AUROVILLE WATER

HARVEST

PROFILE-2005

Naidu House,
Kottakarai,
Auroville – 605 101

Auroville Water Harvest

" Water is life, that comes from rain

Sans rain our duties go vain" – Thiruvalluvar

The Auroville Water Service (AWS) is a public Service Unit with non-profit motive, under the Auroville Foundation. The technical facility of Auroville Water Service started in 1986, progressing with its main activities of drinking water supply and sanitation, concentrated in Auroville and the nearby ten villages. The AWS erects tube wells and windmills.

Ground water being the only through the year stable resource of water in Auroville, tube wells are the extraction mechanism tapping aquifers. Harnessing natural sources in a sustainable way is a tradition in this township and it is common that communities depend on windmills and solar panels for their energy requirement and water extraction.

The international township and the villages in and around Auroville have developed a symbiotic relationship over the years and one of the beneficial interactions is through water. AWS had a steady request from the villages to assist them in water supply. This program takes place in collaboration with Auroville Village Action Group, facilitating water resources management in Auroville Bio-region.

Due to Climatic influences and weather patterns, Auroville's water resources are limited and only proper management strategies could guarantee a regular and sufficient supply of high quality water. The centre of the city is located at only 5 kms from the sea, with the danger of pollution of the aquifers by seawater intrusion.

Since 1995, salty water intrusion is monitored in the coastal aquifers, which is the consequence of over-pumping of ground water and the decay of the monsoon harvesting tanks. With time, excessive exploitation of aquifers and neglect of surface water structures resulted in saline intrusion in the coastal aquifers, with cause for concern in the interior region also. The impending environmental catastrophe provoked AWS to embark on a strategy to control the ecological damage and devise management initiatives in a holistic perspective.

However, these physical causes are deep rooted in the way water is perceived and handled by individuals and society. The environmental, social, technical and economical challenges are all interconnected, hence "HARVEST" an integrated development agency was launched on 15th August 1996. Harvest is a research unit with a participatory approach that deals with water resources management in the Auroville bioregion.

HARVEST

Centre for Water Resources Management

Objectives

Today Harvest has evolved into a Center for Water Resource Management. Multidisciplinary project teams tackle a broad array of water issues aiming at conducting field researches, operational projects, and to develop new methodologies in the field of water management. The major objectives are to fight saline water intrusion and to sustain the water resources with users and stakeholders participation.

Recent Events

Recent Activities

In September of this year, jointly with CSR, Harvest hosted an International Seminar on Sustainable Water Management for the bioregion. This seminar endorsed by UNESCO under the HELP (Hydrology for Environment, Life and Policy) Basin Program but also supported by His Excellency, Dr. A.P.J. Abhdul Kalam, President of India. As well, Harvest's area of operations and investigations, the Kaluvelly-Pondicherry coastal sedimentary basin, has been accepted as one of the new catchments of the UNESCO HELP Basin Program. Under this program, jointly coordinated with a team of French scientists, the basin is used as a pilot area to create a collaborative framework for integrated water management with a focus on studying the relatively unknown processes and dynamics of aquifer salinization in this basin and ways of remediation, as well as stakeholders participation (for more information see the Ground and Surface Water page).

Support from His Excellency, the President of India

On the occasion of the Golden Jubilee of the merger of Pondicherry with the Indian Union, the 1st of November this year, His Excellency, Dr. A.P.J. Abdul Kalam, President of India passed by Auroville to hear about our investigations into the water issue's of our area and our plans to tackle them. Specifically, he wanted to hear about the research on seawater intrusion into the main aquifers done through one of Harvest's major collaborative programs.

The President, during his talk to the Pondicherry Parliament, gave full support to our work and emphasized the need to complete the work carried out so far.

In His own words:

"I understand that in Auroville, a UNESCO endorsed International Seminar brought out the problem of seawater ingress into fresh water aquifers in Pondicherry and Tamilnadu. It is essential to formulate a 20-year Integrated Water Management Plan based on further detailed studies, and then implement the Plan, in an integrated manner."

With recent collaborations among stakeholders in the area, the acceptance of our basin into the UNESCO HELP Basin Project, and the strong support of the President, the shared vision for an Integrated Water Management Plan is well on its way.

THE TSUNAMI AND AFTER

The Tsunami, which occurred on 26th December 2004, has created unprecedented damage in the coastal villages of Pondicherry and Tamil Nadu. The destruction spoke of untold human and economic losses. Along with human and economic loss there were serious changes in the ecology and environment. There was already a serious risk of contamination by fecal matter, salinity, and industrial pollution with the lack of proper sanitation infrastructure and hygiene knowledge. Public health was at a disadvantage as there was little that the communities could do without proper facilitation.

Water situation

The decline of ground water has reached the extent that the normal balance of the continental water level against the sea water level is not maintained anymore. This leads to a high risk of infiltration of sea water into the fresh water aquifers making all drinking water sources polluted. This water is also used for irrigation. But with the saline intrusion, the water turns the cultivable land into mineralised land resulting in further environmental degradation and loss of food grains for the people dependent on the land.

Another major problem faced is of open defecation and improper sanitation infrastructure. Open defecation takes place mainly near water bodies like ponds. This in turn contaminates the water tables which in turn affects the health of the pollution dependant on the water source for drinking. If sanitation infrastructure does exist, in the form of public toilets, there are improper drainage facilities and in most cases, the wastes end up in pools that slowly percolate into the water tables below.

