PRIME MINISTER'S AWARD FOR EXCELLENCE IN PUBLIC ADMINISTRATION 2020
Innovation (General) – State Government

Conversion of Abandoned quarries as Water Reservoirs & Tertiary Treatment of Waste Water for Industrial use in Chennai city (Application ID:INNO/00507)

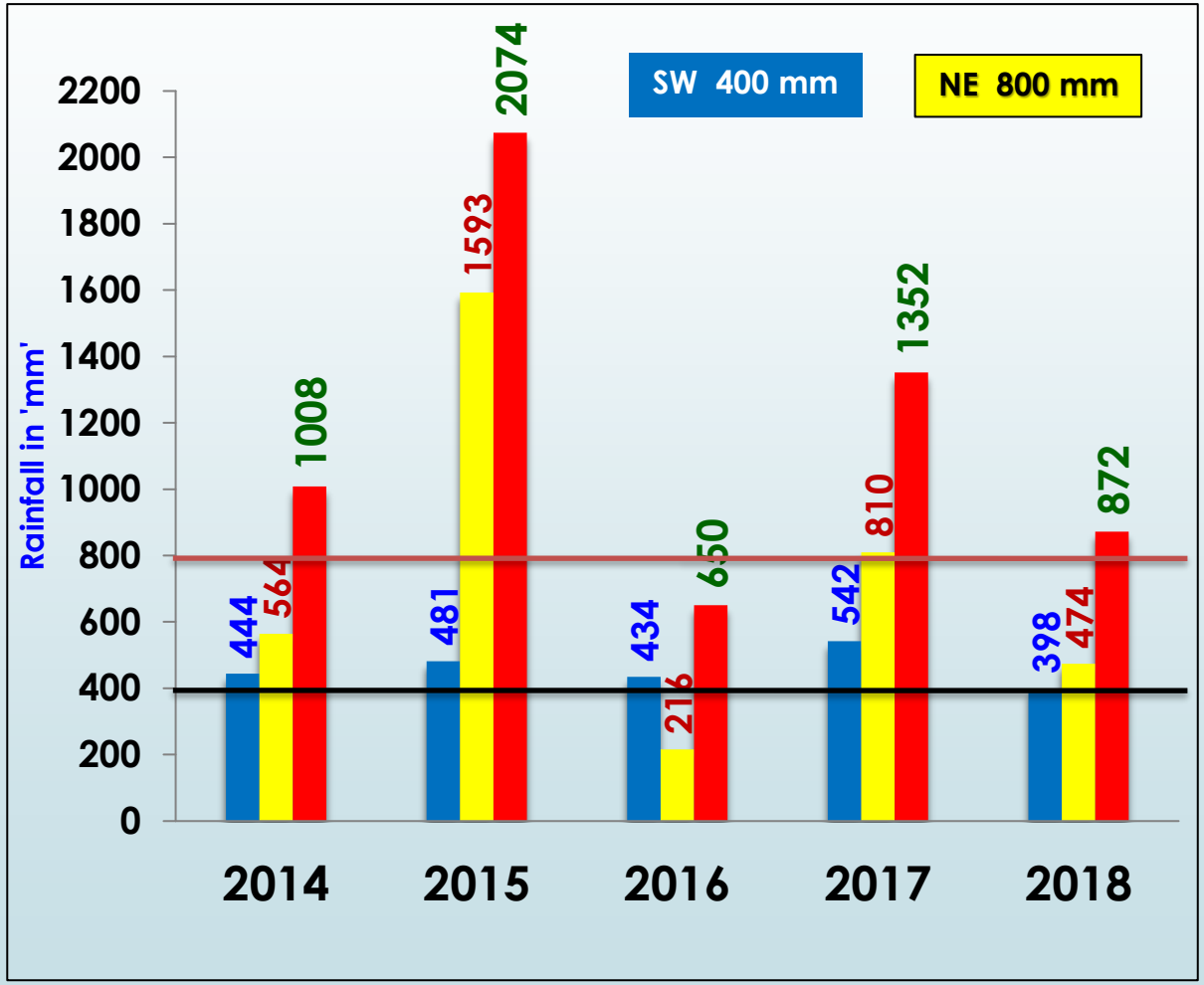
Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB)

