

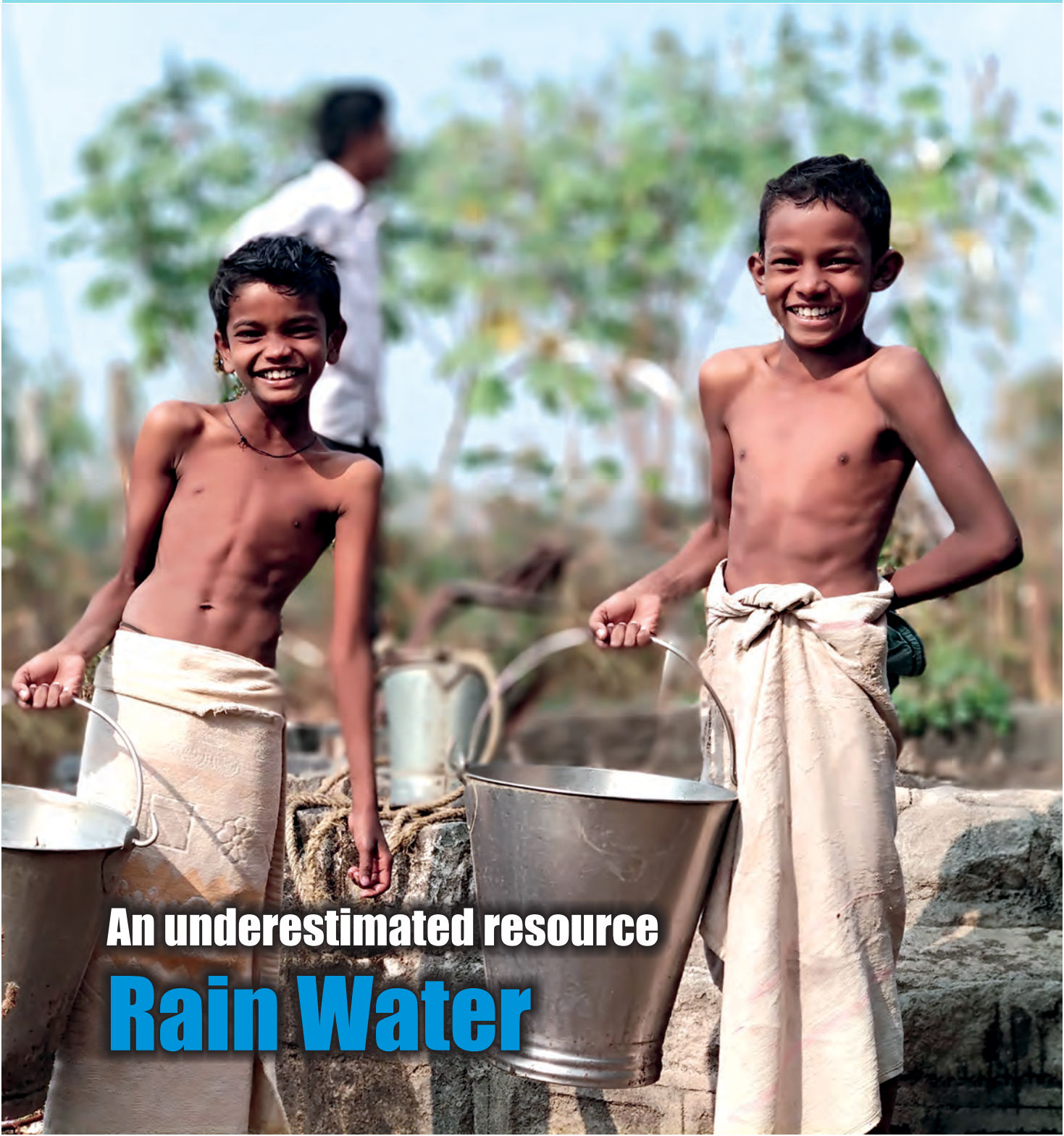


July 2018

Water *Watch*



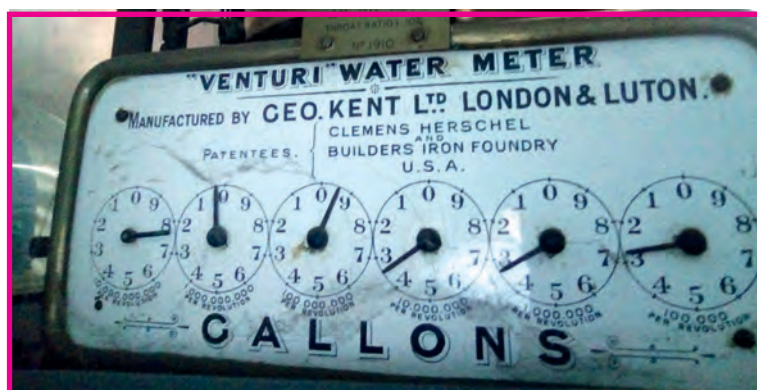
Quality Matters



An underestimated resource

Rain Water

Venturi water meter, The flow measurement devices for water supply which is used in the Arapalayam Water works around 1930. Presently, this instrument is showcased at the Arignar Anna Maligai (Madurai Corporation office). This 'Type A 'Orivent' Water Meter Recorder was made by George Kent Ltd, a London-based firm. By 1922, the company claimed to have installed 7,000 flow metering units throughout the world including places such as Hong Kong, India, Japan and Argentina. These type Orivent water meters are displayed in several eminent museums like Museum of Applied Arts, Sydney. Now this oldest instrument is an added jewel in the crown of Madurai's heritage..



