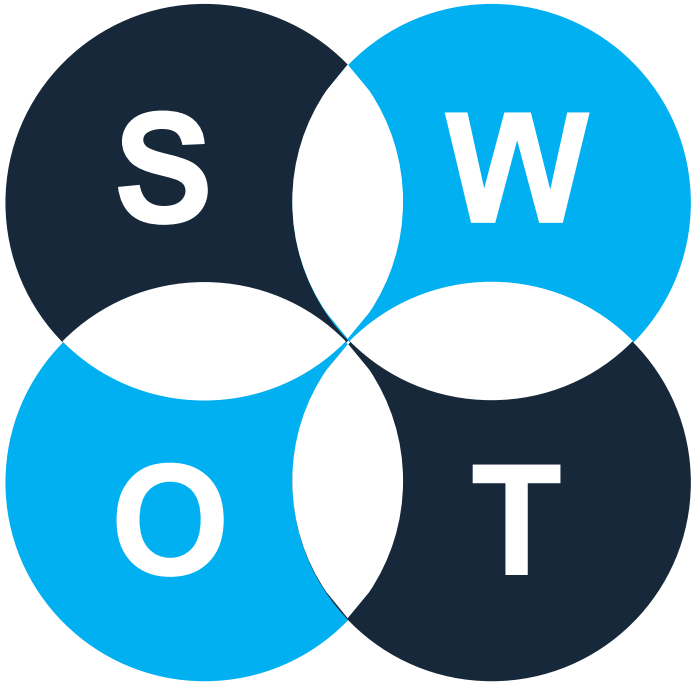
# WHY WATER SCARCITY?

Safe and readily available water is important for public health, whether it is used for drinking, domestic use, food production or recreational purposes. Improved water supply and sanitation, and better management of water resources, can boost countries' economic growth and can contribute greatly to poverty reduction.

The scarcity of water has seen the city's main reservoirs run dry. Borewells are depleted and the groundwater levels have fallen sharply. Tankers have become the primary source of water for the population. The dire state has been attributed to the failure of the northeast monsoon on which the city is heavily reliant.

# SWOT ANALYSIS

- Largest automobile hub with great business opportunities
- Major submarine telecommunication networks
- Highest Literacy rate of 90.33% *(census 2011)* among metropolitan cities
- Better medical and tourism facilities




- No reliable water source and WATER SHORTAGE
- Lack of NMT facilities and high traffic
- Insufficient dump yards and waste processing units
- Flooding and water logging in streets and subways due to heavy rains

- All modes of well-planned Infrastructure
- Public-private participation due to availability of private stakeholders
- Economic growth oriented reforms
- Latest architectural changes

- Water scarcity
- Automobile Pollution
- Overcrowding in certain pockets
- Decrease in manufacturing industry
- Limited infrastructure expansion possibility

# PAST SOLUTIONS

## 1. DESALINATION


**1. Seawater Nemmeli Desalination Plant**
Output capacity: 100 mld

**2. ABENGOA Desalination Plant, Minjur**
Output capacity: 100 mld

UPCOMING PROJECT:

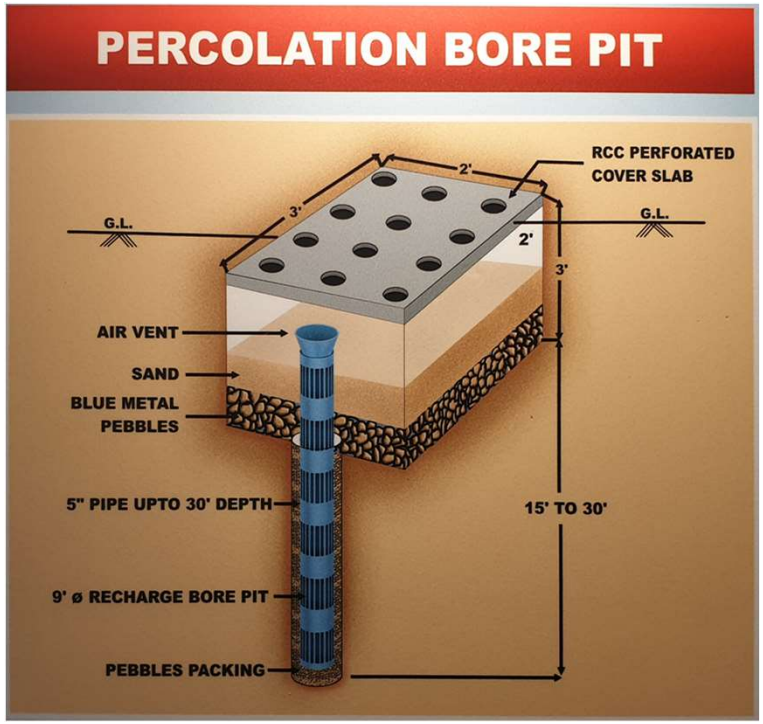
**Nemmeli Seawater Desalination Plant**
*(New phase)*
Output capacity: 150 mld

**Expected to go on stream in 2021…**

# PAST SOLUTIONS

## 2. Rainwater Harvesting :

1. In 2003, Govt. set a landmark ordinance on Rainwater Harvesting in Tamil Nadu.
2. Mandated water harvesting structures in all buildings




**Reasons of failure:**

- **Bad implementation** of the Rainwater Harvesting rule
  Government buildings were the worst violators .
- **Inefficient Design**
  Broken pipes, clogged pipes, badly maintained bore pits and drains were commonly detected.

