

RESISTIVITY SURVEY & INFILTRATION TEST IN AUROVILLE REGION

A Project proposal from Auroville Water Service - Harvest

1. Introduction

Auroville Water Service - Harvest proposed to develop a concept of water resource management for the Auroville Region. The result of our investigations was delivered in June 25th 2010 as a document called "*A Model of Water Resource Management for the Auroville Region*". The general conclusions were presented in our final report.

The available data indicated a good potential for sub-surface flow harvesting, which then advocates full scale stormwater management and integrated landscaping. This would allow for a reduced stress on the deeper aquifers, already over exploited. Further investigations are anyhow needed to consolidate the model. Accordingly, Harvest has started to work on a specific project proposal to target these most urgent questions.

2. Description

Groundwater is one of the prime sources of consumable water. It is a major resource for agriculture, industry and human consumption. The advent of modern technologies and the man's increasing quest for optimum use of the available natural resources has had a heavy impact on ground water. Ground water is being excessively extracted without any regulations. In India, Ground water accounts for more than 50% of total irrigated area, 80% of drinking water and other domestic requirements and a further sizable portion for industrial requirements. Thus, the magnitude of extraction of ground water requires no mentioning, causing adverse effects on the hydrologic balance and quality of water. In the Auroville area, we have observed over several years a fast depletion of the main aquifers due to consecutive poor monsoon, but chiefly to over extraction of water. Negative cumulative factors like over irrigation; absence of maintenance of the irrigation structures; destruction of the lively fences and forest; and erosion, led to a depletion of 17 meters in the water level of the main aquifer, and fast developing saline intrusion.

This situation also prevails in Auroville itself, although somewhat mitigated by the prevailing geological topography. It is then clear that strong efforts must be made to preserve groundwater resources and to develop appropriate water resource management in order to create a positive impact on the environment and serve as a model for the area.

Auroville receives significant amounts of rainfall in short periods of time, chiefly during the winter and summer monsoons. Water management of the Auroville region must be designed to facilitate ground water recharge:

In our badly depleted groundwater situation, ground water recharge must be the primary focus. The water management system must offer every means to improve water recharge, as infiltration rates to the aquifers are decreasing in the Auroville region. Anyhow, further development of the Auroville Township will increase the impervious area; therefore, increasing the runoff potential and finally reducing the groundwater recharge in our Auroville region if effective countermeasures are not taken.

To consolidate this actual appreciation and in order to help further stormwater management and landscape studies, it is proposed to conduct two separate grid tests in the Auroville region.

The first test will focus on groundwater and geological investigation by using the electrical resistivity method. This would allow the development of a detailed geological map of the zone as well as its water potential.

The second one will focus on the infiltration capacity. This would give us a consolidated and ground-assessed model for the general layout of the zone, including water ways and water bodies. A limited number of data in some areas is already available. The proposed survey will hence target uncovered areas.

Our target area in the Auroville region involves about 600 hectares. A correct assessment of groundwater must include the surrounding to have any relevance: the parks; the full village area; the canyons up to their starting area; and the land on both side of the tar road. Altogether, this defines the area of 600 hectares to survey.

3. Objectives:

- To conduct a grid survey of the Electrical Resistivity in order to determine the specific resistivity of each layer of the soil.
- To take up a random survey of the resistivity data in order to perform data interpretation & analysis work.
- To find out accordingly the potentials of the aquifers.
- To find out which area is affected by saltwater contamination.
- To assess the effect of over extraction in the Auroville region.

- To conduct a grid survey of the infiltration capacity as well as to determine the percolation rates of each specific soil as well as some particular areas in the Auroville region.
- To find out what percentage of rainwater percolates into the ground.
- To integrate and process the collected data in a GIS (Geographical Information System) in order to generate detailed maps of the area.
- To produce a report on this work for planners, developers and architects of Auroville.

4. Methodology:

Resistivity Survey

- A Hydro geologist with two assistants will be involved.
- They will select the places with the help of the existing grid map (see attachment), and then conduct the Resistivity tests (Total number of points: 40) with the help of the Resistivity meter DDR-3. The reading accuracy is up to 150m.
- Resistance graphs will be created with the information collected from the field and integrated in a database.

Infiltration Survey

- A Hydrologist with two assistants will be involved.
- They will select the places with the help of the existing grid map (see attachment), and then conduct the Infiltration tests (Total number of infiltration tests: 40) with the help of a double ring Infiltro-meter

5. Anticipated outcome:

- A detailed perception of the potential of the aquifers in the Auroville area.
- An overall assessment of the groundwater potential as well groundwater quality in the Auroville region will be established.
- This will also help to trace out which area is over exploited and to develop a general perception on the meteorological scenario of the Auroville area.
- To classify the geological formation demarcated in the area viz. groundwater potential.
- To determine what percentage of rainwater percolates into the ground and may be therefore available in future.
- Based on this information, recommendations can be made to the planners, developer and architects for the location and sizing of stormwater management devices and rainwater harvesting.