With this multifaceted problem of water contamination and pollution and over extraction, there is a need to view things from perspective and to plan in a sustainable and beneficial manner. The tsunami and its impacts on the already degraded environment has created a need to look at the endemic problem of absence of sanitation facilities in the coastal areas, access to fresh and secure water supply and fast depletion of groundwater with the increasing risk of saline intrusion. It has become imperative that the approach be holistic and integrated to address all issues in a sustainable manner.

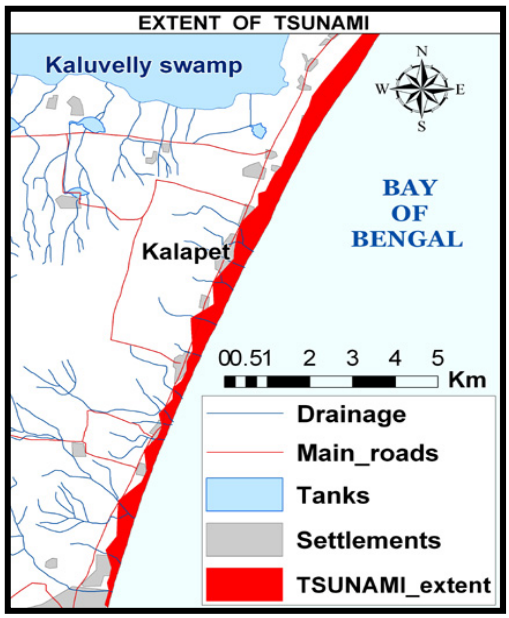
There were major damages after the tsunami to the drinking water sources for the communities affected as it is often seen in disasters that contaminated drinking water leads to more deaths. As per international reports, diseases are at more than 80% from water origin in India, and 40% of death come also from water related aspect. Uncontrolled defecation is the direct cause for fast spreading of diseases like diarrhoea, hepatitis, cholera, typhus, not to speak of the endemic worms, bacteria etc. The immediate need was to assess the changes in the quality of potable water.

24 villages were affected in the neighbouring area of the watershed. There was an immediate response from Auroville (www.auroville.org) in responding to the problems created by the tsunami. In total 34,585 people are living in Auroville's area of concern. Of these people some 10,425 have been affected in one way or the other by the tsunami. The number of people who died as a result of the tsunami was 104. In total 3,910 houses, 2,320 boats and 16,563 nets have been damaged.

Long term plans were being made for rehabilitation in a phase wise manner. All work is being done in collaboration and coordination with the office of the regional Collector and various Government agencies and NGOs working in the area. There was an emphasis on solid and liquid waste disposal and protection of

water sources so that in the near future water would not pose to be more of a threat to the community.

With the critical situation of the area in relation to saline intrusion, indiscriminate use of deep bore wells, over exploitation of the ground water tables and contamination of drinking water sources, it became important to develop a plan of action that could be implemented phase wise to control the situation and bring it to normalcy. The Auroville working group on the tsunami issue have developed a multifold water management plan for the area as it is the need of the hour. Issues of health and sanitation, drinking water supply, ground water contamination, solid waste disposal systems etc are planned out in a phase wise manner to provide maximum benefit. The situation of the tsunami has made such an integrated plan possible to be realised. This can serve to be a case study of planned water management in such a basin area.



SITUATIONAL ANALYSIS OF THE AFFECTED AREAS

Drinking water situation in the villages

Drinking water to the villages is made through the supply of an over head tank to street taps. There are also household owned water facilities like taps and shallow hand pumps. These are regarded as necessary as the public facilities have limited potential in catering to the entire population. The dune formation in the area had a water level of 5 – 10 ft during the summer and come up to 1 to 3 ft during rainy season, this creating perfect conditions for pollutant intrusion. There was already a heavy contamination of ground water with fecal matter. There was also the infiltration of saline water into these water tables.

People utilised the water for drinking, cooking, and bathing purpose. With the tsunami, there has been a heavy intrusion of saline water into the ground water table making water from the hand pumps unusable. The wave acted as a piston pushing all the defecation into the ground water table.

In order to provide sufficient and safe drinking water to the households in the villages, the NGOs and Government departments have installed temporary plastic tanks in the streets which are filled with water brought by tankers from neighbouring places and chlorinated with bleaching powder. As this is only a temporary measure which will not be sustainable for a long run, alternative strategies have to be developed for sustainable supply of safe drinking water. Purification plants have been installed by Aquadyn, Auroville in a few coastal villages while other villages are in the process.

Our major concern is to consolidate potable water supply from protected sources in appropriate quantity and on trying to rectify the saline water percolated in the shallow fresh water aquifer along the coast.

Sanitation situation in the villages

Open defecation near the shore is commonly practiced in India. Individual toilets are rarely seen in the rural India. There are a few government built public toilets but most of these are unused as ether they have no water supply or are damaged beyond repair. There are several schemes now in place for public sanitation infrastructure. Sanitation awareness has taken a lead in rural areas in India.

The women and girl children are most affected as they have to perform their ablutions in open spaces and hence prefer to go either early morning or late at night. This in turn enhances

gynaecological problems among them and is also a serious security problem as they may be prone to voyeurs.