TAMIL NADU

Background

- Chennai – a drought prone metropolitan city
- Area of 426 sq km & Population of 7.5 million.
- No perennial water sources in the vicinity of the city
- Primarily dependent on rainfall
- Severe droughts in 2017 & 2019
- Forced to opt for unconventional & climate resilient sources of water supply

Rainfall in Chennai – 2014 to 2018



Chennai - Water Supply Initiatives

Atal Mission for Rejuvenation and Urban Transformation

1978 — **CMWSSB**
Board Founded

1983 — **Telugu Ganga**
Agreement signed

1996 — 401 Kms canal
12 TMC / year
Krishna water

2002 — **Rain Water Harvesting**
First City in India

2004 — **New Veeranam**
228 Kms pipeline
180 MLD Cauvery water

2010 — **Minjur Desal**
100 MLD DBOOT
Desalination plant

2013 — **Nemmeli Desal**
100 MLD Desalination plant

2020 — **TTRO plants**
Kodungaiyur & Koyambedu
45 MLD each

Chennai's fluctuating Reservoir Storage levels

RESERVOIR	Full capacity in mcft	Storage as on 23.08.19
Chembarambakkam	3645	**0**
Redhills	3300	**0**
Poondi	3231	**16**
Cholavaram	1081	**0**
Veeranam	1465	**83**
TOTAL	**12722**	**99**

Cholavaram

Red Hills

Poondi

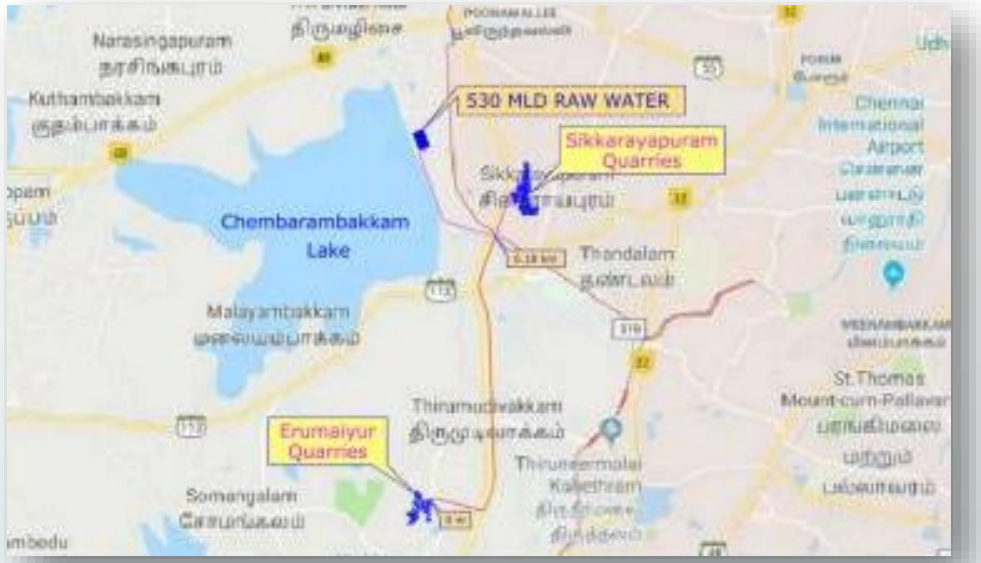
Chembarambakkam

A. Quarries as Storage Reservoirs

- Constraints in creating new large water storage reservoirs in Chennai
- Historically worst droughts in 2017 & 2019
- All 4 reservoirs bone dry
- Southern & Western outskirts – Rocky terrain with quarrying activity
- CMWSSB in its effort to decentralize and identify additional sources for City water supply, found an opportunity and made an never before attempted effort to **convert the abandoned mining quarries in the vicinity of Chennai city in to water storage reservoirs.**
- Taken up as a drought contingency measure with funding under State Disaster Relief Fund
- First of its kind project & no previous engineering references to rely upon.