Centre for Urban Water Resource (CURE)
Water Knowledge Centre
DHAN Vayalagam (Tank) Foundation
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Cover Photo Courtesy:
Nitish Nikam, The Dhan Academy

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Rain - An Underestimated Water Source

In the month of May 2018, Madurai city receives 73 mm of rainfall which is 8.6% of its annual rainfall of 840 mm. This rainfall had the potential of creating 5.4 billion litres (only 50% efficiency are considered) inside the corporation limit having the area of 148 sq.km. Unfortunately Madurai citizens failed to create rain-friendly city. Most of the rainfall in the Madurai is allowed to drain away as run-off.

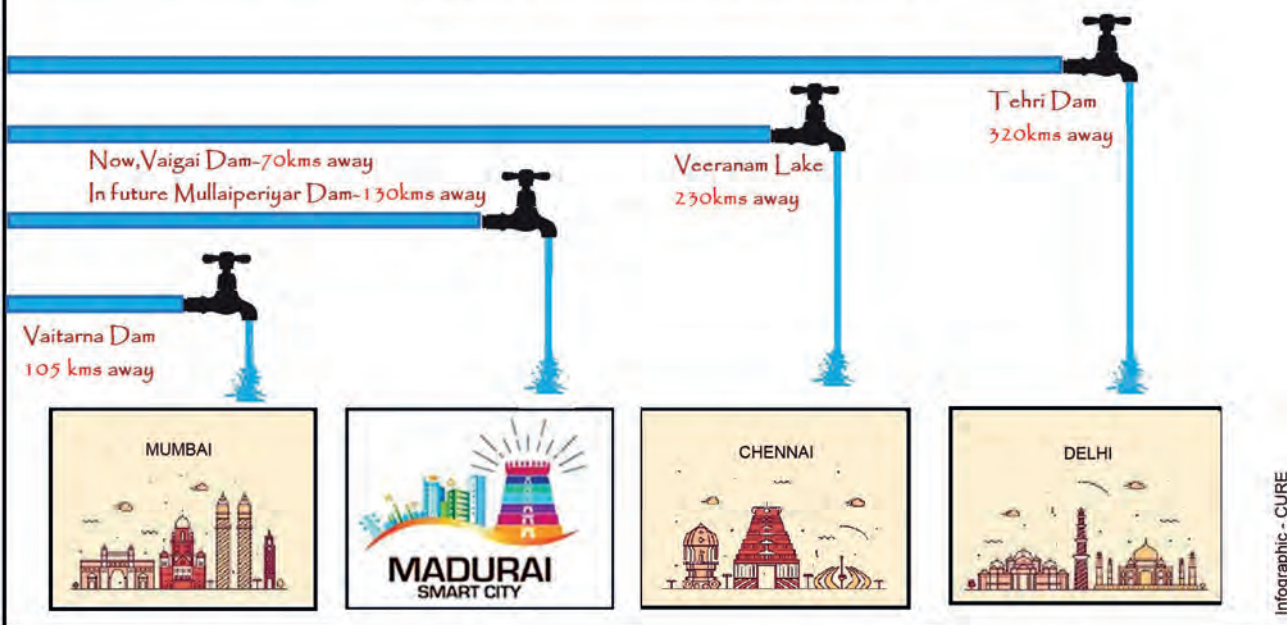
A common thinking of our Citizens are 'Water supply is a civic body's subject'. But citizens forget that water is the subject of nature, It's an individual responsibility. Due to our own inefficiency, city administration are in need to go for great efforts to bring water at a huge cost through pipes and tankers. Much of this water is abstracted from far-off areas giving rise to potential point of conflict with the users of this water in those places.



Madurai's Fact

1.5 TMC/year	
Assigned water source for Madurai from Vaigai dam	
42% of Madurai city don't have water supply connection.	₹ 90,84,99,000 Total expenditure for water supply and drainage
Source: Madurai City Municipal Corporation Budget Financial Year: 2018 – 2019	

IS FAR WATER, IS REALLY FAIR? Cities with distant water sources



Welcoming the Far Source

The Tamil Nadu government has given the administrative sanction for the Project of bringing drinking water for Madurai Corporation from Lower camp of Mullai Periyar Dam.

The G.O(MS) No: 51 Dated on 23/05/2018 of “Water supply Improvement Scheme to Madurai Corporation with Source from Lower Camp of Mullai Periyar dam” are sanctioned by the Tamilnadu government based on the request by Commissioner of Madurai Corporation and Commissioner of Municipal administration, Chairman of Tamil Nadu Urban Finance and Infra Structure Development Corporation (TUFIDCO) the project costing ₹1,020 crore.


This Project has been planned to supply 125 million litres per day (MLD) from the Lower Camp hydroelectric power station to Madurai city through gravity as the force with the distance of a 143-km pipeline. (Via: Lower camp - Pannaipatti Water Treatment Plant-OHT-Households)


The sum of Rs. 1,020 crore of project cost are sanctioned under Atal Mission for Rejuvenation and Urban Transform (AMRUT), 2017-2020. The Project fund are shared by Government of India, Government of Tamilnadu, Madurai Corporation and Asian Development bank.

