

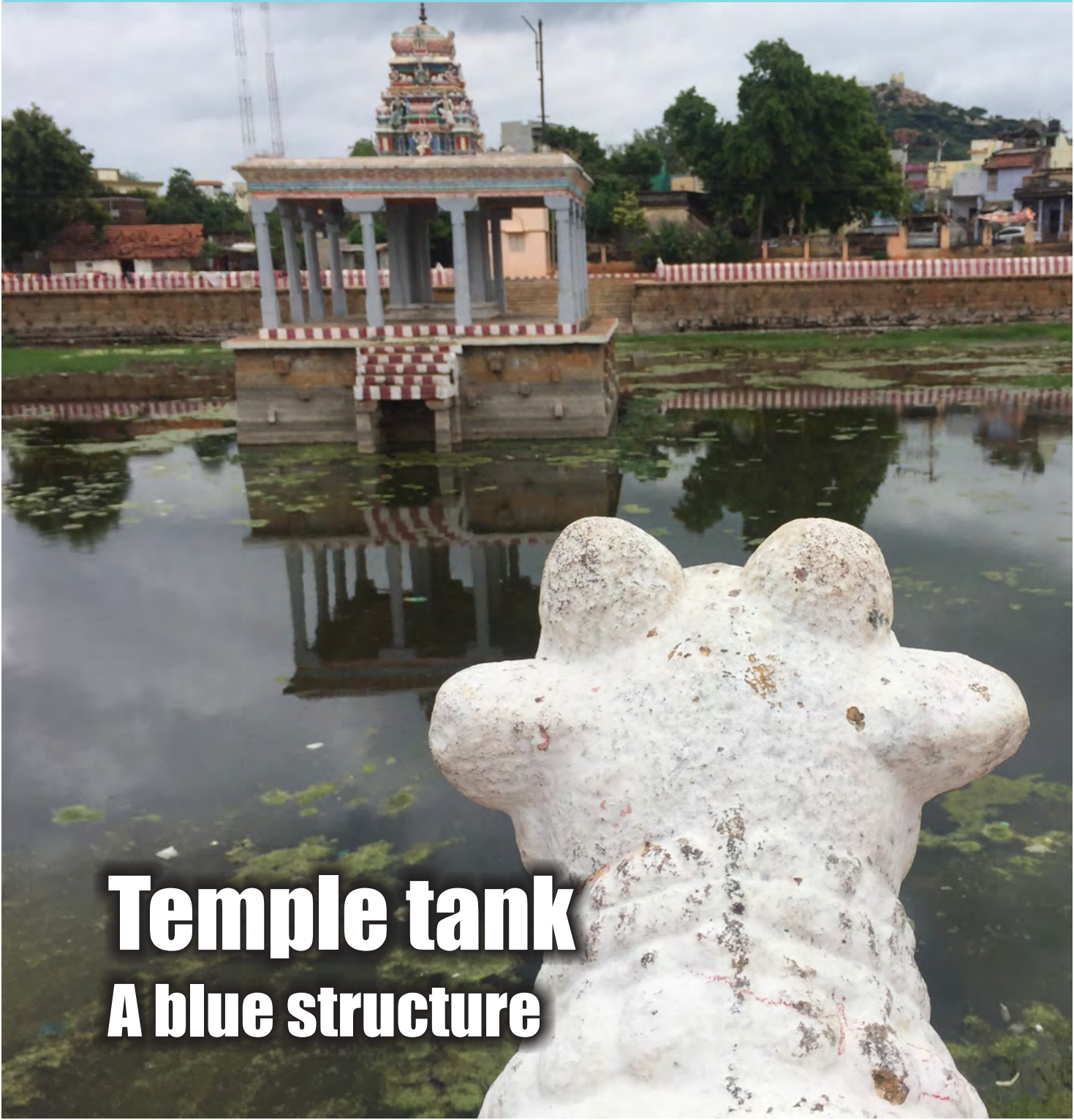


September 2018

Water *Watch*



Quality Matters



Temple tank
A blue structure

Vandiyur Mariamman Teppakulam built in 1645 A.D, is the temple pond mainly used for devotional festivals. It is situated at a distance of about 2 km from the Meenakshi Amman Temple. The tank is connected to Vaigai River through an ingenious system of underground Channels. It has a total of 12 long stairs (steps) made of granite on all four sides. It is approximately 305 m long and 290 m wide, nearly equal area to that of Meenakshi Amman Temple. In the centre of the tank, there is a Maiya Mandapam (Central Mandapam) with Vinayakar temple and garden. The temple as well as the stairs was built by the King Thirumalai Nayak. This is the location where the king Thirumalai Naicker excavated the soil to fabricate the bricks required for constructing his palace, Thirumalai Nayakkar Mahal. The pit that was thus formed is seen as tank now.



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Temple Tanks – Blue spots in Concrete Urban Fabrics!

Madurai, the temple city of Tamil Nadu is rich in heritage temple tanks. Temple tanks are as ancient as temples itself, because the temple tanks are ponds dug for construction of temple. The pond was dug to fulfil the demand of water for labours involved in construction, demand of water for construction and demand of soil for construction. Post construction, the pond was reconstructed into temple tanks with the left over rocky stones. The left over stones were crafted as stone walls and Ghats. Temple tanks are used for domestic needs of the community, domestic demand of devotees, for rituals connected with temple and for performing float (Theppam) during float festival (Theppa Thiruvizha). The temple tanks are usually connected with water bodies such as irrigation tanks, rivers, irrigation channels and runoff from hill locks for feeding of water. Few natural springs in the vicinity of the temples are considered as 'Theertham'. In some places, the springs are designed as temple tanks for better accessibility. Theerthams are considered as holy and the water is used for spiritual purpose.

Structurally the temple tanks have proper stone walls to avoid sliding of soil, Ghats with stone steps for better accessibility, Madapams at center of the tank- a special seating arrangement for kings and kingsmen for better visualisation during theppam festival, inlets connected to feeder channel with shutter and outlets with surplus channel with shutter for control over flow of water. The temple tanks are not sealed at the bottom, which allows the water to recharge the ground water aquifers. Similar to other water bodies, temple tanks are also affected adversely due to Urbanization. The feeder channel for few temple tanks are polluted, therefore the shutters remain closed to avoid entry of sewage into the tank. Feeder channel of few tanks are encroached or destroyed which results in empty tank. Outlet channels of the tank are completely encroached which leads to inundation of the surrounding area during heavy rainfall. The side walls, parapet walls, steps in Ghats are damaged or encroached which makes the temple tank structurally weak and inaccessible.

The temple tanks are not only structurally weak but also polluted due to various reasons. As feeder channels are

dumped with sewage and solid waste by neighbourhoods, water that flows through it flushes away and deposits in the temple tank. This enhances organic loading of the temple tank water which complicates the ecosystem of the tank. Few temple tanks are leased for lotus and fishes. Lotus is allowed to invade the tank which suffocates life in the tank. In few tanks, fishes are completely harvested from the tank. This affects the food chain of the tank leading to collapse of bioremediation of the tank. This deteriorates the quality of water and pushes away communities from accessing the water.

Geologically, Granitic (Granites, Charnockites and Gneisses) rocks underlie most of Madurai, while alluvium along the river courses.