Project Execution

- Possibilities of using the stored water left stagnant in the abandoned quarries at Sikkarayapuram, Erumaiyur, Malayambakkam, Pammal, Thiruneermalai, Pallavaram and Nanmangalam were explored
- 25 quarries at Sikkarayapuram & 10 quarries at Erumaiyur were taken up, due to their proximity to Chembarambakkam WTP.
- Total quantity around 1000 mcft ascertained
- Quality of water studied for 54 parameters inc. Radioactivity and found to be suitable for consumption after conventional treatment
- Entire activity done in house and in a record duration of 45 days, right in the midst of the drought



Impact

- **Augmentation of Surface water storage**

  Around 5000 Million Litres supply every year. 30 MLD for 6 months each in 2017 & 2019

- **Reduced evaporation losses**

  Unlike conventional reservoirs, quarries are very deep and store large quantity of water over a smaller surface area

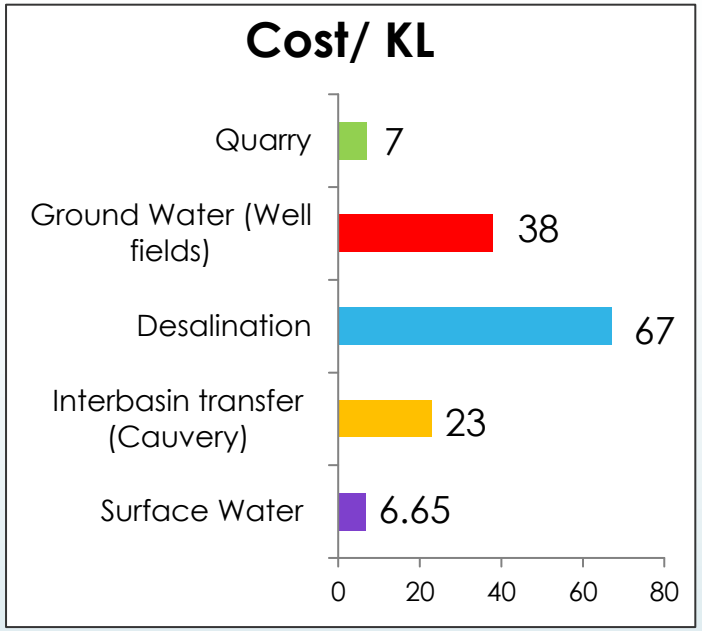
- **Reduced seepage losses and flood mitigation**

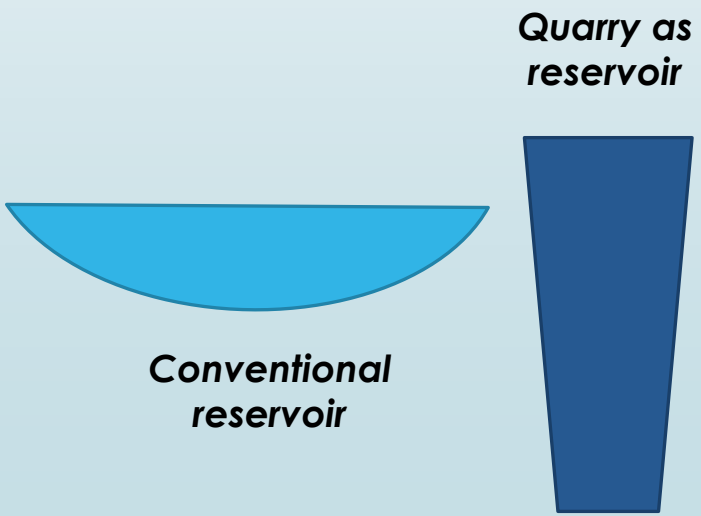
  Rocky nature of the reservoirs, minimal losses due to seepage, offer storage of excess water during intense short spells & during floods thereby acting as a flood mitigator

- **Cost effective with nil environmental impact** due to its efficiency. Only Rs. 7/ KL

