



# **A Report on Reduction of Non Revenue Water in Kundapura Municipal Water Supply**

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## **(1) Background**

Kundapura is a prominent town in Udupi district and developing along the western coast line of Karnataka. It is famous for fishing and tile factory activities. The town is surrounded by water bodies on three sides. On the west there is Arabian Sea, on the north is the Gangolli river and to the east it is bounded by Halladi river. National Highway No. 17 passes through the town linking it to Mangalore at the south and Mumbai at north. The town is also connected by the Konkan Railway, which links it to Kerala at south and Mumbai at north. The famous pilgrimage temple Kollur is situated at a distance of 37Km and Sri Krishna temple of Udupi is located at a distance of 35Km from Kundapura.

Kundapura has more or less even topography unlike other costal towns of Karnataka having scattered growth at outskirts. Interior roads are very narrow due to property density, environment is corrosive, humid climate and temperature is normally 32 to 37 degree Celsius during summer. Rainfall during monsoon is high to very high (3200 to 3700mm) with depth of ground water table is at 2 to 3m below ground level. The soil type is of entirely Lateritic.

The Town Municipal Council came into existence in the year 1973. The main town of Kundapura & Kodi Island constitute the municipal limits of Kundapura. The integrated town is having an area of 11.84 Sq Km with 23 Administrative wards. Population of the town is 28591 as per the census 2001 and present population is around 32000. Projected population of Kundapura for the year 2016 and 2026 is 37094 and 43049 respectively. Population growth, floating population, urbanization and industrialization have increased significantly in recent years.

## **(2) Situation prior to the initiative**

Since formation of TMC in the year 1973, the source of water supply for Kundapura was ground water. It continued till the year 2006. There were 11 open wells maintained by town municipal council for supplying the water to entire town. Water was supplied from these wells for drinking purpose without any treatment. Monitoring of water quality was not in practice. Water from some of the 11 wells was pumped to the nearby OHT's

located at various places within the town and then distribution used to take place. In some parts of the town, water from open wells was pumped directly to the distribution lines. The total quantity of water supply before the initiative was 0.6MLD with a supply rate of 23 LPCD, which was practically inadequate. There were 405 house connections and 1100 public stand posts in the old system.

**The details of Elevated Service Reservoirs in the Old Scheme**

<b>SI.No</b>	<b>Location</b>	<b>Type</b>	<b>Capacity (Lakh Liters)/ Staging height (M)</b>
1	Gandhi park	OHT	4.50/12m
2	Ferry Road	OHT	0.5/12m
3	Maddugudde	OHT	0.5/9m
4	Ashraya Colony	OHT	0.50/12m

The previous water supply system had 29Km of distribution lines of diameter ranging from 50mm to 200mm PVC and covered only about 60% of the road length. Most of these lines were leaking and damaged. Also most of the valves were not functioning as expected.

There used to be scarcity of water supply during summer due to inadequate water availability in the existing 11 open wells. Because of this kind of situations, there used to be no sufficient water pressure in many parts of the town. Hence, water was supplied through tankers to meet the basic demand of the town. The revenue generated through water supply was very meager due to 405 metered tap connections and more than 1100 public stand posts. The demerits of the previous water supply system are listed as follows.

1. Inadequate water supply
2. Untreated Water Supply
3. More number of Public standposts, increased percentage of Non-Revenue Water
4. Insufficient length of distribution lines
5. Maximum amount of leakage due to old PVC pipe network

6. Water scarcity during summer seasons
7. Only 2 hrs of water supply per day
8. Maintenance of Open wells was very tedious & expensive
9. Water storage facility was inadequate
10. Water audit, Energy audit & Recovery audit was absent

### **(3) Objectives and aims**

1. To have sustainable water supply system for the entire town
2. To identify a permanent source of water
3. To supply the Treated water by having water quality monitoring system
4. To increase Water storage capacity
5. To increase in supply level from 23 lpcd to 135 lpcd for households
6. To increase the number of hours of water supply at least to 8Hrs
7. Discouraging the public stand posts
8. Increasing of individual house connections
9. To bring all consumers under 100% metering of efficient revenue collection
10. To maintain entire water distribution system by gravity for energy savings
11. To have fully efficient distribution system including water and energy audit
12. To reduce the quantity of Non-Revenue water in the system

### **(4) Strategies adopted and implementation process**

1. Estimated the water demand up to 2026 AD
2. Identified a permanent source of water supply from the near by river "Jambu" which is 12Km from the town
3. Constructed an Intake well, Jack well, Water treatment plant of capacity 7.6MLD, three new OHT's of capacity 5Lakh liters each, Raw water raising main, Clear water raising main of 13 Km length and 53Km HDPE distribution pipe lines, which covers entire TMC area except Kodi area under KUDCEMP at a cost of 13.1Crores
4. Implemented the water quality monitoring system
5. Reduced the water supply connection deposit amount

6. Revised the water tariff with respect to Kilo liter expenditure
7. Compulsory metered connections
8. Encouraged the public to have individual house connections
9. Allowed the consumer to pay water connection deposit in 3-4 installments
10. Completely stopped the water supply in old distribution lines
11. Reduced the public stand posts in phased manner
12. Meeting the demands for new individual connections within stipulated time by authorizing more number of plumbers
13. Setting up of 24/7 Public Grievance Redresser cell as well as online complaint registration system in TMC's own web site, so that public can lodge their grievances along with the leakage in the water supply network
14. Attending the water leakage complaints within 24 Hrs time

#### **(5) Situation after implementation of initiative**

Because of above said initiatives, Kundapura town is having sufficient quantity of water supply at present