- 1) Groundwater is at a depth of 7 to 8 m along the river courses. The ground water is in unconfined aquifer conditions in the spits and bars along the meanders and on the flood plains beyond the banks of river Vaigai.
- 2) Groundwater is at a depth of 30 to 40 m in the granitic rocks. The ground water is in Semi to unconfined conditions in the weathered residuum of the granitic rocks in regions beyond the rivers.
- 3) Groundwater is at a depth of 50 to 100 m in the Inter-connected shallow to deeper fractures. The groundwater is in semi-confined to confined conditions.

The geological nature of Madurai clearly indicates that most of the temple tanks are hot spots for ground water recharge. Therefore, it is important to harvest higher quantity of water for better recharge, with better quality to avoid contamination of ground water aquifers.

As there is no command area for Irrigation tanks in Madurai Urban, stakeholders ownership is weak. But this is not the case of temple tanks. The temple exists, local residential association exists, and devotees also exist. It is time for revisiting temple tanks, restoring temple tanks and reviving its utility because these are the few blue spots in urban concrete fabrics. This issue of 'Water Watch' throws limelight on the temple tanks in and around Madurai Urban.

Azhagar Kovil Temple Tank



10.074345, 78.215730



Location: It is located in foot of Azhagar Hills, in front of the Kal Azhagar Temple with Dimensions 150 ft x 300 ft.

Inlet: Storm water runoff from the temple premises is collected and supplied to the tank through a stone channel.

Outlet: There is no proper outlet structure in the tank. If the tank is full, then the inlet channel is blocked and the water is diverted to the downstream bypassing the tank.

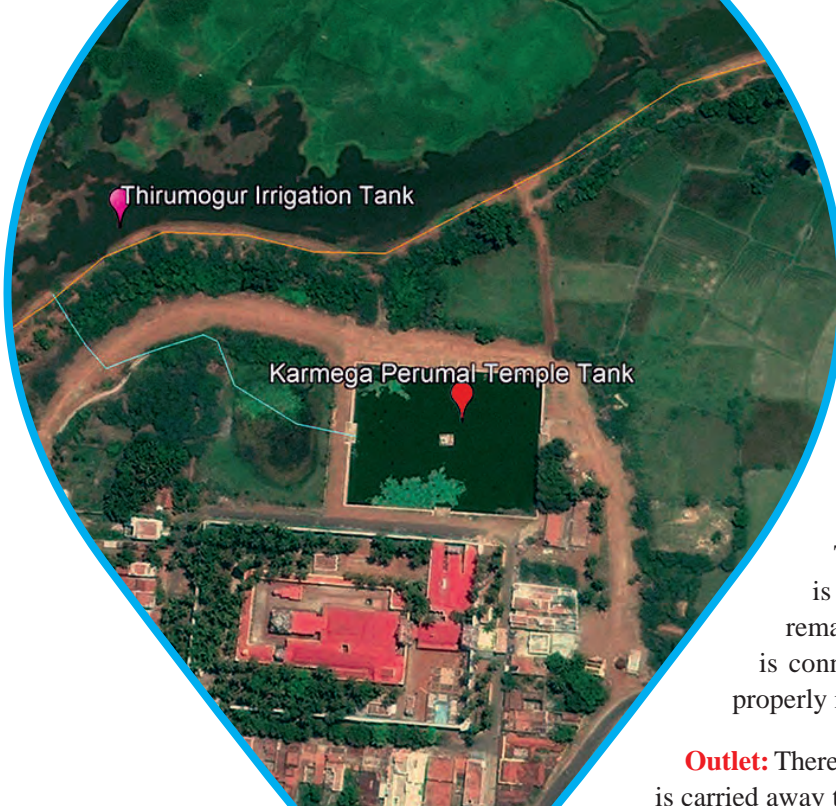
Structural Description: The tank is constructed with stone masonry side walls. The temple is having access in all directions. As the plants growing in-between the stone walls and steps are not removed in regular intervals, the bondage between wall stones and step stones are getting weaker. This is making the structure weaker and it may cause collapse of walls and steps if not addressed in time. As the Catchment Area for the tank is restricted to portion of the temple premises, water reaching the tank is minimal.

Description of Infection: The water in the tank is highly polluted because of disposing organic, inorganic and plastic materials as part of rituals. The water is green in colour. Samples revealed that the colour is due to Algal suspension. There is a common toilet in south of the temple tank. The faecal sludge management in this toilet is worst. Faeces are exposed to surface. During rainfall, the faecal sludge may get mixed with the storm water. This might pollute the temple tank to severe extent. Presence of reed in the tank shows the presence of silt depositions in the temple tank.


Functional Description: As the water in the tank is less than 10% of the total capacity and the quality of water is poor, access to water in temple tank is restricted. The water level in the tank does not reduce much even in the non rainy season. It shows that the tank is not contributing much to the ground water.



Recommendations: The tank should be desilted to improve ground water recharge from the tank. The toilet near the tank must be repaired for proper faecal sludge Management. The plants growing between joints of stones in wall and stairs must be removed and proper bonding between stones must be carried out. Catchment Area of the temple tank shall be increased by proper rain water harvesting design. Weed and plastic wastes floating or sedimented in the tank should be cleaned. Disposal of ritual materials should be regulated in a way that it will not contaminate the water.



Karmega Perumal Temple Tank

 9.951724, 78.207302

Location: It is located in Thirumogur Village of Madurai District, besides Karmega Perumal Temple with Dimensions 230 ft x 300 ft. There is a small mandapam in the center of the tank.

Inlet: The Temple Tank receives water through a feeder channel feeding water from Thirumogur Irrigation Tank. The inlet channel is lined to certain extent from tank sluice and remains unlined till it feeds a small pond which is connected to the temple tank. The channels are properly maintained.

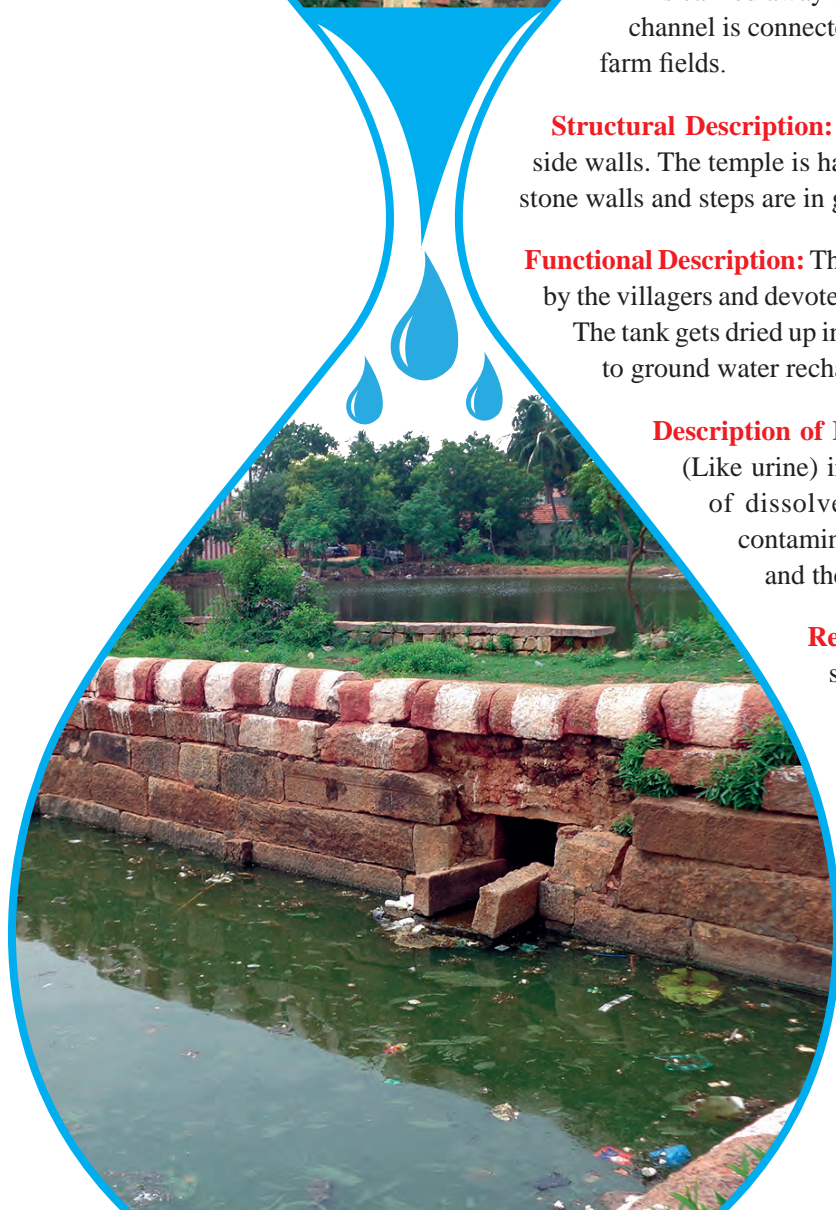
Outlet: There is proper outlet in the tank and the outlet water is carried away through an open unlined channel. The surplus channel is connected to irrigation channel that takes water to the farm fields.