- **Efficient Rain Water Harvesting**

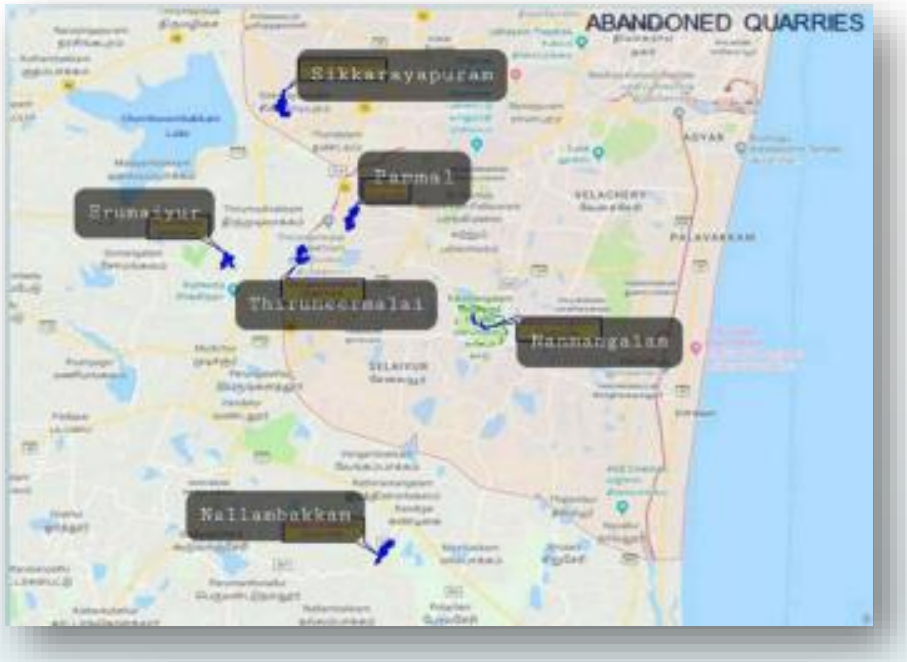
  Quarrying sites free of habitations & not easy to encroach upon, due to which rainwater in their catchment areas can be harnessed efficiently with minimal surface runoff.





Replicability

- Use of quarries as a concept is easily replicable across the country
- Lessons learnt by CMWSSB transmitted to the other local bodies of Tamilnadu.
- Works carried out to tap nearby quarries as a water source in Pallavaram and Pammal municipalities and were successfully implemented by them
- CMWSSB has so far converted quarries at Sikkarayapuram and Erumaiyur.
- More quarries identified at 3 more locations at Pulipakkam, Thalakkanancheri, Nallambakkam and Keerapakkam and DPR for implementation is under preparation.

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More water for Pallavaram now from quarries

There are three quarries at Tirusulam which can supply five MLD of water for 100 days if drawn daily by both agencies.

B. Waste Water Reuse by TTRO

- 12 Sewage Treatment plants in Chennai at 4 locations
- Total installed capacity of 727 MLD
- 550 MLD of Secondary Treated Effluent is discharged into the waterways
- Chennai has a dense industrial cluster & a traditional investment destination for industries
- Ensuring uninterrupted water supply vital for their viability
- Conventional Surface water & Ground water sources unsustainable
- Desalination water expensive
- Reuse Waste water for Industrial use seen as the solution
- Chennai – A pioneer in Waste water Reuse
- 36 MLD STEW supplied to industries since 1993

Tertiary treatment Reverse Osmosis

- 2 TTRO plants commissioned at Koyambedu & Kodungaiyur
- 45 MLD capacity each – Largest in India
- 120 MLD STEW converted to 90 MLD TTRO water
- Supply reuse water to industries at Manali Industrial Corridor & Sriperumbudur Industrial Corridor respectively
- 6o kms & 28 kms long pipelines
- Project funded by AMRUT scheme & World Bank
- Beneficiaries - more than 500 industries