As a next step, Harvest proposes to conduct a fully developed study on stormwater management, rainwater harvesting and landscaping for the Auroville region

6. Planning

Preliminary Resistivity Survey

S.N.	Purpose	No. of days required
1	Area to be surveyed: 600 hectares. Resistivity survey on 40 locations, creating an appropriate grid to cover the geological stratum variation underneath. @ 3 test / day	13 days
2	Resistivity survey data processing	5 days
		18 days

Infiltration test

S.N.	Purpose	No. of days required
1	Area to be surveyed: 600 hectares. Infiltration test on 40 locations @ 2 test / day.	20days
2	Infiltration test data processing	5 days
		25 days

Reporting

S.N.	Purpose	No. of days required
1	To integrate the resulting data with Geographical Information System (GIS) and to generate thematic maps.	10 days
2	To develop a comprehensible report	5 days
		15 days

TOTAL TIME REQUIREMENT: 58 working days.

The work is depended on weather conditions. The study can be started and be pursued according to when funds will be made available. Thus, the delivery date may fluctuate for the above reasons.

7. Budget

Preliminary Resistivity Survey: 40 tests, including Processing.

March-10	qty of day work	rate / day Rs	Total Rs
Survey			
Manpower			
Hydrogeologist	13	850	11,050
Helper	13	300	3,900
2nd Helper	13	300	3,900
Driver	13	250	3,250
Equipment			
Direct reading digital resistivity Meter –DDR-3 Model 1 no.			22,100
Jeep with trailor (running cost 3h/d)	13	750	9,750
Subtotal			31,850
Processing			
Manpower			
Hydrogeologist	5	850	4,250
Equipment			
Computer	5	500	2,500
Subtotal			6,750
Resistivity survey budget			38,600

Infiltration test: 40 tests, including Processing.

March-10	qty of day work	rate / day	Total
Survey			
Manpower			
Hydrogeologist	20	850	17,000
Helper	20	300	6,000
2nd Helper	20	300	6,000
Driver	20	250	5,000
Equipment			
Jeep with trailor (3h/d)	20	750	15,000
Subtotal			49,000
Processing			
Manpower			
Hydrogeologist	5	850	4,250
Equipment			
Computer	5	500	2,500
Subtotal			6,750
Infiltration survey budget			55,750