Technically, this water is not only planned for drinking purpose, it is also to increase the flow of solids in Underground drainage (UGD) to increase the efficiency.

Centre for Urban water resources encourages the corporation for this great effort. But in the term of Sustainability, City corporation should encourage the concept of decentralization such as Roof water harvesting which is affordable, durable and sustainable.

Name of the work	(Rs. in Crore)					O&M cost
	Project cost	Funding pattern		ULB share under		
	AMRUT	GOI (33%)	GOTN (20%)	Corp. (10%)	ADB (37%)	
Water supply from Mullai Periyar dam	1020.00	336.60	204.00	102.00	377.40	3.00





ABSTRACT

AMRUT 2017-2020 - Implementation of Water Supply Improvement Scheme to Madurai Corporation with source from Lower camp of Mullai Periyar Dam at a cost of Rs.1020.00 Crore - Administrative Sanction - accorded-orders issued.

Municipal Administration & Water Supply (MC.2) Department
G.O.(MS) No.51 **Dated 23 .05.2018**
 திருச்சூர் மாநகராட்சி, 2018
 கீழ்க்கண்ட விவரம்

Read:-

- From the Commissioner, Madurai Corporation Letter No. MA. PO-4 /021398/2014, Dated 17.05.2018.
- From the Commissioner of Municipal Administration Letter No.8214/2016/H/MSDP3 Dated 18.05.2018 & 21.05.2018.
- From the Chairman & Managing Director, Tamil Nadu Urban Finance and Infra Structure Development Corporation Letter No. TUFIDCO / AMRUT /MN/814/AM(M)2017, Dated 18.05.2018.

ORDER:-

3. In the letter third read above, the Chairman & Managing Director, Tamil Nadu Urban Finance and Infra Structure Development Corporation has issued the Sanction letter for the approval of Implementation of Dedicated Water Supply Scheme to Madurai Corporation from Mullai Periyar River as source at a total estimated cost of Rs.1020.00 Crore under AMRUT/ADB with the following funding pattern:-

Name of the Project / Scheme No.	(Rupees in crore)			
	Approved Cost	GOI Share (33%)	G/TN Share (20%)	ULB Share (47%)
Dedicated Water Supply Scheme to Madurai Corporation from Mullai Periyar River as source (Scheme.No. AMRUT III-40)	1020.00	336.60	204.00	479.40



Perfect Count on Raindrops!



What to do?

Rain water harvesting involves the capture, storage and use of rain water and runoff for domestic purposes.

Roof water harvesting affords an affordable means of accessing good quality at the point of consumption, where control of the water supply lies at the user level.

Why to do?

The Tamilnadu Municipal Laws ordinance was passed on July,2003, under which all buildings would have to install the rain water harvesting system. In the absences of RWH, water connection could be disconnected. This enforcement also got strengthen by some other rules like Tamilnadu District Municipalities Building Rules,1972, Tamilnadu Panchayat Building rules, 1997.

How much Cost?

The construction cost as an initial investment are:

	Ferro cement Structure (recommendable)		HDPE Tank (UV Treated)
	Above the ground level Structure	Below the ground level structure	Above the ground level Structure
Permanent Structure without filter	26,000+	20,000+	15,000+
Permanent Structure with Centrifugal filter	34,000+	28,000+	23,000+
Permanent structure with Bio-sand filter	29,000+	23,000+	18,000+

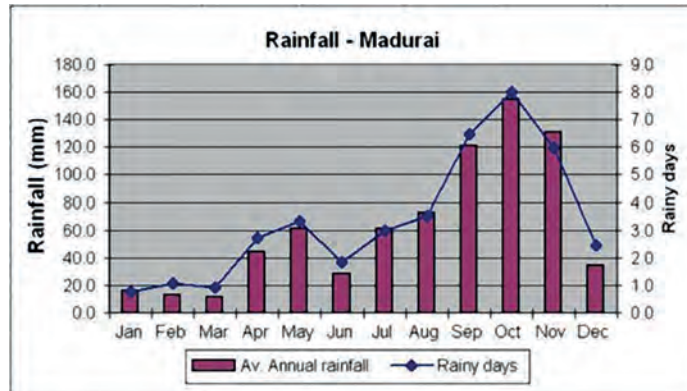
*Applicable for 3500litres tank *Approximate cost for reference

How to do?

The setting up of the basic elements are:

1. The catchment area - Rainfall area as Terrace
2. The conveyance area - a water conductive system as pipelines
3. The Filter system-treatment for runoff through Bio sand filter or Centrifugal filters
4. The Storage area-a tank of Ferro-cement or HDPE tank.
5. The recharge area-recharging the Surplus for Ground water recharge.

What about Rainfall?



Who can help you?

**Town planning Division
Madurai Corporation**
Contact: 0452-2531140

**City Resource Centre
DHAN Foundation**
Contact: +91-9994963128

Rainwater Quality

One of the first questions that people ask about harvested Rain water - is that water is suitable for drinking? What about the quality of rain water? Is it suitable for cooking? Can it be used for house hold purposes?