The villages which belong to Pondicherry have masonry side drains for sewage water draining. But in the villages of Tamil Nadu, the sewage water runs in open channels. Stagnation of this sewage water was also observed in several villages. This in turn leads to breeding ground for flies and mosquitoes leading to health problems.

There is currently a strong push for sanitation and hygiene education in the country. The local authorities are joining forces to see that schools have proper sanitation infrastructure and are maintained in a proper way.

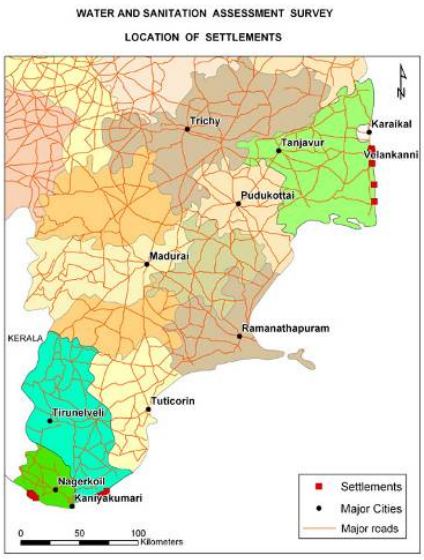
IMPACT ASSESSMENT

An impact assessment of the damages of the Tsunami was carried out in the weeks following this catastrophy to investigate into (a) the extent of the damage caused and (b) probable strategies to deal with the consequences on human life.

From the overall observation in the investigated area (21 km of coast line which concerns 25 villages), it was found that the waves went inland for a distance up to 500 m from the seashore and crossed the East Coast Road (Pondicherry-Chennai road), which is the National Highway dividing the coast from the inland, in some of the places.

The distance of inland intrusion shows high variations from village to village. Further contamination is probable as the wave went locally further than the boundary limits of the sand dune formation , and also because of the multiple wells perforating the clay layer which separates the dune formation from the underneath sandstone formation. The impact on fresh water resources becomes even more dramatic because of the very large population depending on this particular aquifer mainly for domestic and irrigation purposes. It was hence decided to conduct a survey to determine precisely how far the waves went inland, and to conduct sampling in order to assess the extend and importance of the pollution, both in term of salinity and bacterial contamination.

Second Impact Assessment. From May 22th to May 28th, 2005, a field survey has been conducted by a team joining Catholic Relief Services, RedR India, and Auroville Water Harvest, in Nagapattinam, Tirunelveli and Kaniyakumari district in the temporary shelters settled in the Tsunami affected villages. 19 settlements have been visited to assess the conditions of the existing sanitation facilities, as well as the water supply conditions for drinking and non drinking purpose.



Parameters and Sampling method

The main objective was to assess the level of contamination of the groundwater, both for salinity and bacterial contamination. The water was sampled from various sources used so far for domestic or irrigation purposes. The electrical conductivity, but also the pH and the temperature of groundwater were measured on site, while the sampling point was localised by GPS. The samples were then analysed for bacterial content.

The parameters chosen were the electrical conductivity as an indicator of salinity and the quantity of E-coli and total coliform. The electrical conductivity is expressed in micro siemens per centimeter (µSm/cm). As per Indian Standard, the upper limit is 1000 µSm/cm for drinking water. 2500 µSm/cm is considered as the upper limit for most of the plants while salt resistant species

can handle higher level. The E-coli and total coliform maximum limit for drinking purpose is 0 as per WHO standard.

According to on site reading, other sampling was conducted further inland to determine the later migration of salt if any. In the same way, a based ground survey was conducted to determine the extent of the wave's impact and its spatial variation.

Afterward, the results were integrated and processed on GIS and maps were generated to facilitate the readability of the data and visualise the area affected and the level of pollution. Then they were used to award the authorities in charge of water resources management.

Groundwater quality

After the Tsunami, it was seen that the salinity level has drastically increased, with levels reaching more than 3500 µSm/cm everywhere, and up to 19000 µSm/cm in some locations. It can be visibly observed that plants are dying rapidly.

It is not possible to determine precisely the risk level as accurate data on the geological setup and hydrodynamic parameters along the coast is not available. We could only highlight the absolute necessity to conduct the required investigations in order to secure the water supply for the larger area and its population.

It is very clear that the entire dune formation has now turned heavily saline and cannot be used anymore as a drinking water resource. Further west, the groundwater does not seem too much affected apart from certain specific locations, but it is necessary to maintain the monitoring in order to substantiate propagation of salt contamination through time, if any.

About the bacterial contamination, the same can be observed , as nearly all the samples show high level of e-coli and total coliform (give the values highest, mean, min), absolutely unfitting to drinking purpose.

CONCLUSION

The temporary shelters, constructed at the emergency situation, require improvement for sustainability of one to two years. The sanitary conditions in the settlements are generally poor and should be improved immediately before the coming monsoon.

Water resources

In most of the places, the drinking water quality is contaminated and requires treatment as well as a regular checking and monitoring. In every settlement, the local water resources were affected by the Tsunami and the groundwater is now highly saline. The continuous use of saline water by hand pumps will lead to health problems for the population.

The water supply has to be increased according to the needs. The figures given in this report refer only to the public distribution system. At present, people are meeting their requirements with water extracted from hand pumps, but this is not advisable since the groundwater is highly saline and contaminated by fecal matter in many places.