Structural Description: The tank is constructed with stone masonry side walls. The temple is having access in all 4 directions via Ghats. The stone walls and steps are in good condition and well maintained.

Functional Description: The water is used for domestic and ritual purpose by the villagers and devotees. People wash clothes, take bath in this tank. The tank gets dried up in late monsoon season and the tank contributes to ground water recharge too.

Description of Infection: The tank water is slight yellowish (Like urine) in colour. The colour may be due to presence of dissolved solids present in the water which was contaminated by the detergents, soaps, ritual disposals and thermocol pieces.

Recommendations: Regular cleaning of floating solids disposed in the temple tank should be addressed in regular intervals.



Marugaal Udaiya Ayyanar Temple Tank

 9.952446, 78.168055

Location: It is located in Uthangudi Village of Madurai District, behind Uthangudi Irrigation Tank. The temple tank is in front right corner of the Marugaal Udaiya Ayyanar Temple.

Inlet: Storm water runoff from the temple premises and nearby areas is collected and supplied to the tank through 6 inch pipes.

Outlet: There is a provision for the outlet in the tank but the provision has been chocked and currently not functional

Structural Description: The tank is constructed with stone masonry side walls. The parapet walls are constructed by brick masonry and were plastered by cement mortar. The temple is having access in two opposite directions only via Ghats. The walls and steps are in good condition and well maintained. There is an open well inside the tank. A bore and pipe set up was established to pump water for domestic usage of communities. The tank is heavily silted.


Functional Description: As the water in the tank is less than 20% of the total capacity and the quality of water is poor, people are not accessing the water. Siltation of the tank reduces its ground water contribution.

Description of Infection: The open space around the temple tank is used as cow sheds. The area is highly polluted by cow dung and urine. The storm water used to carry all these wastes along with it before entering the temple tank. The water is 'slightly higher yellowish' than Thirumogur Temple Tank. The well is full of solid waste disposals.

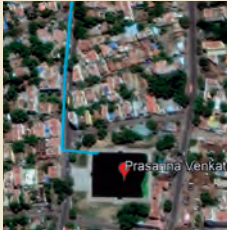
Recommendations: The temple tank should be completely desilted and cleaned. A regulatory mechanism such as 'temple tank association' should be established to maintain the tank and restrict solid waste disposals. The catchment area of the tank should be prohibited for cow sheds. The catchment area of the temple tank should be increased by proper rain water harvesting design. Possibilities of feeding the temple tank from Uthangudi tank surplus shall be explored. The outlet channel is to be restored.



Prasanna Venkatachalapathy Temple Tank

 9.933913, 78.134373

Location: It is located in Thallakulam, about 100 m away from the Prasanna Venkatachalapathy Temple, with Dimensions 200 ft x 250 ft. The renovation is carried out at a cost of Rs.60 lakh in the year of 2014. The temple tank hosts the yearly 'theppam' or float festival organized as a part of 'Purattasi Brahmotsavam' celebrations.



Inlet: The Temple Tank receives water through a feeder channel that receives water from one of the sub channel of Periyar Main Canal. As sewage is disposed in this sub channel, the inlet gate remains closed until water is released in Periyar Sub Channel. The feeder channel is highly polluted by solid waste disposals and sewage.

Outlet: There is a provision for the outlet in the tank but the provision has been chocked and currently not functional. Remains shut.

Structural Description: The tank is constructed with stone masonry side walls. The parapet walls are constructed by brick masonry and were plastered by cement mortar. The temple is having access in all 4 directions via Ghats. The stone walls and steps are in good condition and well maintained by the temple's authorities. A paver block pathway is being laid around the tank for the public to walk. Stone benches are also going to be set up there and work is on to plant small trees. Besides the tank area is also a children's play area.


Description of Infection: As the Periyar water flowing through feeder channel flushed and carried away solid waste disposals and sewage, the temple tank was polluted by it. The water looks green due to algal growth in the sewage mixed tank water.

Functional Description: The temple tank premises are kept open only during 'Purattasi' month. Rest of the period it remains shut. The Children play space was not utilized and so it got ruined. As the outlet channel is not functioning, at full tank condition inundation happens when there is heavy rain. The tank is contributing majorly for the ground water recharge.

Recommendations: The tank is to be regularly cleaned to remove floating and settleable solids which was flushed by feed water. The outlet channel is to be restored and the tank space is to be opened for public usage.



Koodal Azhagar Temple Tank

 9.918201, 78.113984



Location: This temple tank was built in order to host the float festival in the Tamil month of 'Masi'. This Sangam old tank is having dimensions 240 ft x 260 ft. There is a mandapam in middle of the tank.

Inlet: The Temple Tank once received water from Vaigai river. As the connection was broken due to poor town planning, the tank was never full for past two decades.

Outlet: There is no outlet provision.


Structural Description: The parapet wall, Ghats, open space of the tank around it was completely encroached by row of shops in all directions. Though encroachment was evicted partly in south direction, the demolished building debris was left unaddressed. The side walls and Ghats of the tanks are also damaged.

Description of Infection: People urinate in the southern Ghat where shops were partly evicted.

Functional Description: As there is no water and no way to access the water, it is dysfunctional.

Recommendations: As per the tank boundary, encroachments should be evicted completely and building debris should be disposed properly. The feeder channel is to be provided for drawing water from existing storm water drainage running parallel to the tank in north direction. Ghats, Parapet and side walls are to be restored. Local Catchment Area has to be increased by proper Rainwater harvesting design.

Thiruvappudayar Temple Tank

 9.930033, 78.122881

Location: It is located in Sellur, besides Thiruvappudayar Temple. The Tank is completely ruined.

Structural Description: The tank walls are completely broken and slumped inward, along the slope. The tank is completely damaged and ignored.

Recommendations: The tank has to be structurally restored and rain water harvesting is to be designed so that it shall be a percolation tank in densely populated Sellur area.



Saravana Poigai

 9.877065, 78.074725

Location: It is located in eastern side of Thiruparankundram Hill lock. It is having water spread area of 4.5 Acres. The temple tank is having a well maintained mandapam inside it.