Water Quality Analysis: 75 Sample locations, including Processing

AV - Region infiltration test & Resistivity-Survey

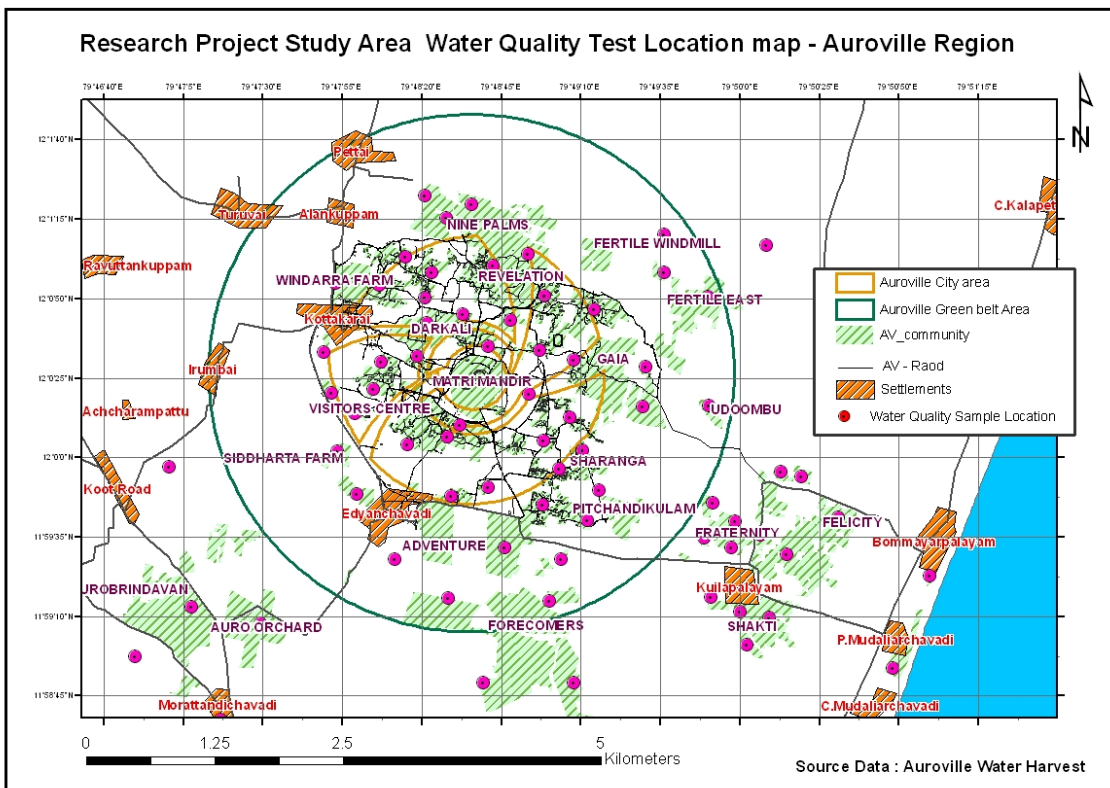
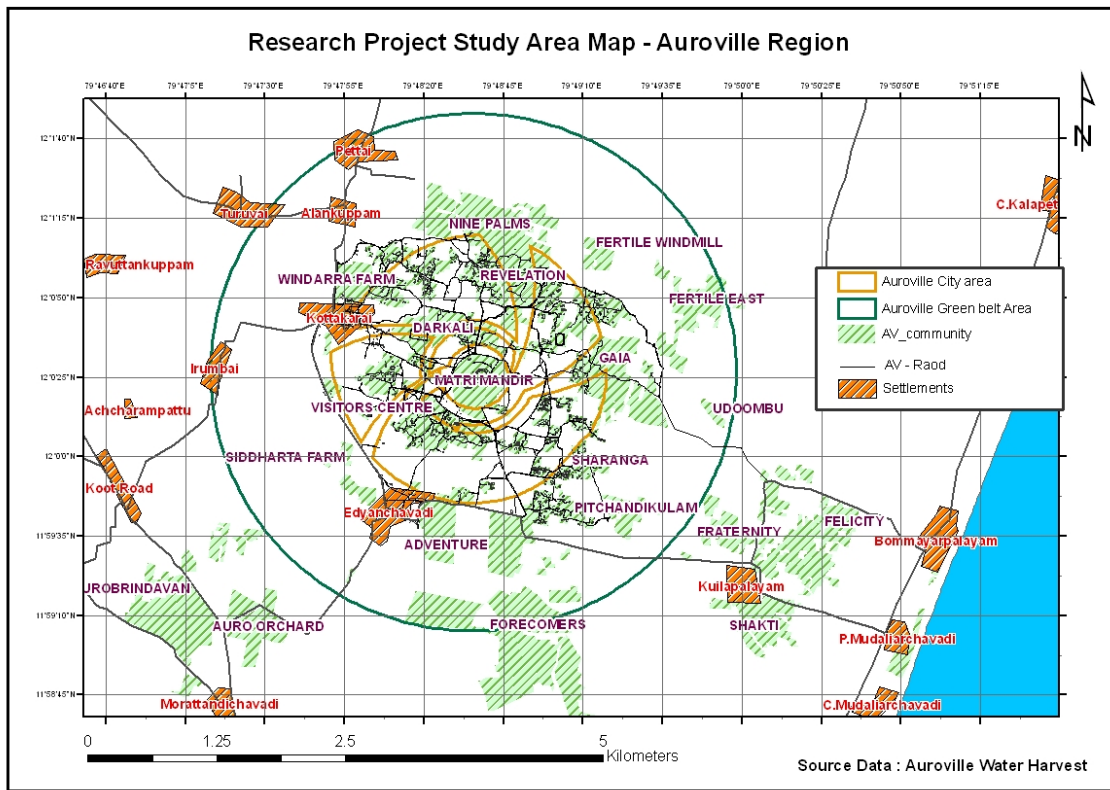
March-10	qty of day work	rate / day	Total
Survey			
Manpower			
Helper	10	300	3,000
2nd Helper	10	300	3,000
Two wheeler	10	200	2,000
Equipment			
Multimeter	10	500	5,000
Subtotal			13,000
Data Processing			
Equipment			
Computer	5	500	2,500
Subtotal			2,500
Infiltration survey budget			15,500

General Budget

March-10	qty of day work	rate / day Rs	Total Rs
Field Work and Processing			
Resistivity Geological Test Grid	13		38,600
Infiltration Soil Test	20		55,750
Water quality Analysis	10		15,500
Integration, Map generation & Reporting			
Manpower			
GIS processing and map generation	10	850	8,500
Reporting (Hydrogeologist)	5	850	4,250
Equipment			
Computer	15	500	7,500
Stationary			2,000
Subtotal			22,250
Unforeseen		5%	6,605
Overhead		10%	11,660
Subtotal			18,265
Total budget			1,50,365
Say			1,50,400

Rupees : One lakhs fifty thousand and four hundred Rupees only.

8. Annexure: Maps and analyses



AV - Region infiltration test & Resistivity-Survey