Along with an augmentation of the quantity of water supplied, the frequency of the daily distribution should be increased, as people should also be able to store the water in the shelters without difficulties. This should be done with the concerned authorities, at the settlement level or at the village level.

Sanitation

According to the minimum standard requirements given by the Sphere Project for disaster management, an important number of bathrooms are to be constructed. As for toilets is concerned, the structures in the temporary shelters are not fitting with environmental requirements and may become unhygienic for the community. They need to be rebuilt in a safe way, and new toilets have to be added to cover the needs.

Moreover, the previous usage of toilets has been a failure due to the lack of a proper maintenance of the structures. A strategy for setting up a participatory program for cleaning the toilets is an absolute necessity keeping the difficulties in usage of toilets in mind.

Solid waste management is also a necessary to keep the settlement clean and safe from pollution and infections. This requires social mobilization and awareness for a better understanding and involvement from the concerned communities.

Additionally, the drainage systems in the settlements also need improvement before the coming monsoon.

Education and promotion of hygiene is a priority and should be considered as a key for a successful improvement of the sanitary conditions in the settlements.

For the implementation of the sanitation projects, support to the Catholic Relief Services can be given by Auroville Water Harvest for the following activities:

- Designs of toilet structures
- Waste water management
- Water purification units for desalination and bacterial decontamination
- Training for installation of structure and equipment maintenance
- Training in bio-composting using Effective Micro-organisms.

RECOMMENDATIONS

It is clear that the coastal population is now facing a very critical situation for their water requirement, the supply coming from the wells along the beach so far, cannot be considered secure anymore. The constant (and even more important today) problem of bacterial contamination, with the lot of illnesses it is generating, cannot be disregarded as it is a constant and growing threat to public health.

The recommendations of the researches were:

- Proper measures have to be taken to secure and consolidate water supply of appropriate quality and quantity in the villages: new wells at appropriate location and new distribution systems must be developed. Bore wells close to the sea shore have to be sealed properly.
- Treatment facilities must be developed to supply standardised drinking water as per quality of resources available (bacterial contamination, salinity).
- To try to rectify the saline water percolation in the shallow fresh water aquifer. This may be possible in some spot where the water does not get too heavily contaminated by pumping for a long period and check how the salinity level evolve along time.
- Conduct required investigations to evaluate the potential impact on the deeper aquifers
- Conduct researches on risk of short/middle/ long term intrusion of seawater in the system of aquifers.
- To take proper preventive measures against the intrusion of seawater in the deeper aquifers, which is the source of drinking and irrigation water for the larger area. This can be done by developing a real groundwater management plan for the area and by encouraging farmer to reduce groundwater tapping for irrigation purpose.
- Regular monitoring of the quality of ground water together with water level measurements.
- Mass awareness campaign about the ill effects of open defecation and other inappropriate sanitation and waste disposal.
- Construction of sanitation facilities, sewage, drains and solid waste compound.
- Protection of the canyons outlet from pollution risk (fast and direct groundwater recharge areas).
- Development of settlement at suitable and safe locations (flood, high tidal, Tsunami, storm risks). The new permanent housing scheme that the government has taken out for the rehabilitated villages on the coast requires that all housing settlements be constructed 500 m from the sea shore,

Harvest Activities

- Rainwater harvesting
- Tank Rehabilitation
- Ecological Sanitation
- Ground Water resource investigation
- Environmental awareness & education
- Community mobilization
- Social extension
- Sustainable agriculture
- Eco-friendly solutions to the industries
- Moisture conservation and run-off water management

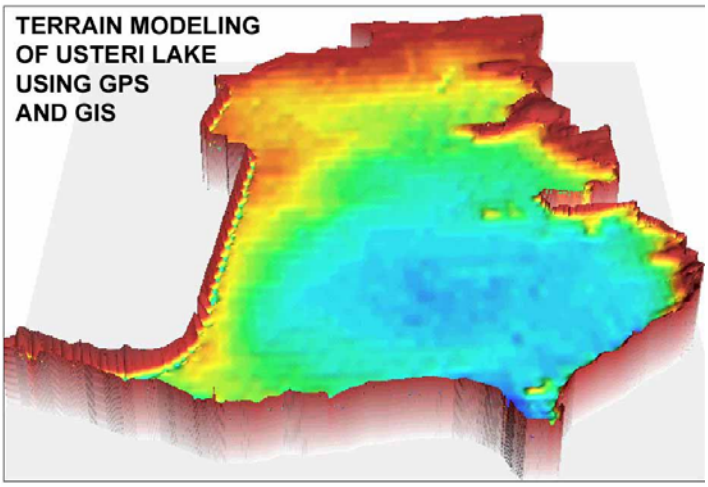
Expertise

- Mr. Gilles Boulicot – head – Engineering, General Development concept, Water Management, Wastewater and Sanitation, Technical Division
- Mr. Pierre Jorcin – Geographer & GIS expert
- Mr. Sivasubramanian – Hydrogeologist, 15 years of experience in the area
- Mr. Portchejian – Topographer expert

Workforce

- Administrative Team
- Tank Rehabilitation / Engineering Team
- Water Resource Studies of groundwater, surface water/ Groundwater Team
- GPS -Survey Team
- GIS / Data management Team
- Social / Organic Agriculture Team

Data Collection



Harvest collects and processes a wide range of data pertaining to ground and surface water in order to gain a full understanding of the area. It is from these scientific investigations that we go forward with our remediation efforts.