Inlet: There is no inlet channel for the tank. The tank receives runoff water flowing from the hill lock.

Outlet: There is proper outlet provision for this tank that disposes surplus water to the adjacent pond.

Structural Description: The temple tank is having steps in shore area. The steps, fences and walls are in good condition.


Functional Description: The water is used for domestic and ritual purpose by the villagers and devotees. People wash clothes, take bath in this tank. The tank never gets dried up due to its rocky bed.

Description of Infection: As the fishes in the tank were caught completely, it led to collapse of the tank ecosystem leading to poor 'greenish water' which smells bad and itches when taking bath. Number of people using it has reduced drastically.

Recommendations: The ecosystem of the tank has to be restored efficiently with proper solid waste management.



Thiruparankundram Theppam

 9.882071, 78.069968

Location: It is located in Thiruparankundram along the GST Road. The dimension of the theppakulam is 500ft x 500ft. There is a small mandapam in the center of the tank. The theppam is 700 meters away from Thirupparankundram Subramaniasami Temple

Inlet: The temple tank receives water from one of the sluice of Thenkal Tank. The inlet channel is still functional.

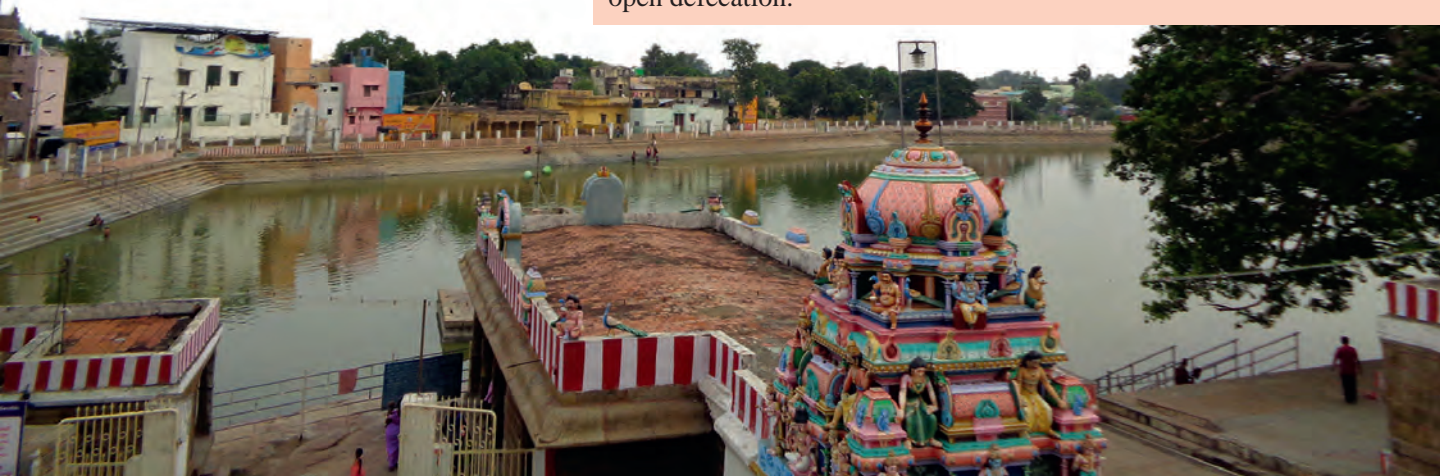
Outlet: There is no outlet for the temple tank. Once the tank is full, inlet channel is closed to avoid further filling of the tank.

Structural Description: The stone masonry side walls of the tank are well maintained. The temple is having access in all 4 directions via Ghats. The mandapam and the Ghats are in a good condition.

Description of Infection: The tank water is highly infested with weed grass and algae. The tank is dumped with floatable and settle able solid wastes.

Functional Description: The temple tank is not accessed by communities. It is subjected to open defecation, despite the presence of a public toilet very close to the tank and household waste disposal by the neighbourhoods. The water in the tank is contributing to the ground water.

Recommendations: The temple tank must be desilted and cleaned. The common toilet which is located near to the temple tank should be repaired and functional, so that people will not access the tank for open defecation.



Sri Yoga Narasinga Perumal Temple Tank

9.967113, 78.189454



Location: It is located in Narasingam, Y.Othakadai at the foot of Yanaimalai. The water spread area is about 1.38 acres. The temple tank is located besides the temple in north.

Inlet: There is no separate inlet channel. The tank receives runoff water flowing from the hill lock. The tank never gets dried up due to its rocky bed.

Outlet: There is an outlet in the north of the temple tank. The outlet channel is functional.

Structural Description: The tank is constructed with stone masonry side walls. The temple is having access in all 4 directions via Ghats. The bondage between stone walls is poor resulting in dismantling of walls. The same has been seen with the steps in Ghats. The steps are poorly maintained and need to be repaired. The recent brick masonry retaining wall was also broken.

Description of Infection: About 90% of the temple tank is covered by lotus. This suffocates the carps in the tank water. Lot of fishes can be visualized near the Ghats where lotus is absent. Ritual Wastes are disposed by the devotees. Along with ritual materials, devotees dispose plastic bags too. This further complicates the ecosystem of the tank. The tank water is slight greenish in colour with floatation of oil, duck weeds and algae.

Functional Description: The tank is leased every three years for lotus. Though local beliefs are against fishing, deprived communities do fishing from the temple tank. The entire tank was cleaned about 10 years ago for the temple kumbabishegam. The water is used for ritual purposes only. The groundwater contribution of the tank is minimal due to the rock bed.

Recommendations: The tank is to be desilted and cleaned up to remove solid wastes. The stone walls and Ghats are to be repaired. The parapet walls are to be reconstructed. Appropriate ritual solid waste management has to be implemented. Lotus infestation has to be restricted to one third of the tank water spread area for better ecosystem.

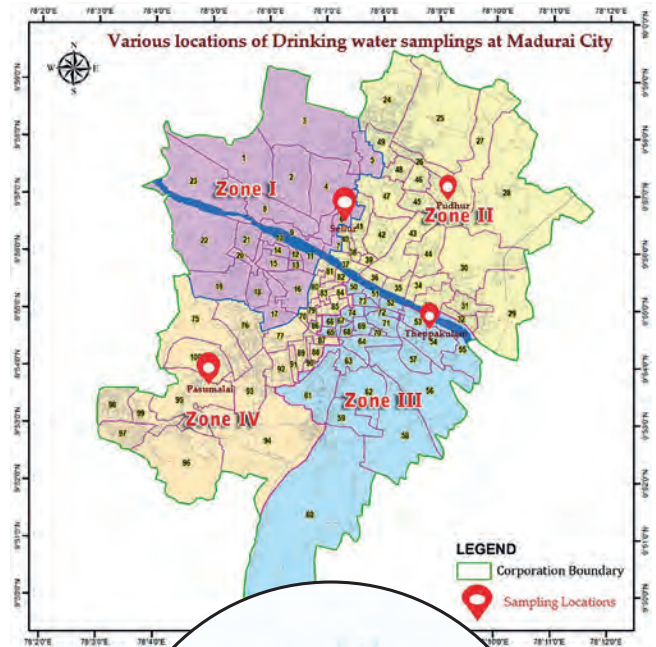


Baseline Assessment Water and Scenario Analysis

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 at the same location. 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**



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



Bore well water- Ground water

Different Sources of Drinking Water in Madurai City



Zone 1 - Corporation Water

TOTAL DISSOLVED SOLIDS 178 mg/l 	TURBIDITY 0.5 NTU 	pH 7.3 	TOTAL ALKALINITY AS CaCO₃ 88 mg/l
TOTAL HARDNESS AS CaCO₃ 80 mg/l 	CALCIUM (Ca) 16 mg/l 	MAGNESIUM (Mg) 10 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0.056 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 2 mg/l 	CHLORIDE (Cl) 20 mg/l
FLUORIDE (F) 0.2 mg/l 	SULPHATE (SO₄) 3 mg/l 	PHOSPHATE (PO₄) 0.007mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.