# PAST SOLUTIONS

## 3. Reducing Evaporation Losses in Lakes :

**Methods:**

- Spreading chemicals (*cetyl alcohol* and *stearyl alcohol*)
- Shade balls
- AgFloats
- PV Panels (Proposed)

**Reasons of failure:**

- The layer of chemical spread over the reservoir to reduce evaporation is deformed by birds which leads to formation of discontinuities through which evaporation occurs.
- Due to high wind speed over the reservoir, the saturated air flows away and the fresh air gets saturated too, the cycle continues.

# PAST SOLUTIONS

## 4. Creation of New Resources:

The Nucleus Cell recommended (1980) creation of two new reservoirs in the upstream of Chembarambakkam Tank, influencing Adyar River, to capture 1.57 Thousand Million Cubic feet (TMC) of water.

**Reasons of failure:**

- Delay of **8 years** in execution of proposed project.
- Site was populated due to which the requisite land was not available.
- Socio-Political hindrance.

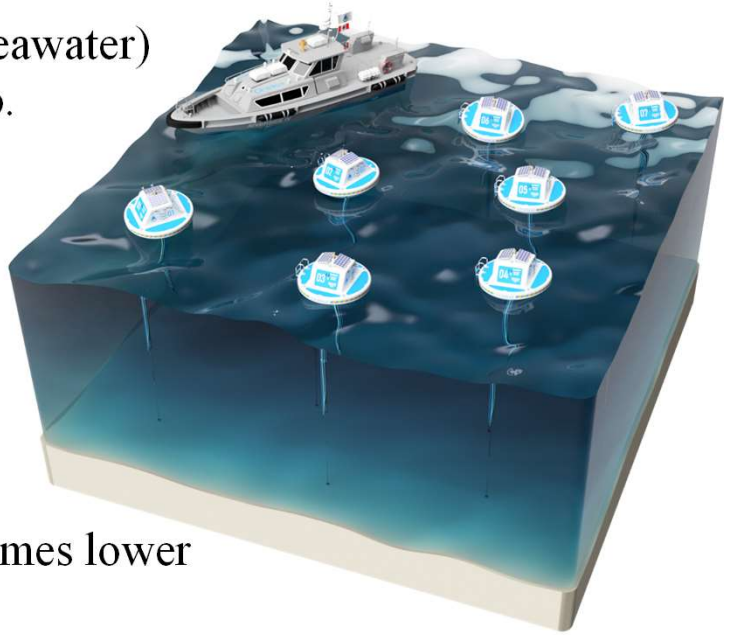
Works are also underway to **bring water from Retteri, Ayanambakkam and Perumbakkam tanks** and also to tap water from **126 borewells in the city's periphery**.

# PROPOSED SOLUTIONS

## 1. Wave-powered desalination buoys

*(A water desalination system powered mechanically by waves as the only source of energy)*

- Combines the resource (sea water) and the source of energy (waves) in the same system to make drinking water.
- Principle: It uses a very dense energy (waves) to transform the resource (seawater) which is the same element thus enabling a very simple technology to do so.
- Allows a **sustainable, economical, scalable and eco-friendly** supply of drinking water.
- 1 buoy contributes to 500 people, we can add buoys based on needs as population or touristic installations arise.
- Key features :
  - Each unit saves 19 tons of $CO_2$ / year
  - Over 120,000 L / year of fuel saved
- Profitability : Price of water for one system is less than \$2/$m^3$ which is 4 times lower than the price of water offered by some utilities



# PROPOSED SOLUTIONS

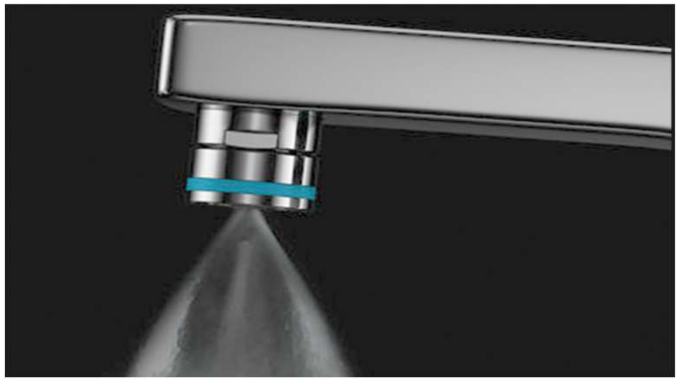
## 2. Clara Pur (CP)

*(Providing drinking water through solar energy)*

- **Solar thermal energy is used** to make drinking water out of: saltwater, untreated, ground- and surface water.
- **Arsenic/inorganic arsenic** that is naturally present at high levels in the groundwater of a number of countries is removed.
- It produces drinking water at the point of use, which solves the **distribution problem**.
- In many cases water must be transported, by ship or by truck but can not be consumed immediately after transport, it must be treated.
- Key features :
  - Zero emissions.
  - For off-grid use.
- Profitability : A cost of 0.014 USD per liter of water for a 10-module plant, or 14 USD per 1000 liters of water.

# PROPOSED SOLUTIONS

## 3. Altered:Nozzle Pro



- It atomizes the flow of water in a water faucet.
- Only 2% of the regular flow of water is used, all while making it possible to wash hands, do dishes, wash greens, etc.
- Key features :
  - 98% savings in water flow usage.
  - Estimated savings of 40 000 liters of water and 900 kg C02 per year for an average household.
- Profitability : A payback period of 2 months for a hotel with 100 rooms with $45 000 in savings per year.

## 4. Smart Greenhouse

(Greenhouse with internet connection for smart management)

- It is used to grow safe fruits and vegetables in limited spaces with limited maintenance and footprint.
- Key features :
  - Off-the-ground culture that can be installed anywhere on a flat ground.
  - 80%in water saving compared to standard agriculture or gardening.
- Profitability : A payback period of 5-8 yrs and when it is reached, the greenhouse continues to produce an equivalent of more than 2,000 EUR revenues of food per year.

# ANY QUESTIONS?