Since 1996, the water resources (hydrology and groundwater) team is monitoring the water levels and quality parameters over a 200 sq. km area, covering the Auroville plateau and the wider bioregion. After the monsoons the fluctuation of groundwater levels and tank water correlating with the rainfall is measured, as well as the runoff in the hydrological network.

Hydrological data is incremented using an automatic metrological station, and detailed topography of tanks, channels and ayacut areas is laid out using high accuracy differential GPS technology. All of this data is compiled in a database that also includes sociological information gathered by Harvest's social team. The collected information is processed in Geographical Information Systems (GIS) for further modeling. This provides us with thorough and up-to-date tools for watershed management.

Physical Works Tools

In 1999 The Dorabji Tata Trust donated two Tata Hitachi excavators (LC200, tracked) to Auroville Water Service to support the Water User's Associations in water harvesting works. Harvest has used these excavators to efficiently and effectively carry out water harvesting works for the benefit of WUA`s around the Auroville bioregion as well as in TRPP villages.

Since 1999, the work of the Tata Hitachi excavators have been largely dedicated to water management issues as reflected upon below.

Excavators Work	No. Of Hours	Amount Rs
Tank Rehabilitation	9002.05	8858143.22
Pond	840.18	906851.66
Supply channel	2708.50	2076598.50
Other	223.00	228031.55
TOTAL	**12773.73**	**12069624.93**

List of Villages where Harvest's excavators have been utilized

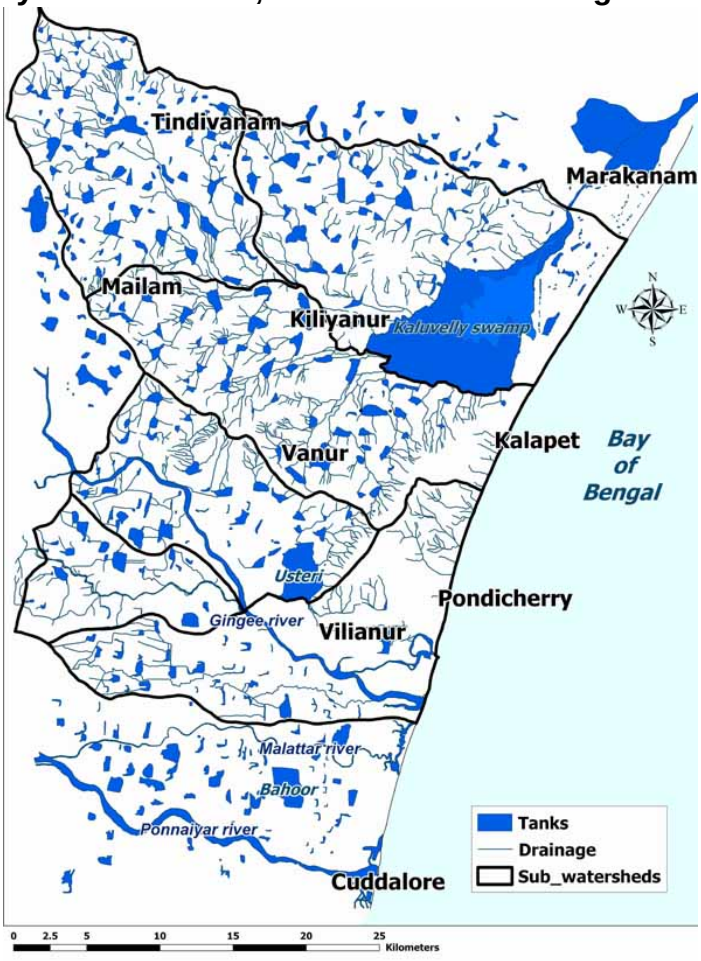
SN	Year	Name of Village	No. of tank
1	2000-2001	Alankuppam	1
2		Koonichampet	2
3		Chettipet	1
4		Mannadipet	1
5	2001-2002	Bahoor chitheri	1
6		Uchimedu	1
7		Melparikkalpattu	1
8		Arachikuppam	1
9		Manapet	1
10		Kirumampakkam	1
11		Sivaranthagam	1
12		Perunalur	1
13		Kokadu	1
14	2002-2003	Uchimedu	1
15		Arachikuppam	1
16		Sivaranthagam	1
17		Bahoor	1
18		Perungalur	1
19		Manapattu	1
20		Koonichampet	1
21		Melparikalpattu	1
22		Kirumampakkam	1
23		Korkadu	1
24		Kattukuppam	1
25		Uchimedu	1
26		Arachikuppam	1
27		Thirukannur	1
28		Kootakarai	1
29		Papanchavady	1
30		Mathur	1
31		Omipper	1
32		Munnur	1
33	2003-2004	Vanipper	1
34		Munnur	1
35		Korkadu	1
36		Karasanur	1
37		Koonichempet	1
38		Alankuppam	1
39		Thirukanji	1
40		Kilagrakaram	1
41		Madagadipet	1
42		Perungalur	1
43		Uruvaiyar	1
44		Mangalam	1

Harvest Activities

Ground and Surface Water Activities

Kaluvelly and Pondicherry Sedimentary Coastal Basin, a UNESCO HELP Program

This is a large pilot program undertaken to create a framework for successful sustainable water management in this basin. Presently, the hydrodynamic functioning of the whole system is poorly known and no water management laws have been enacted nor applied. The aim is to create an action-research and operational project to develop new methodologies in the field of: Hydrology and hydrogeology; tank rehabilitation; coastal area water management; policy development; environmental and water management awareness; and social development. The main objectives are: To understand present circumstances from a hydrological and socio-economical point of view; to quantify the fresh water resources and their time evolution in order to prevent salinisation in the aquifers; to define methodologies of system evaluation that could be applied and extended to other sedimentary basins; and to find good arguments to promote the introduction of water management rules/laws.