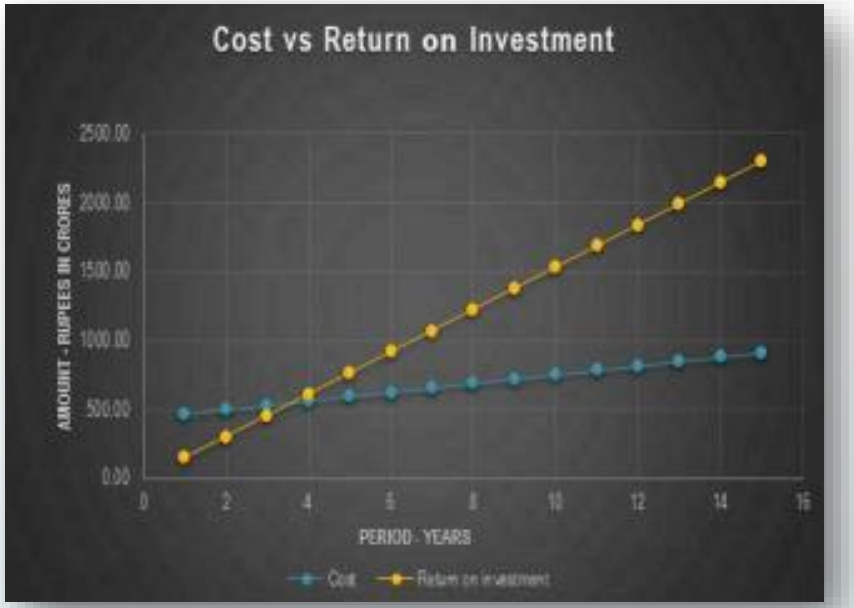
Parameters	RO Product Water
TDS	<70 mg/L
BOD	BDL
COD	BDL
Total Silica	<5 mg/L

Impact

- Improvement in the availability of water for domestic supply by 90 MLD due to swapping of present fresh water sources for industries with recycled wastewater.
- Uninterrupted supply of water to the industries, thereby facilitating industrial growth and employment.
- Reduced contamination of waterways due to reduced discharge of waste water.
- Prevention of ground water exploitation by industries.
- Chennai - first & only Indian city to recycle and reuse 20% of the sewage generated

Impact

- A classic case of Waste to Wealth intervention and illustration of circular economy of water
  - Cost of water (CAPEX+OPEX) = Rs. 50/ KL
  - Priced at Rs. 80/KL
  - Revenue = Rs. 240 crores/ year
  - Break-even in 4 years
  - Vital in ensuring cost recovery for water utilities
- A huge incentive for attracting Industries, thereby generating employment
- TN Global Investors meet 2019
  - Rs. 3 lakh crores investments
  - 10 lakh jobs to be generated



Tamil Nadu Global Investors Meet 2019: MoUs worth ₹3 lakh cr. signed, says Edappadi Palaniswami

SPECIAL CORRESPONDENT

CHENNAI, JANUARY 25, 2019 [illegible] IST
UPDATED: JANUARY 25, 2019 [illegible] IST

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Big deals

The two-day Global Investors Meet 2019 saw over 300 MoUs being inked

Over 300 MoUs signed; 10 lakh jobs expected to be created

Surpassing the 'success' of the first edition of the Global Investors Meet (GIM) held in 2015, the Tamil Nadu government has signed 304 Memoranda of Understanding (MoUs) and agreements entailing investments to the tune of over ₹3,00,431 crore in GIM-II, Chief Minister Edappadi K. Palaniswami has said.

Sector	No. of MoUs	Investment (₹ crore)	Jobs to be created
Big industries	146	1,34,648	4,73,871
Housing	70	57,381	92,626
Energy	15	40,700	14,200
IT	10	11,674	1,66,171
Higher education	50	1,013	6,797

Replicability

- Most Urban local bodies have Underground Sewerage System and a Sewage Treatment plant or a Fecal Sludge Treatment plant.
- Waste water recycling and reuse system through TTRO can be successfully implemented in any urban area in any part of the country.
- Product water can be earmarked for Industrial use or Agricultural use.
- In times of water scarcity, it may even be used as a source of drinking water as it is completely devoid of any physical, chemical or biological contaminants.
- TDS level is 70 mg/l which is much less than that of conventional tap water which is around 250 mg/L.

Way Forward

- Source Diversification is Key
- Climate Resilient interventions

Conclusion

1. Conversion of abandoned quarries as water storage reservoirs hasn't been attempted in any part of the world given the unique challenges associated with it, mostly perceived.

- Innovation coupled with engineering expertise has been the hallmark of this project

2. Recycle and reuse of wastewater by Tertiary Treatment Reverse Osmosis is a technology driven intervention to ensure uninterrupted supply of water to the industries.

- Adoption of state of the art technology to address the water security of the city has been the key feature of this project.

THANK YOU

"All water has a perfect memory and is forever trying to get back to where it was"

- TONI MORRISON