Rain water is less susceptible to contamination, especially when compared to ground water and even compared with surface water. It is usually free from color and odor and there is least possibility of being contaminated by human faeces or chemicals. Rainwater is an effective way to lower ground water extraction and avoid groundwater-related diseases

Rainwater having the chance of contamination due to the poor design or improper maintenance of the structure. Thereafter, regular cleaning and maintenance measures ensure good water quality. Where rainwater is used for drinking, additional protection can be secured through a variety of measures.

Ensuring Purification of Harvested Rainwater

When rainwater is used for drinking, an extra level of purification can be under taken. Even after the filtration and maintenance measures. Biological contaminants such as bacteria, viruses, protozoans and cysts can be removed by a variety of disinfection measures, which include boiling, chlorination, micro- filtration and ultra – violet (UV) treatment. The most easy ways of treatment are:

Boiling: This is an effective purification method and simple to carry out. After the efficient boiling temperature, it should be allowed to do so for 10-15 minutes. This kills off the micro organisms. Boiling can also drive away some of the volatile organic compounds. To increase the Dissolved Oxygen (DO), many times rinsing are recommendable before consuming.

Chlorination: This technical process is unsafe for domestic use. It only recommendable if you suspects that the rainwater has been contaminated by animal faeces or there are signs of sickness after using rainwater. Although chlorine can kill a range of bacteria, it may not kill viruses or cysts. Its effectiveness depends on the correct dosage and the contact time the time.

The Source for contaminations and the simple prevention methods are

Part of RWH system	Contaminants & source	Prevention methods
Roof	Dust/air pollutants from surroundings area	Regular cleaning or catchments
	Bacteria from bird/ animal droppings	First flush
	Organic debris such as leaves or other plant materials from overhanging trees	Trim overhanging branches / leaf mesh
	Toxic chemicals if roof is treated painted or is made of aged asbestos	Avoid painted/treated roofs
Storage tanks	Mosquito larvae formation.	Proper sealing of covers, regular cleaning of tanks Prevent sunlight from entering tank
	Dust or debris, silt, organic debris Growth of bacteria, algae	Filter systems at entry points into tanks Use non toxic materials and non reactive materials.

The World Health Organization (WHO) has set some quality benchmarks for the maximum level of contaminants allowed in the rainwater are:

Parameter	Guideline value
Faecal coliform of E.coli	Not detectable in a 100 mL sample
Aluminium	0.2 mg/L*
Cadmium	0.003 mg/L
Copper	2 mg/L
Chloride	250 mg/L*
Fluoride	1.5 mg/L
Iron	0.3 mg/L*
Lead	0.01 mg/L
Sodium	200 mg/L*
Sulphate	250 mg/L*
Turbidity	5 NTU*
Total dissolved solids	1000 mg/L*
Zinc	3 mg/L*

* Level likely to result in consumer complaints

Sources

1. Luke Mosley(2005), *WATER QUALITY OF RAINWATER HARVESTING SYSTEMS*; <https://www.researchgate.net/publication/242143735>
2. Gita et_al(2013), *Catch water where it falls(CSE)*

Baseline Assessment Water and Scenario Analysis

A spatial temporal assessment of the Madurai urban water quality to provide an understanding of the relative condition of water quality in different sources of water supplies such as Lorry water, Corporation water, Groundwater, Surface water which are all utilised for drinking purpose. In order to cover all four zones, we collected the drinking water sample in the each zone under corporation boundary.

To understand the trend of the water quality, we sampled the same location what we done on June,2018. The Locations are



1. Sellur- Zone-I;
2. Pudhur- Zone-II;
3. Thepakulam- Zone-III;
4. Pasumalai- Zone-IV

**Packaged drinking water-
CAN water Supply**



**Water Supply
through Vehicles -
Lorry Supply**



Bore well water- Ground water

**Water supply through Pipe Network-
Corporation Supply**

Results of various drinking water sources in Sellur area (Zone 1)

Type of Source		Acceptable Limit as per BIS 10500-2012	Permissible Limit*	Corporation Water	CAN Water	Lorry Water	Ground Water
Date of Collection				26/06/2018	26/06/2018	26/06/2018	26/06/2018
Location of Sample				Zone 1 Sellur			
Physical Parameters	1. Total Dissolved Solids (mg/L)	500	2000	311	59	No supply during sampling day	1326
	2. Appearance	Crystal & Clear		C&C	C&C		C&C
	3. Colour			None	None		None
	4. Odour	Unobjectionable		Unobj.	Unobj.		Unobj.
	5. Turbidity	1	5	0.7	0		0
	6. Electrical Conductivity (Micro mho/cm)			445	84		1895
Chemical Parameters	7. PH	6.5-8.5	6.5-8.5	7.1	6.8		7.4
	8. Total Alkanity as CaCo3	200	600	128	32		480
	9. Total Hardness as CaCo3	200	600	140	12		380
	10. Calcium as Ca	75	200	32	3		80
	11. Magnesium as Mg	30	100	14	1		43
	12. Iron as Fe	0.1	1	0	0		0
	13. Manganese as Mn	0.1	0.3	NT	NT		NT
	14. Free Ammonia as NH3	0.5	0.5	0	0	0.4	
	15. Nitrite as NO2	0.5	0.5	0	0	0.2	
	16. Nitrate as NO3	45	45	1	3	8	
	17. Chloride as Cl	250	1000	48	6	256	
	18. Fluoride as F	1	1.5	0.6	0.2	1	
	19. Sulphate as SO4	200	400	35	0	88	
	20. Phosphate as PO4	0.5	0.5	0.017	0	0	

*Permissible limit are acceptable in the absence of alternate sources. Bureau of Indian Standards recommends that acceptable limits to be implemented.