Hydrological network of the 1400 km^2 project area

This Program is a continuation and expansion of a scientific collaboration that has been built between Harvest and a team of French scientists (Paris 6 University, Tours University, Rennes University and IPGP) to study the origin of salinisation in the Vanur aquifer of the sedimentary basin of Kaluvelly. Since January 1999, a team of French scientists coordinated by Ms. Sophie Violette (Pr. Hydrogeology) and Ms. Nathalie Gassama (Pr. Hydro-geochemistry) have worked together to assess the "Source of Salinity and Groundwater Circulation in Kaluvelly Watershed". The first part, dedicated to the hydro-geochemistry resulted in the discovery of the current sources of salinisation (see the description of the groundwater situation up top). Currently, since October 2003, the hydrology and the hydrogeology phases of the study are being conducted, with the participation of Pr. De Marsily, an internationally awarded hydro geologist and engineer.

This program also involves many partners including: UMR–Sysphe UPMC - France, CGWB – Chennai, TRPP-PWD - Pondicherry, PWD-SGWB - Chennai, and TWAD – Villupuram District to name some of them.

Pre-feasibility Study for a Sustainable Water Management for Auroville and its Neighborhood

One of the aftermath of the water conference held in Auroville in September 2004 was the launch of a pre feasibility study on a sustainable water management for the Auroville and its surrounding, Because of the concern of Auroville for sustainability and the shocking water resources situation, it was decided to launch a study, with the help of international experts from France, Germany,

Holland and Israel. The study is actually in process and aims to integrate last development in term of integrated concept that it can be utilized as a model in similar context in India and abroad.

Integrated Sustainable water management for the International Zone, Auroville

A document was put together by Harvest to create a base for future planning and development for the International Zone of Auroville. The purpose of this document was to initiate reflections on Integrated Sustainable Water Management for the International Zone aiming at environmentally sound development. It analyzed the features of the International Zone systematically and consequently the solutions fitting with the needs and defined criteria.

This research brought to light the absolute need to incorporate the village of Kottakarai, which is partly inside the International Zone, into the development plans. In terms of water management, Kottakarai is a very sensitive area due to its high water tables and its initial position in the chain of tanks in the Kaluvelly watershed. Pollution from garbage waste and human excrement pose a threat to the health of the people and of this water system. A pilot water and sanitation project for this village is currently in the works. The hope is to replicate this in the surrounding villages positively affecting the health of the entire watershed.

Industrial wastewater management, Anglo-French Textiles

A pre-feasibility study on wastewater management and sludge disposal for Anglo-French Textiles was conducted in collaboration with Cynergy (Centre for Scientific Research). The solutions advocated tertiary treatment for the reuse of wastewater and power generation by sludge incineration in a gasifier.

Groundwater assessment, E.I.D Parry (I) Ltd

A preliminary study was carried out for the E.I.D Parry sugar mills at Nellikuppam to assess the groundwater and the upcoming salinity threat to the cane growing areas.

The study included the quantification of groundwater extraction and water quality parameters covering 996 sq.km. The results showed degradation in both quality and quantity of the water, and it was forecasted that unless corrective measures would be taken rapidly, sustainability of the activities of the mills would be in jeopardy.

Development of a Participatory Methodology in Hydro geological Extension, Tamil Nadu Council for Science & Technology

On grant by the Tamil Nadu Council for Science & Technology, Harvest has developed and completed a program of participatory hydro geological extension in which village youths are conducting hydrological surveys and assessments in 14 local villages. Through these youth a network of rainfall assessment stations for this area have been created.

Groundwater Resources for the Wider Auroville Area, Pondicherry Engineering College

Harvest was also involved in a joint research project started in 2001 with Pondicherry Engineering College, the Auroville Planning and Development Council and Harvest to assess the Groundwater resources for the wider Auroville Area. The outcome was an extensive report that is now available.

Dr. S. Mohan – IIT, Mr. R.L. Dhar from N.G.R.I, and Mr. Suresh from CGWB were also investigating on the area.

GIS Project, Indian Space Research Organization, Govt of India, Bangalore

In the light of the ISRO promoting different schemes for India's natural resources utilization, conservation, restoration and educational outreach programmes, a proposal was born to create a GIS office and training facility at Auroville as a collaborative effort between ISRO and Auroville. The GIS project is being executed under the direct authority of the Auroville Foundation with expertise support from ISRO.

The socio-economical swift shift of India today his provoking a massive shift in the cropping pattern of the coastal area and people tend to cultivate paddy, sugarcane, coconut and other irrigated crops. Hence an urgent need to understand the cropping pattern of the region and its changes over time has been realized.

The project commenced in January 2000 and is involving various working group of Auroville. Harvest is concentrating on the water and agricultural applications in this project. Data (spatial and non-spatial) acquisition and integration as well as processing are well underway.