Zone 1 - Packaged Can Water

TOTAL DISSOLVED SOLIDS 44 mg/l 	TURBIDITY 0 NTU 	pH 7.2 	TOTAL ALKALINITY AS CaCO₃ 20 mg/l
TOTAL HARDNESS AS CaCO₃ 16 mg/l 	CALCIUM (Ca) 3 mg/l 	MAGNESIUM (Mg) 2 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0.08 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 3 mg/l 	CHLORIDE (Cl) 64 mg/l
FLUORIDE (F) 0.6 mg/l 	SULPHATE (SO₄) 7 mg/l 	PHOSPHATE (PO₄) 0.007mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.

Within acceptable limits
 Within Permissible limits
 Exceeds permissible limits



Zone 1 - Corporation Lorry Water

TOTAL DISSOLVED SOLIDS 161 mg/l 	TURBIDITY 0 NTU 	pH 7.5 	TOTAL ALKALINITY AS CaCO₃ 80 mg/l
TOTAL HARDNESS AS CaCO₃ 84 mg/l 	CALCIUM (Ca) 16 mg/l 	MAGNESIUM (Mg) 12 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 1 mg/l 	CHLORIDE (Cl) 16 mg/l
FLUORIDE (F) 0.2 mg/l 	SULPHATE (SO₄) 2 mg/l 	PHOSPHATE (PO₄) 0 mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.



Zone 1 - Ground Water

TOTAL DISSOLVED SOLIDS 1624 mg/l 	TURBIDITY 0.3 NTU 	pH 7.5 	TOTAL ALKALINITY AS CaCO₃ 420 mg/l
TOTAL HARDNESS AS CaCO₃ 480 mg/l 	CALCIUM (Ca) 96 mg/l 	MAGNESIUM (Mg) 58 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0.32 mg/l 	NITRITE (NO₂) 0.005 mg/l 	NITRATE (NO₃) 16 mg/l 	CHLORIDE (Cl) 400 mg/l
FLUORIDE (F) 1.2 mg/l 	SULPHATE (SO₄) 82 mg/l 	PHOSPHATE (PO₄) 0.007 mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

IT IS OBSERVED THAT WATER IS HARD BECAUSE OF THE PRESENCE OF CALCIUM AND MAGNESIUM. TOTAL DISSOLVED SOLIDS(TDS) EXCEEDS ACCEPTABLE LIMIT. IT DOES NOT HAVE DIRECT HEALTH EFFECTS BUT SOLIDS WHICH CAUSES HIGHER 'TDS' MAY BE HARMFUL TO HUMAN HEALTH. HIGHER LEVEL OF FLUORIDE IN DRINKING WATER MAY CAUSE BONE DISEASES AND DENTAL FLUOROSIS. THIS WATER IS **NOT** RECOMMENDED FOR DRINKING. BUT IF THERE IS NO OTHER SOURCE OF DRINKING WATER, THEN IT SHALL BE CONSUMED.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits



Zone 2 - Corporation Water

TOTAL DISSOLVED SOLIDS 214 mg/l 	TURBIDITY 0.5 NTU 	pH 7.65 	TOTAL ALKALINITY AS CaCO₃ 96 mg/l
TOTAL HARDNESS AS CaCO₃ 84 mg/l 	CALCIUM (Ca) 16 mg/l 	MAGNESIUM (Mg) 11 mg/l 	IRON (Fe) 0.16 mg/l
FREE AMMONIA (NH₃) 0.16 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 1 mg/l 	CHLORIDE (Cl) 28 mg/l
FLUORIDE (F) 0.2 mg/l 	SULPHATE (SO₄) 10 mg/l 	PHOSPHATE (PO₄) 0.01mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS EXCEPT IRON. PRESENCE OF IRON MAY ADD RUSTY TASTE TO WATER. IT MAY ALSO CAUSE STOMACH ILLNESS. BIO SAND FILTERS ARE BEST IN REMOVING IRON IN WATER. THEREFORE THE WATER IS RECOMMENDED FOR DRINKING AFTER FILTERING IT IN BIO SAND FILTER.



Zone 2 - Packaged Can Water

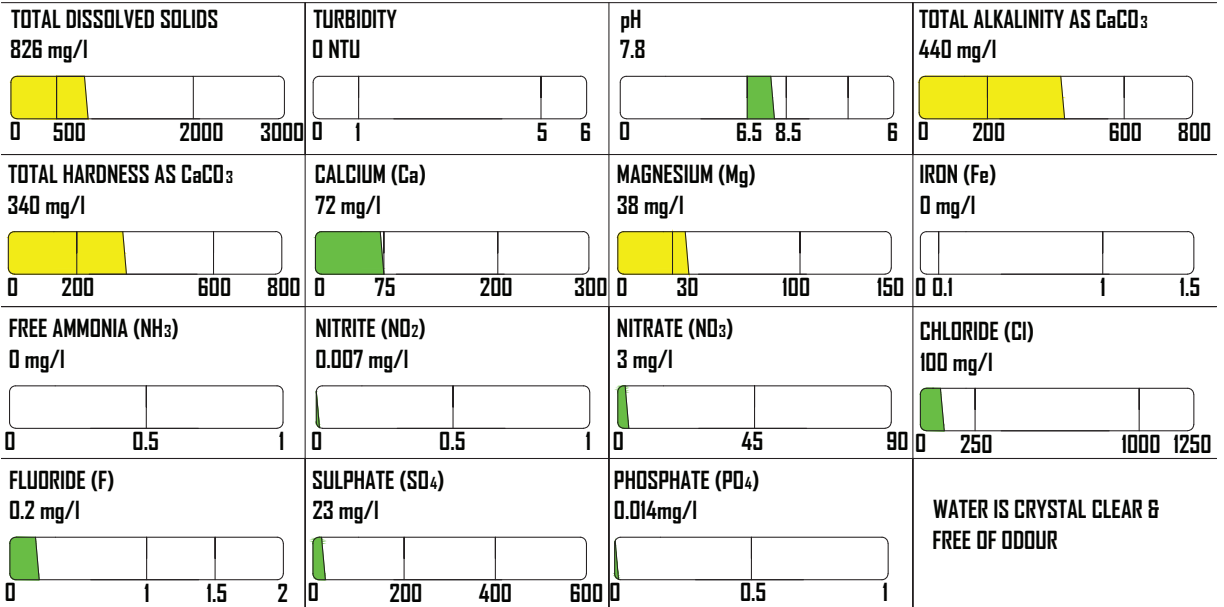
TOTAL DISSOLVED SOLIDS 46 mg/l 	TURBIDITY 0 NTU 	pH 6.8 	TOTAL ALKALINITY AS CaCO₃ 20 mg/l
TOTAL HARDNESS AS CaCO₃ 16 mg/l 	CALCIUM (Ca) 3 mg/l 	MAGNESIUM (Mg) 2 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 0 mg/l 	CHLORIDE (Cl) 8 mg/l
FLUORIDE (F) 0.2 mg/l 	SULPHATE (SO₄) 2 mg/l 	PHOSPHATE (PO₄) 0 mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits



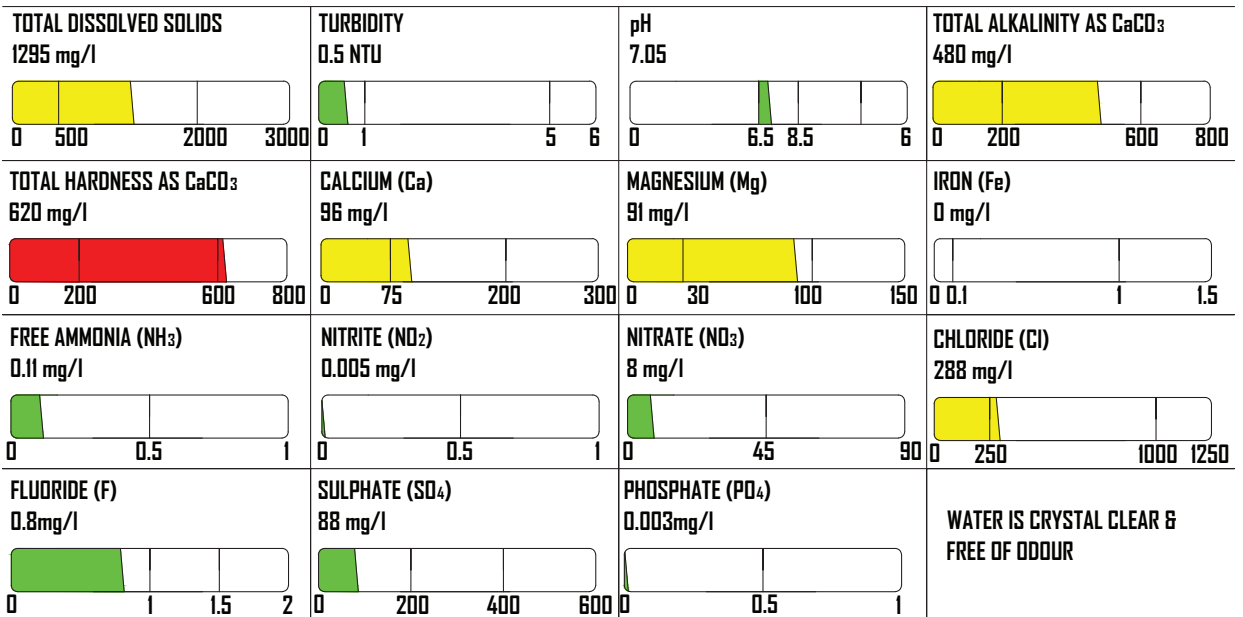
Zone 2 - Ground Water



IT IS OBSERVED THAT WATER IS HARD BECAUSE OF THE PRESENCE OF CALCIUM AND MAGNESIUM. TOTAL DISSOLVED SOLIDS(TDS) EXCEEDS ACCEPTABLE LIMIT. IT DOES NOT HAVE DIRECT HEALTH EFFECTS BUT SOLIDS WHICH CAUSES HIGHER 'TDS' MAY BE HARMFUL TO HUMAN HEALTH. THIS WATER IS **NOT** RECOMMENDED FOR DRINKING. BUT IF THERE IS NO OTHER SOURCE OF DRINKING WATER, THEN IT SHALL BE CONSUMED.



Zone 3 - Ground Water

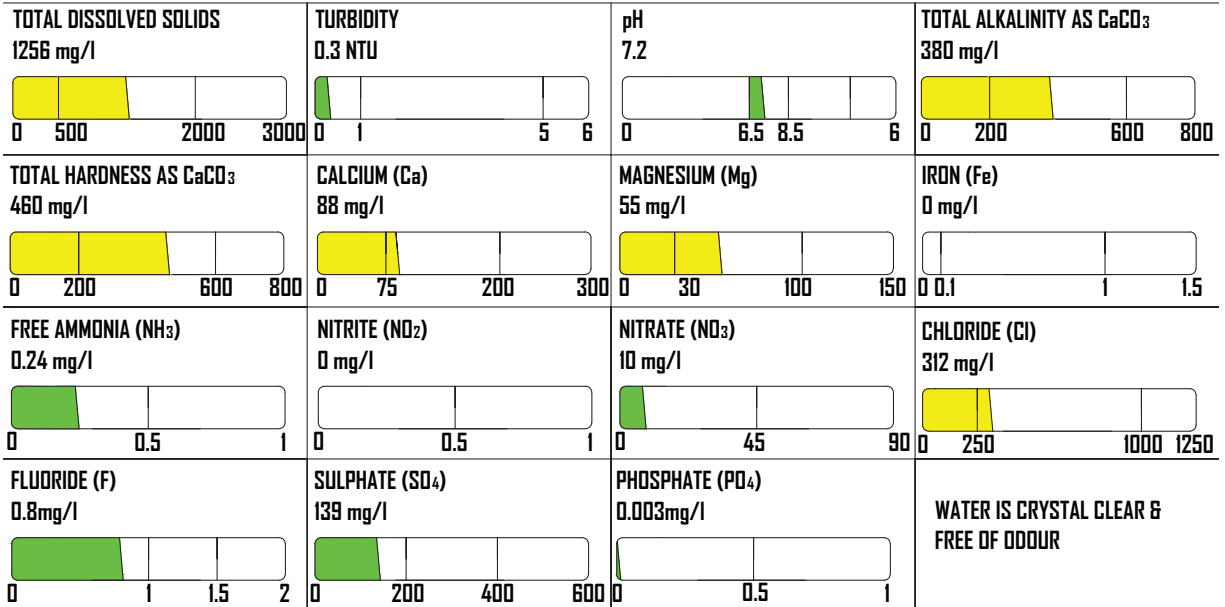


IT IS OBSERVED THAT WATER IS HARD BECAUSE OF THE PRESENCE OF CALCIUM AND MAGNESIUM. TOTAL DISSOLVED SOLIDS(TDS) EXCEEDS PERMISSIBLE LIMIT. IT DOES NOT HAVE DIRECT HEALTH EFFECTS BUT SOLIDS WHICH CAUSES HIGHER 'TDS' MAY BE HARMFUL TO HUMAN HEALTH. THIS WATER IS **NOT** RECOMMENDED FOR DRINKING.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits



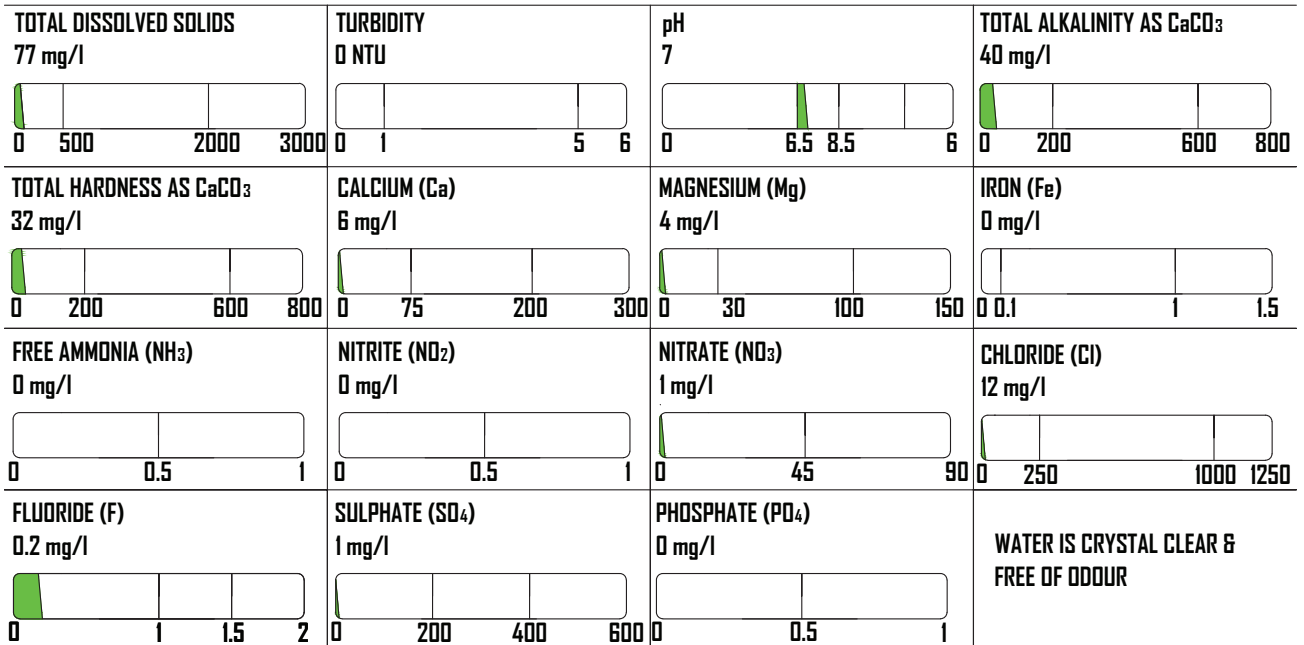
Zone 3 - Corporation Lorry Water



IT IS OBSERVED THAT WATER IS HARD BECAUSE OF THE PRESENCE OF CALCIUM AND MAGNESIUM. TOTAL DISSOLVED SOLIDS(TDS) EXCEEDS ACCEPTABLE LIMIT. IT DOES NOT HAVE DIRECT HEALTH EFFECTS BUT SOLIDS WHICH CAUSES HIGHER 'TDS' MAY BE HARMFUL TO HUMAN HEALTH. THIS WATER IS **NOT** RECOMMENDED FOR DRINKING. BUT IF THERE IS NO OTHER SOURCE OF DRINKING WATER, THEN IT SHALL BE CONSUMED.



Zone 3 - Corporation Water

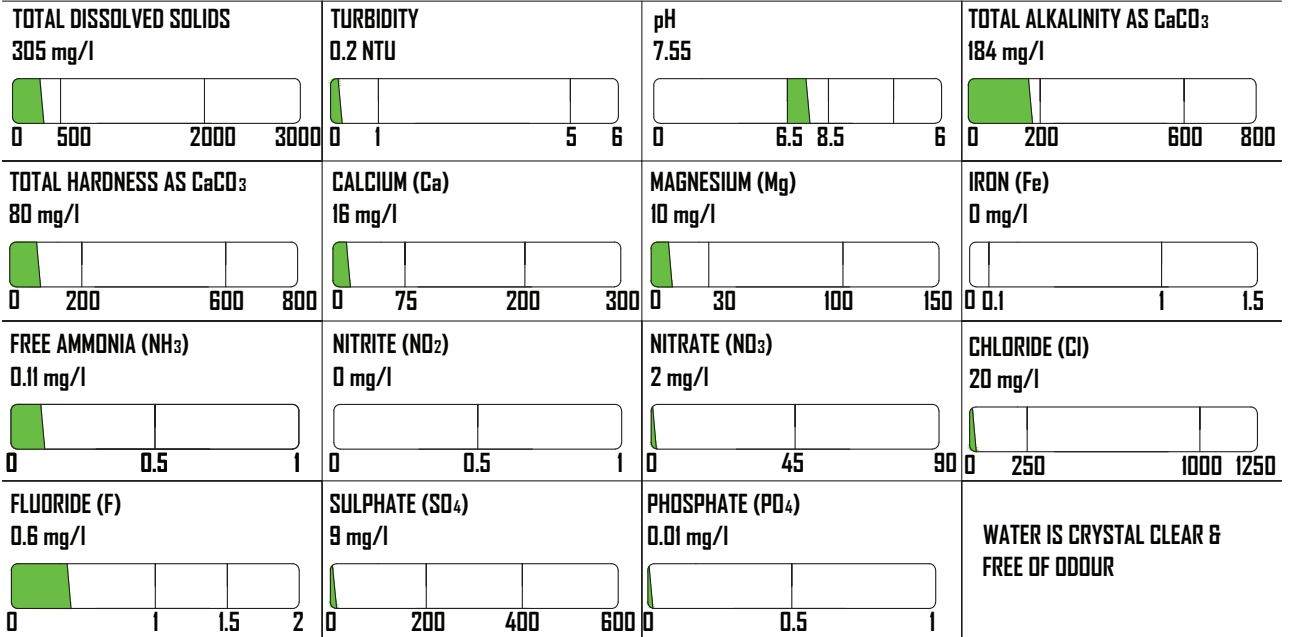


ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits



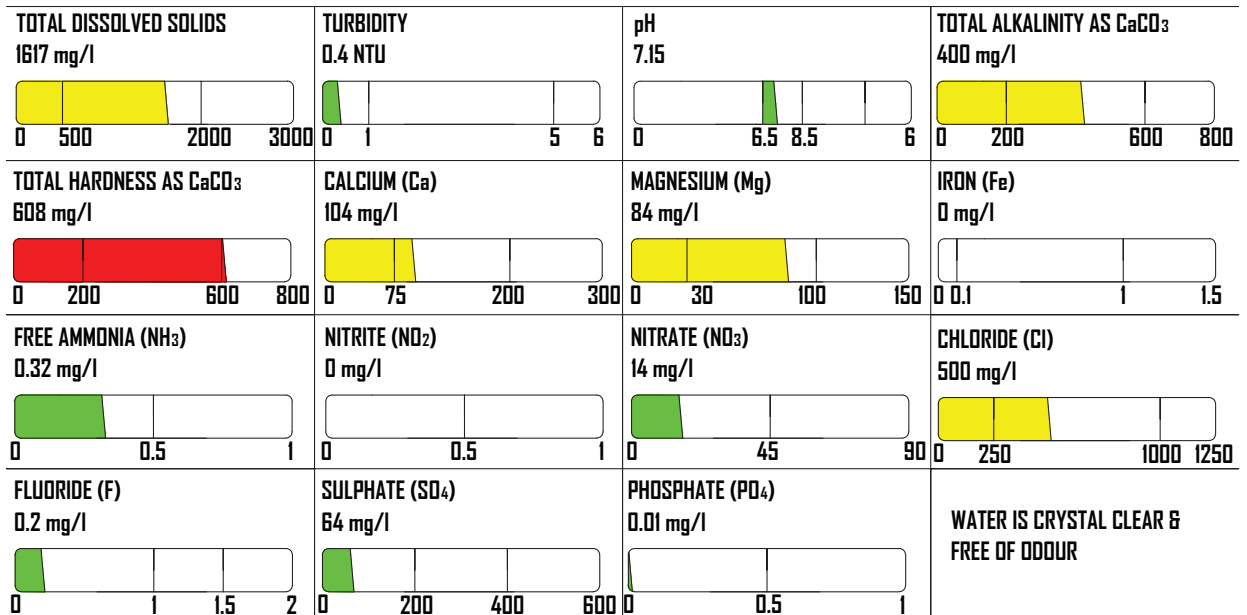
Zone 3 - Packaged Can Water



ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.