*All Chemical parameters are expressed as milligram per Litre (mg/L)

*Red indication are the values beyond the acceptable limit

Inference from the Zone 1 result

S.No	Parameter	Inference
1	Total Hardness /Corporation water	Even though it is under acceptable limit. If, Hardness increase the consumption of water decrease due to taste. The hardness also leads to fixtures failure by scale formation.
2	Ammonia/ Corporation water	The continuous water supply reduces the Ammonia pollution in the corporation water. Now Sellur region having water supply on alternative days. Last June, Ammonia pollution are found due to water supplied once in four days.
3	TDS/ Ground water	Ground water is highly alarming of solid content. These serious indicators reflect the improper recharge of rain water. There is no point of dilution.
4	Ions and Minerals/CAN water	Due to demineralisation, The contact of sunlight and Air, leads to formation of biological pollutants.

Thanks to Corporation, recently we are getting water supply once in two days and In some residences, officials from corporation ceased the illegal motors used for the suction of corporation water supply.

- Ms.Shanthi
Bose street, Sellur



Results of various drinking water sources in Pudhur area (Zone 2)

Type of Source		Acceptable Limit as per BIS 10500-2012	Permissible Limit*	Corporation Water	CAN Water	Lorry Water	Ground Water
Date of Collection				26/06/2018	26/06/2018	26/06/2018	26/06/2018
Location of Sample				Zone 2 Pudhur			
Physical Parameters	1. Total Dissolved Solids (mg/L)	500	2000	200	38	No supply during sampling day	2023
	2. Appearance	Crystal & Clear		C&C	C&C		C&C
	3. Colour			None	None		None
	4. Odour	Unobjectionable		Unobj.	Unobj.		Unobj.
	5. Turbidity	1	5	0.5	0		0.3
	6. Electrical Conductivity (Micro mho/cm)		320	285	55		2890
Chemical Parameters	7. PH	6.5-8.5	6.5-8.5	7.2	7		7.3
	8. Total Alkanity as CaCo3	200	600	88	16		640
	9. Total Hardness as CaCo3	200	600	100	12		520
	10. Calcium as Ca	75	200	24	3		120
	11. Magnesium as Mg	30	100	10	1		53
	12. Iron as Fe	0.1	1	0	0		0
	13. Manganese as Mn	0.1	0.3	NT	NT		NT
	14. Free Ammonia as NH3	0.5	0.5	0.064	0		0.64
	15. Nitrite as NO2	0.5	0.5	2	2		0.02
	16. Nitrate as NO3	45	45	32	8		5
	17. Chloride as Cl	250	1000	32	8		500
	18. Fluoride as F	1	1.5	0.4	0.2		1
	19. Sulphate as SO4	200	400	16	0		28
	20. Phosphate as PO4	0.5	0.5	0	0		0.55

*Permissible limit are acceptable in the absence of alternate sources. Bureau of Indian Standards recommends that acceptable limits to be implemented.

*All Chemical parameters are expressed as milligram per Litre (mg/L)

*Red indication are the values beyond the acceptable limit

Inference from the Zone 2 result

S.No	Parameter	Inference
1	Corporation water	This water is almost safe. All parameters are under acceptable limit. The TDS of 200mg/L refers the tasty water.
2	Pollution indicators/ Ground water	Ammonia, Nitrite and Phosphate are the pollution indicators. Pudhur ground water is detected with both ammonia and phosphate pollution.
3	TDS/ Ground water	TDS in the groundwater crossed maximum allowable limit as 2023mg/L. Also water having high hardness in nature.
4	Minerals/CAN water	The CAN water is almost demineralised. To balance the deficient minerals, Healthy diet is needed if you are consuming RO water

Our residences are very close to the Over head tank (OHT), So we always gets the good quality and pressurised water supply. We request government to standardise the supply timings because working women's suffers lot due to random timings.

- Ms.Megala Devi
Bharathiyar main road,
K.Pudhur



Results of various drinking water sources in Pasumalai area (Zone 3)

Type of Source		Acceptable Limit as per BIS 10500-2012	Permissible Limit*	Corporation Water	CAN Water	Lorry Water	Ground Water
Date of Collection				26/06/2018	26/06/2018	26/06/2018	26/06/2018
Location of Sample				Zone 3 Pasumalai			
Physical Parameters	1. Total Dissolved Solids (mg/L)	500	2000	1078	37	74	1270
	2. Appearance	Crystal & Clear		C&C	C&C	C&C	C&C
	3. Colour			None	None	None	None
	4. Odour	Unobjectionable		Unobj.	Unobj.	Unobj.	Unobj.
	5. Turbidity	1	5	0.3	0	0	0
	6. Electrical Conductivity (Micro mho/cm)		320	1540	53	106	1815
Chemical Parameters	7. PH	6.5-8.5	6.5-8.5	7.2	6.9	6.6	7.05
	8. Total Alkanity as CaCo3	200	600	320	12	28	360
	9. Total Hardness as CaCo3	200	600	260	16	20	520
	10. Calcium as Ca	75	200	48	3	5	56
	11. Magnesium as Mg	30	100	34	2	2	67
	12. Iron as Fe	0.1	1	0	0	0	0
	13. Manganese as Mn	0.1	0.3	NT	NT	NT	NT
	14. Free Ammonia as NH3	0.5	0.5	0	0	0	0.4
	15. Nitrite as NO2	0.5	0.5	0	0	0	0
	16. Nitrate as NO3	45	45	8	2	8	7
	17. Chloride as Cl	250	1000	260	8	12	300
	18. Fluoride as F	1	1.5	0.6	0.2	0.2	0.8
	19. Sulphate as SO4	200	400	60	3	1	67
	20. Phosphate as PO4	0.5	0.5	0	0	0	0