Tank Rehabilitation and other Rainwater Harvesting Activities

Tank Rehabilitation Project-Pondicherry

The Tank Rehabilitation Project-Pondicherry (TRPP) was initiated in the year 1999, with aid from the European Union. It is coordinated by the Project Management Unit of the Public Works Department, Govt. Pondicherry. This is a unique project in Pondicherry as it involves the participation of all the stakeholders in all stages of the project. The successful implementation of the tank rehabilitation works and the sustainable management of the system lie in the effective mobilization of the whole community. In order to create awareness on the management of water resources and to make the people to get involved in the project, Community Organisers are employed through the NGOs.

Rehabilitated Pond

Harvest was entrusted with the work of Community Organizing since the pilot phase of the project. Today, 10 Community Organisers and one Nodal Officer are deployed by Harvest to carry out Social mobilization in 31 tank villages.

As well Harvest conducted GPS topographic surveying in tanks, channels and ayacut areas for TRPP. Surveys were conducted in the Pondicherry Region and the adjacent Tamil Nadu area. The end product was the submission of computer generated topographic maps and reports describing the methodology used as well as volume computation.

Steps in Community Organization and Implementation of Tank Rehabilitation works

1. Introduction in the tank villages.
2. Conducting sub-group meetings with the different stakeholders including: Ayacut farmers, non ayacut farmers, farmers with their own bore wells, landless agricultural labours, scheduled caste people in the colony, women and youth groups, and other general users of the tank.
3. Awareness creation through street plays and exhibitions.
4. Conducting household surveys.
5. Facilitating exposure visits to rehabilitated tank villages.
6. Conducting Participatory Rural Appraisals to assess needs (Social Mapping, Collection of Village and Tank time line data, Seasonality diagram, Tank Resource map).
7. Collection of data on the village, tank and ayacut area from Government departments.

Tank User Association Meeting

8. Selection of Executive Committee members and Office Bearers of the Tank Association (60 % Ayacut farmers, 40 % Non Ayacut Farmers and Landless labours).
9. Membership enrollment for the Tank Association (at least two persons from each house).
10. Conducting General body meeting.
11. Registration of the Tank Association
12. Participatory planning and estimation with the engineers (87.9% PWD and 12.1 % Beneficiaries).
13. Collection of contributions from farmers (12.1 % of the estimate amount).
14. Capacity building through trainings (Leadership skills development, Technical training, Accounts and Book keeping training, Tree plantation, Fish culture, Crop and water management through Farmers Field Schools).
15. Implementation of the physical works.
16. Conducting regular Executive Committee Meetings.
17. Maintenance of accounts and auditing.

Sustainability and Future Maintenance of the Tank

1. Provision of User rights of the tank to the Tank Association.

The benefits from the trees and fishing in the tank are given to the Tank associations and the amount earned is used for the maintenance of the structures of the tank.

2. Corpus fund

This fund is developed as a joint contribution from farmers (Rs. 250 per Ha. of Ayacut land), PMU (Rs. 150 per Ha. of Ayacut land) and the Agriculture Department (Rs. 1000 per Ha. of Ayacut land). The interest from the fixed deposit of this amount is utilized for further maintenance of the tank.

Harvest entrusted villages for social mobilization activities under TRPP

Sl. No.	Year	Name of Village	No. of tanks
1	1999-2000	Vadhanur	1
2		Kariamanickam	1
3	2000-2001	Alankuppam	1
4		Chettipet	1
5		Koonichampet	2
6		Mannadipet	1
7	2001-2002	Thirukkanur	2
8		Kaikalapet	1
9		Kodathur	1
10		Sompet	1
11		Manalipet	1
12		Katteri kupam	1
13		KK Puduthangal	1
14		KK Pazhya Tangal	1
15		Kuppam tank	1
16		Thethampakkam	1
17		Suthukeni	2
18	2002-2003	Madagadipet	1
19		Nallur	1
20		Sanyasikuppam	1
21		Sorapet	2
22		Thiruvandarkoil	1
23		Vambupet	1
24	2003-2004	Eripakkam	1
25		Madukarai	1
26		Sooramangalam	1
27		Kalitheerthalkuppam	1
28	2004-2005	Tirubuvanai	1
29		Veedur Feeder Channel	1
30		Vikravandi Feeder Channel	1
31		Karaikal pilot phase	1
		Total	**35 tanks**

User-based Watershed Development

In Tamil Nadu Harvest has completed the rehabilitation work of 18 minor irrigation tanks and 17 other water ponds under Namakku Naame Thittam and Employment Assurance Scheme sponsored by the Directorate of Rural Development Agency, Villupuram. 14 Water Users Associations have been organized and the creation of the first federation of associations in the region is on the Anvil.

These works took place as part of the Kaluvelly project. The long-term vision is the establishment of a user-based watershed management model called the Kaluvelly Watershed Development Agency.