Zone 4 - Ground Water



IT IS OBSERVED THAT WATER IS HARD BECAUSE OF THE PRESENCE OF CALCIUM AND MAGNESIUM. TOTAL DISSOLVED SOLIDS(TDS) EXCEEDS PERMISSIBLE LIMIT. IT DOES NOT HAVE DIRECT HEALTH EFFECTS BUT SOLIDS WHICH CAUSES HIGHER 'TDS' MAY BE HARMFUL TO HUMAN HEALTH. THIS WATER IS **NOT** RECOMMENDED FOR DRINKING.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits



Zone 4 - Corporation Water

TOTAL DISSOLVED SOLIDS 308 mg/l 	TURBIDITY 0.2 NTU 	pH 7.05 	TOTAL ALKALINITY AS CaCO₃ 108 mg/l
TOTAL HARDNESS AS CaCO₃ 88 mg/l 	CALCIUM (Ca) 16 mg/l 	MAGNESIUM (Mg) 12 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0.08 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 3 mg/l 	CHLORIDE (Cl) 64 mg/l
FLUORIDE (F) 0.6 mg/l 	SULPHATE (SO₄) 7 mg/l 	PHOSPHATE (PO₄) 0.007 mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.



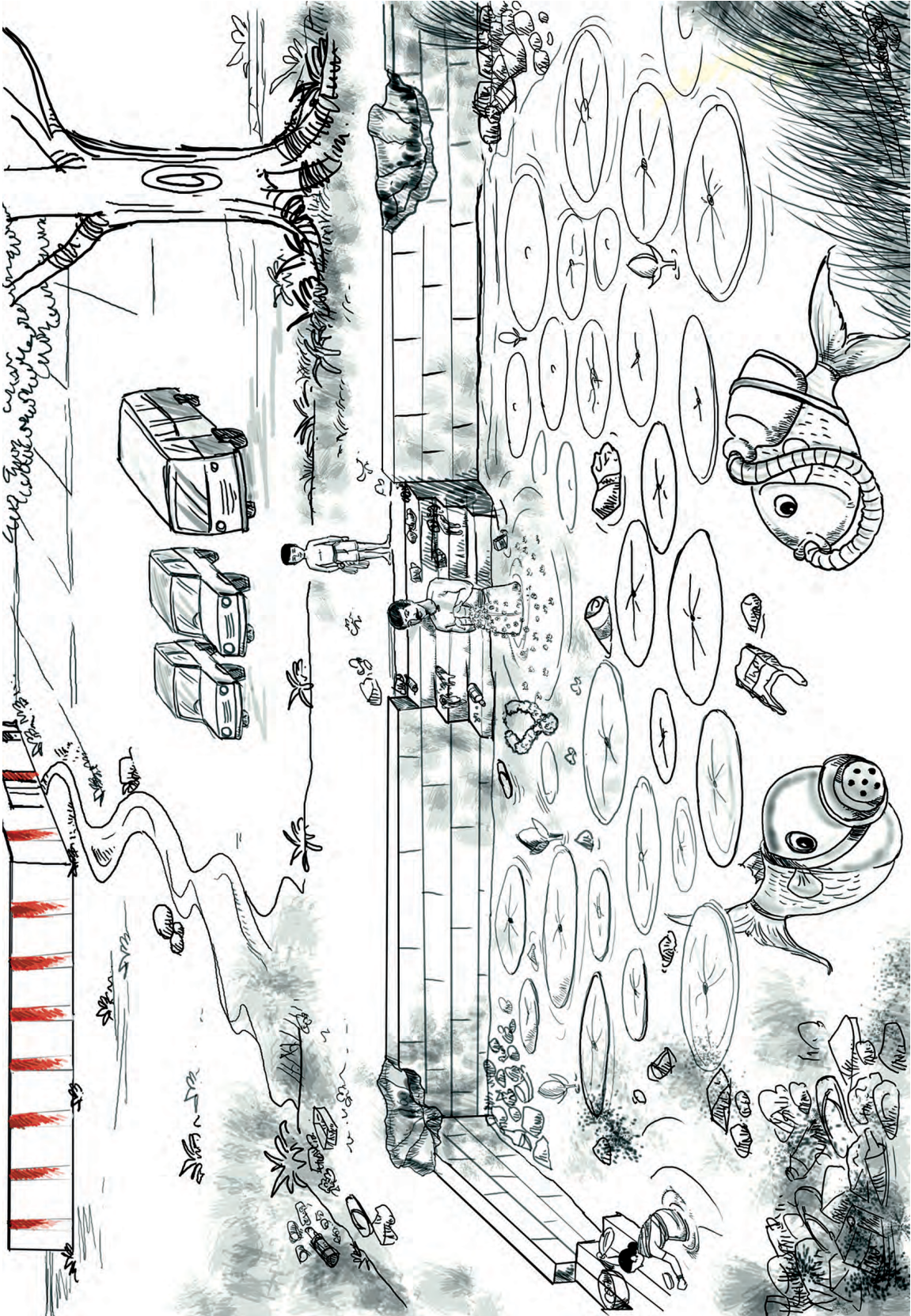
Zone 4 - Packaged Can Water

TOTAL DISSOLVED SOLIDS 82 mg/l 	TURBIDITY 0 NTU 	pH 7.7 	TOTAL ALKALINITY AS CaCO₃ 36 mg/l
TOTAL HARDNESS AS CaCO₃ 40 mg/l 	CALCIUM (Ca) 8 mg/l 	MAGNESIUM (Mg) 5 mg/l 	IRON (Fe) 0 mg/l
FREE AMMONIA (NH₃) 0 mg/l 	NITRITE (NO₂) 0 mg/l 	NITRATE (NO₃) 1 mg/l 	CHLORIDE (Cl) 16 mg/l
FLUORIDE (F) 0.2 mg/l 	SULPHATE (SO₄) 2 mg/l 	PHOSPHATE (PO₄) 0 mg/l 	WATER IS CRYSTAL CLEAR & FREE OF ODOUR

ALL THE DRINKING WATER PARAMETERS ARE WITHIN THE ACCEPTABLE LIMITS. THEREFORE THE WATER IS RECOMMENDED AS SAFE FOR DRINKING.

■ Within acceptable limits
 ■ Within Permissible limits
 ■ Exceeds permissible limits

Ecotoon



Meteorological Updates

Rainfall Data

Station Name: DHAN Central Office, Madurai

Device: Automated rain gauge.

Average Annual rainfall for Madurai: 840mm

August 2018- Rainy days

Date	Intensity(mm/d)
02/08/2018	6
03/08/2018	2
15/08/2018	3
24/08/2018	6
25/08/2018	4
26/08/2018	6
27/08/2018	1
30/08/2018	1
31/08/2018	57
Total rainfall	86mm



Percentage of August month's rainfall (at DHAN Station alone) from Annual average of Madurai: 9.7% of 840mm

Temperature Data

	Temperature	Humidity	Pressure
High	38 °C (2 Aug, 14:30)	91% (27 Aug, 20:30)	1010 mbar (27 Aug, 20:30)
Low	24 °C (31 Aug, 23:30)	28% (21 Aug, 14:30)	1001 mbar (3 Aug, 17:30)
Average	31 °C	55%	1006 mbar

* Reported 1 Aug 02:30 — 31 Aug 23:30, Madurai. Source: CustomWeather, © 2018



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



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