1. Sufficient water supply to the town
2. Sufficient length of distribution lines
3. Because of less number of Public stand posts there is a reduction in percentage of Non- Revenue Water
4. Since distribution lines are of HDPE, less number of leakage problems registered
5. Percentage of Non-Revenue water is drastically come down due to leakage & loss and prompt attending of complaints
6. Treated water supply for a minimum of 6hrs in the town is ensured
7. No drinking water scarcity during summer seasons

**The brief Calculation of daily water supply is given here for understanding**

I. **Residential Supply** =  $(1280*30)/1400 = 38400/1400 = 27.43 \text{ KL/ month/ connection}$

$$\text{Tariff} = (125+24)/28 = 149/28 = \text{Rs.5.32/ KL}$$

II. **Commercial Supply** =  $(20*30)/13 = 600/13 = 46.15 \text{ KL/ month/ connection}$

$$\text{Tariff} = (300+330)/47 = 630/47 = \text{Rs.13.4/ KL}$$

III. **Bulk Supply** =  $(40*30)/2 = 1200/2 = 600 \text{ KL/ month/ connection}$

$$\text{Tariff} = (100+2875)/600 = 2975/600 = \text{Rs.4.96/ KL}$$

IV. **Estimated Revenue generation in a month** = Rs.218280/-

V. **O&M cost for a month** = Rs.230000/-

i.e. Rs.230000 for supplying of 45000 KL = **Rs.5.11/ KL**

<b>Daily Water Supply Distribution pattern of Kundapura</b>		
<b>Category</b>	<b>Quantity in KL</b>	<b>Percentage</b>
Domestic	1280	85.33
Commercial	20	1.33
Bulk	40	2.67
Public Taps	100	6.67
System loss	60	4.00
<b>Grand Total</b>	<b>1500</b>	<b>100</b>

**Summary of Comprehensive Water Balance in Kundapur Town**

Code	Category	Code	Parameter	Unit	Summary
A	ULB Data	A1	Name of ULB	Name	Kundapur
		A2	Name of person filling the form	Name	CMAK
		A3	Telephone number	Number	080-25590332
		A4	Reporting month	Month	Sep-08
		A5	Days in the month	Days	30
		A6	ULB population (present)	Number	28591
		A7	ULB population (supplied)	Number	8005
		A8	Total number of properties	Number	8792
		A9	Average family size	Number	5
		A10	Estimated population of urban poor	Number	3281
		A11	Domestic connections	Number	1400
		A12	Institutional connections	Number	0
		A13	Commercial connections	Number	13
		A14	Industrial connections	Number	0
		A15	Total connections	Number	1413
		A16	Estimated illegal connections	Number	0
		A17	Public taps	Number	50
		A18	Total length of distribution lines	Kilometers	55.5
		A19	Average domestic consumption	Litres/person/day	172
		A20	Average tariff	Rupees/cum	5.11
B	System Input Volume	B1	Volume of water from Source 1	Cum	1300
		B2	Volume of water from Source 2	Cum	0
		B3	Volume of water from borewells	Cum	200
		B4	Total system input volume	Cum	1500
C	Authorised Consumption	C1	Billed metered	Cum	1340
		C2	Billed unmetered	Cum	0
		C3	Total Billed consumption	Cum	1340
		C4	Unbilled metered	Cum	0
		C5	Unbilled unmetered	Cum	100
		C6	Total unbilled	Cum	100
		C7	Total Auhtorised consumption	Cum	1440
D	Water Loss	D	Total water Loss	Cum	60
E	Non Revenue Water	E	Total Non Revenue Water	Cum	160
F	Apparent Loss	F1	Customer meter under-registration	Cum	0
		F2	Unauthorised consumption	Cum	0
		F3	Total apparent loss	Cum	0
G	Real Loss	G	Estimated Real Loss	Cum	60
P	Performance Indicators	P1	Non Revenue water	%	11%
		P2	NRW per connection	Litres/connection/day	113
		P3	Real Loss/KM of distribution mains	Cum/KM/day	1
		P4	Cost of Non Revenue water	Rupees/day	817.6

## **(6) Outputs and outcomes**

1. The system provides sufficient quantity of potable water with adequate pressure
2. The system has reduced the water contamination level very close to zero
3. Better demand management due to metering
4. Excellent consumer satisfaction with willingness to pay bills which motivating the TMC to go for 24/7 hr water supply
5. One enroute Grama panchayat has obtained drinking water for their habitation with a reasonable cost
6. Other two Grama panchayats have requested TMC for providing drinking water for their habitation with a reasonable cost

## **(7) Sustainability**

1. The system is 100% sustainable because the water source is river and is perennial
2. All project components are commissioned based on the long term operation and maintenance standards
3. Water tariff restructuring and metering policy which has come in to force since 01/04/2006 is ensured that
  - The water wastage is negligible
  - Poor are benefited
  - O & M cost is recovered

## **(8) Potential for replication**

Commendable practices shall always be shared with other ULB's directly for

- Water supply system Monitoring
- Operation and maintenance practices
- Systematic Revenue generation
- Energy savings because of gravity flow and less water losses
- Regulation of Non-Revenue Water (NRW)



**Some of the Snap shots which depict the water supply system**

**Situations before...**

**Water supply during summer seasons**



**Some of the Wells from which the water was pumped to ELSRs**



**Present Situation...**

**Jack well Location**



**Raw water Pumping system**



**Raw water Transmission Main**



**Chemical House and Laboratory at WTP**



**Laboratory at Water Treatment Plant**



**Clarifier at Water Treatment Plant**



**Filter House at WTP**



**Clear water Pump house**



**Clear water Transmission Main**



**Blower of WTP**



**ELSR at Gandhi Maidan**



**ELSR at Hale Kote**



**Situation Now...**