*Permissible limit are acceptable in the absence of alternate sources. Bureau of Indian Standards recommends that acceptable limits to be implemented.

*All Chemical parameters are expressed as milligram per Litre (mg/L)

*Red indication are the values beyond the acceptable limit

Inference from the Zone 3 result

S.No	Parameter	Inference
1	Total Hardness /Ground water	Pasumalai's ground water is chemically NON POTABLE since Total hardness value exceeds the maximum allowable limits.
2	TDS/ Corporation water	Pasumali Corporation supply water having the high TDS which is beyond the acceptable limit. Hardness of water also maximum. These shows the tasteless water is supplied.
3	Chemical Parameters/ Ground water	Even after having good geographical location such as Saravanapoigai, Thenkal tanks the water is detected with high chemical parameters in the ground water. This indicates there is no place of recharge and the dilution.
4	Chloride/Corporation and ground water	This Chloride refers the presence of salt content in the water. Both ground and corporation water exceeds the permissible limits.



We are getting water once in 8-10 days. Due to water shortage, We are utilising "Saravanapoigai" water for washing clothes and for bathing. Unfortunately no penalties for the upper-class peoples who use motors for water suction from corporation supply.

- Ms.Pandiyammal
Kodangithoppu,
Thiruparakundram

Results of various drinking water sources in Theppakulam area (Zone 4)

Type of Source		Acceptable Limit as per BIS 10500-2012	Permissible Limit*	Corporation Water	CAN Water	Lorry Water	Ground Water
Date of Collection				26/06/2018	26/06/2018	26/06/2018	26/06/2018
Location of Sample				Zone 3 Pasumalai			
Physical Parameters	1. Total Dissolved Solids (mg/L)	500	2000	171	87	136	868
	2. Appearance	Crystal & Clear		C&C	C&C	C&C	C&C
	3. Colour			None	None	None	None
	4. Odour	Unobjectionable		Unobj.	Unobj.	Unobj.	Unobj.
	5. Turbidity	1	5	1.2	0	0	1
	6. Electrical Conductivity (Micro mho/cm)		320	245	125	195	1240
Chemical Parameters	7. PH	6.5-8.5	6.5-8.5	7.2	7	7.1	7.3
	8. Total Alkanity as CaCo3	200	600	64	32	56	380
	9. Total Hardness as CaCo3	200	600	80	32	40	220
	10. Calcium as Ca	75	200	16	6	8	48
	11. Magnesium as Mg	30	100	10	4	5	24
	12. Iron as Fe	0.1	1	0.16	0	0	0.16
	13. Manganese as Mn	0.1	0.3				
	14. Free Ammonia as NH3	0.5	0.5	0.24	0	0.24	0.24
	15. Nitrite as NO2	0.5	0.5	0.07	0	0.1	0
	16. Nitrate as NO3	45	45	2	8	1	8
	17. Chloride as Cl	250	1000	32	16	30	124
	18. Fluoride as F	1	1.5	0.4	0.2	0.2	0.8
	19. Sulphate as SO4	200	400	12	1	2	54
	20. Phosphate as PO4	0.5	0.5	0.03	0	0.04	0.08

*Permissible limit are acceptable in the absence of alternate sources. Bureau of Indian Standards recommends that acceptable limits to be implemented.

*All Chemical parameters are expressed as milligram per Litre (mg/L)

*Red indication are the values beyond the acceptable limit

Inference from the Zone 4 result

S.No	Parameter	Inference
1	Corporation water and Lorry water	In Thepakkulam area, the sampled location show decent result on water supply
2	TDS / Ground water	Even through our sampling locations are close to Vaigai riverbed. TDS and hardness crossed the acceptable limit.
3	Minerals/CAN water	Due to Reverse Osmosis Technology (RO), The drinking water is almost demineralised. The reject of RO plant having high TDS and Hardness

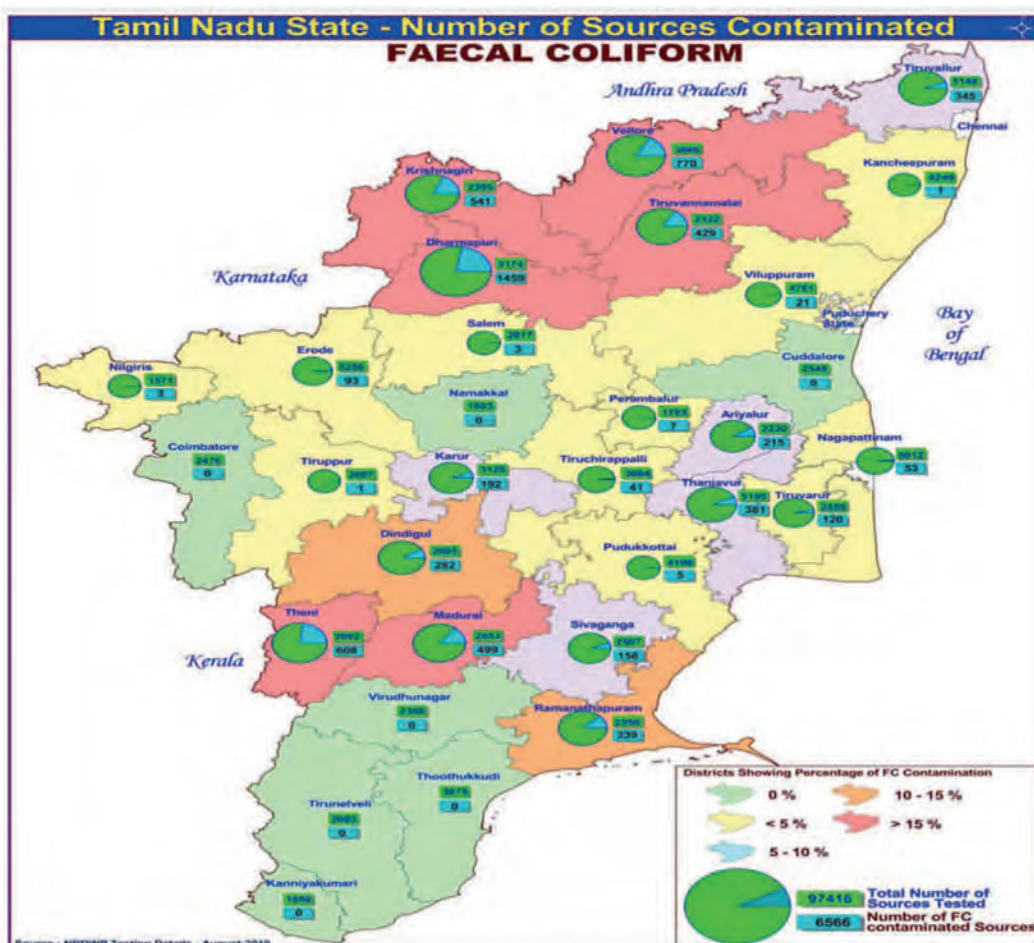
At beginning of supply, we are getting objectionable odour water, after 15-20 minutes of flush. we are receiving the good water. but we are doubt of quality.

- Ms.Usha, Pangajam colony, Theppakulam



Biological Parameter

In future, CURE is planning to measure the Biological parameter. Hereby some reference data of Biological parameter issued from the Tamilnadu water and drainage Board (TWAD)



Did you know?

How much 1TMC?

1TMC = One Thousand Million Cubic feet

One Thousand Million:

1 Thousand = 10^3 ; 1 Million = 10^6

1 Thousand Million = 10^9

Cubic feet:

1 feet = 0.3048 meter

1 Cubic feet = 0.0283168466 Cubic meter ($0.3408 \times 0.3408 \times 0.3408$)

= 28.3168466 Litres (0.28316×1000 ;

1 cubic metre = 1000 Litres)



1 TMC = $10^9 \times 28.3168466 = 28,316,846,592$ litres ≈ 28.3 Billion Litres

Capacity of Vaigai Dam: 6.143 TMC; Capacity of Mullai Periyar Dam 15.663 TMC

Home Sweet(Sustainable) Home

Yes, A family loves both blue and green. Ms. Shanthi Madhuresan, whose home located at the Vaigai river bed. She built a Roof water harvesting system in her home on 2010. With the family of four, she found a source of quality water by looked to the skies. She took an account of Madurai rainfall of 850mm. The house has an 110sq.m of roof which captures rainwater to be stored in three tanks. For daily needs, just 25 litres of water is sufficient for all drinking and cooking

WHY: To be a model home

In west of Madurai, the Rettai-vaikkal area, where Ms. Shanthi lives is not served by municipal water supply. So her husband Mr. Madhurasan has to pedal his bicycle for some kilometres in search of water. In-between they are dependent on ground water, which is pumped through bore well. These all makes her family to look for sustainability, and they found the Roof water harvesting system and she made a best working model for last Eight years.

RAINWATER: For Drinking and Cooking

Ms. Shanthi's family feels the value of rainwater as great one compared to the any other water source. After four types of serious screening process of their own Roof water, Ms. Shanthi gives psychological permit to the family for consumption.

After a mesh filter in the roof, rain water is first directed to a filter system. Before entry in to storage tank, there are options of first flush and sand gravel filter system. Then she stores the water at the underground tank which is restricted for both Sun light and Air. Her interest on continuous monitoring ensures the quality and the taste of water.

Specifications

Year of Implementation : 2010

Roof area : 110 square metre

Storage system usage : Drinking and Cooking

Underground tank capacity (3m×3m×2.5m)
22,500 Litres

Additional HDPE tanks (2×1000) 2000
Litres

Water utilised - 40,000 Litres

Filters used:

Pre-treatment before storage: Sand Gravel filter
(1.5L×0.6D)

Post Treatment after storage: Bio sand filter
(http://www.dhan.org/vayalagam/biosand_filters.php)

Maintenance cost: Rs.1500/year


Water price: 4 paise / Litre
(for span of 25 years)

Other water Source: Bore well upto 300 ft
(mostly underutilised)

Designed and implemented by:
Ms. J. Kanagavalli, DHAN Foundation



Impact



Last Eight years, Ms. Shanthi family consuming the pure healthy water in a cost of just 4 paise / litre. Significantly, she is self-reliable on her own roof water, this directly safeguard the remote water resources. Her Model home is the awareness hub for more than 700 visitors per year. She proudly shows the statics of ten another independent family who installed roof water harvesting system in and around Madurai. This healthy family achieves the matter of sustainability.

Basically I am a Ramnad women, So I know the value of Rain water. Preparedness, Carefulness and clarity are not only applicable for human life, also for roof water harvesting system.

- Ms. Shanthi Madhuresan



Ministry of Housing
and Urban Affairs
Government of India

**SWACHH
SURVEKSHAN
2018**



Madurai Corporation
(TAMIL NADU)

NATIONAL

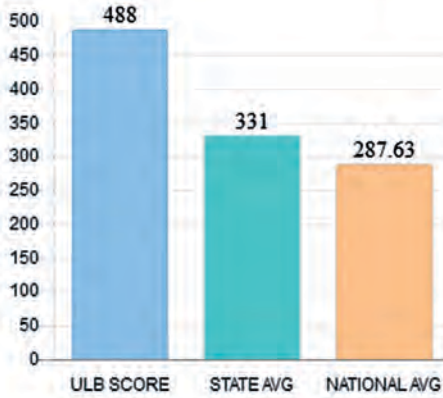
STATE

Rank #123 (Out of 485)

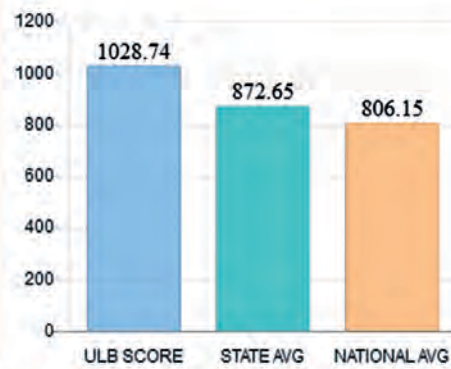
Rank #5 (Out of 26)

ULB Performance

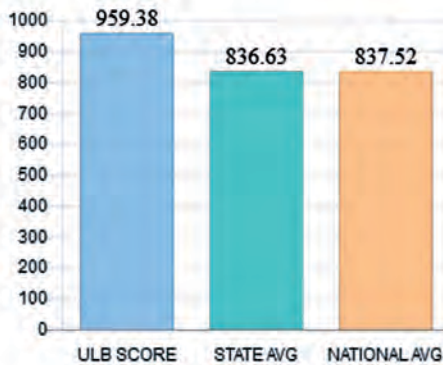
PART-1: Service Level Progress (Max Marks: 1400)



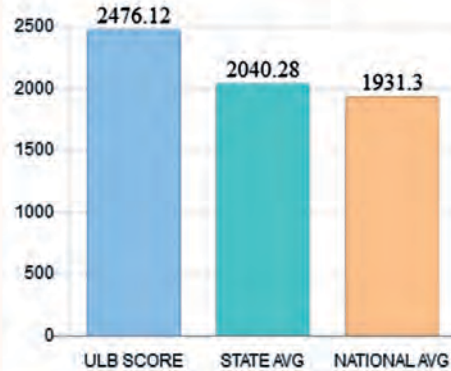
PART-2: Direct Observation (Max Marks: 1200)



PART-3: Citizen Feedback (Max Marks: 1400)



SS2018 Score (Max Marks: 4000)



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The objective of the survey is to encourage large scale citizen participation and create awareness amongst all sections of society about the importance of working together towards making towns and cities a better place to live in. Additionally, the survey also intends to foster a spirit of healthy competition among towns and cities to improve their service delivery to citizens, towards creating cleaner cities.

Meteorological Updates



SW-Monsoon Rainfall 2018 Updates (From 01.06.2018 to 29.06.2018)

Code	Name	Actual in mm	Normal in mm
31	Tamil Nadu - State	47.0	45.5
471	Madurai District	10.8	47.4

Source: Regional Meteorological Centre, Chennai
Ministry of Earth Sciences India Meteorological Department

Rainfall Data

Station Name: DHAN Central Office, Madurai

Device: Automated rain gauge.

Average Annual rainfall for Madurai: 840mm



Temperature Data

June 2018 - Rainy days

Date	Intensity (mm/d)
30/06/2018	25
Total rainfall	25 mm

(Single station data)

June 2018 - Temperature

	Date	Temperature
Highest temperature	15/06/2018	39°C
Lowest temperature	17/06/2018	24°C
Average temperature	38°C/28°C	

We sincerely acknowledge the Laboratory

Water Quality Testing Laboratory
The Institution of Engineers (India)

Madurai Local Centre,
Surveyor colony, Madurai- 625007

For Suggestion/Comments please write us on



Centre for Urban water Resources (CURE)
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