The details of work done under the Namakku Naame Thittam (NNT) and Employment Assurance Scheme (EAS) funded by the District Rural Development Agency Villupuram are furnished as follows:

Years of Sanction	No of Works	Name of the Scheme	Status of the Work	Expenditure Amount in Rs.
1996 – 97	5	EAS	Rehabilitation of M.I Tank	644706.00
1997 – 98	4	EAS	Rehabilitation of M.I Tank	1301328.00
1998 – 99	12	EAS	Renovation of Oorani	1155435.00
1998 – 99	3	NNT	Rehabilitation of M.I Tank	1101750
1999 – 00	1	NNT	Rehabilitation of M.I Tank	474449.00
1999 – 00	1	NNT	Construction of Barrage wall and check dam	976096.00
2001=2002	1	GTT	Improvement of Tank supply channel	140000.00

We also undertook supply channel work in the Anpakkam village in Vanur Block under Girama Thanniraivu Thittam as follows:

S.No	Name of the Village	Name of the work	Tank Ayacut area (ha)	Proposed Estimate Amount	Public contribution
1	Anpakkam	Improvement of Tank supply channel	121.41	140000.00	35000.00

Augmentation of Groundwater through Artificial Recharge in Vanur watershed at Villupuram District

Under funding by the Central Ground Water Board SERC – Chennai, this project aimed to recharge into the Vanur sandstone aquifer under the Auroville Plateau and protect the pumping stations of Tindivanam (a city of 200,000 inhabitants, 30 km from Auroville), which is threatened by seawater intrusion. Both social mobilization activities and physical works were undertaken by Harvest. The major outcomes of this project were the rehabilitation of three minor irrigation tanks (Katrampakkam, Vanur Big tank and Vanur small tank), construction of 7 percolation ponds, construction of 6 observation wells used to measure the water levels, and the installation of an Automatic Weather Station in the Vanur watershed.

Planting vegetation on the tank bund of Vanur Small Tank

Watershed management, Mahindra & Mahindra – M.R.V. Project

Expertise and proposals have been provided to the Mahindra & Mahindra's River Valley project located near the Ovala Village in Thane District of Maharashtra, towards sound watershed and rainwater harvesting development.

Social & Community based Activities

As education is the basis of societal change, most of Harvest's projects include some components of education and public awareness. Though the social team runs most of these components, all of the teams are at least partly involved in them. Village meetings, displays at the weekly market in the main villages, dramas, staff trainings for other NGO's, and exposure visits take place regularly.

Street Theaters

Aruvadai Thagam and Vervaasam are awareness street theatre programs conceived and articulated by the Staffs of Auroville Water Service "Harvest" has been played in and around the villages of the Watershed with excellent response from the local people. In the play Aruvadai Thaagam, the salt water and the contaminated water are thanking mankind's indulgence to let them develop, and have decided to kill nature and poison all life.

Street Play conducted in Vilvanatham Village

T/v Radio Media Programmes

The Pondicherry Doordarshan has telecasted the Street Play "Aruvadai Thagam' twice and AIR Pondicherry has interviewed the people around the region about the operation of Auroville Water Service "Harvest" on the concept and functioning of the Water Users Associations.

Aquaculture Activities

From 1998 to 2000, Harvest was involved in Aquaculture activities aimed at regenerating a positive active relationship between the villagers and the water bodies. Groups of scheduled castes women and unemployed youth are trained into fish rearing in the village ponds after rehabilitation. The aim of the venture is poverty alleviation, improvement of nutrition and humanized wetland ecology. It is a source of income, proteins and recreation for the village women and unemployed youth. Due to poor monsoons these activities have not been able to occur for the last several years.

Stocking of the Pond **Fish Harvest**

Promotion of Organic Farming Activities

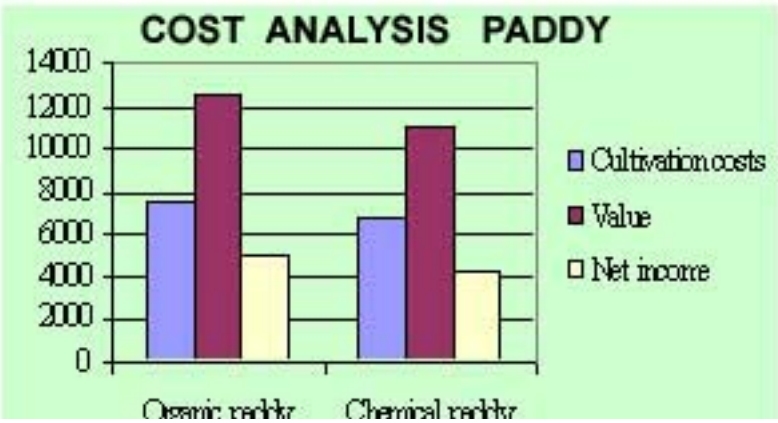
Harvest Eco-Farms

Harvest Eco-Farms was an ecological farming program that included an 8-acre outreach research farm around the Naidu House office and several demonstration plots within farms of interested progressive farmers in the area. A network of farmers interested in ecological farming was formed and the agricultural team, as well as visiting experienced farmers, provided them with training, technical advice, organic inputs, inspections and a guaranteed market for their produce.

The research farm was composed of a variety of local crops and systems: rain fed and irrigated field crops, a coconut grove, sugarcane, vegetables and fruits. The research activities of the farm included:

- Field testing and troubleshooting problems specific to our climatic conditions
- Documenting various cultivation practices and then producing technical pamphlets
- Researching the most cost effective, labor & capital extensive, resource saving practices & technologies

The technical information collected on organic cultivation (from farm results and farm visits) is compiled per crop, adjusted to our local agro-climatic conditions, and published in a series of crop cultivation handbooks.



This graph based on research from the demonstration plots in the surrounding villages shows that by following organic farming methodologies the quality and quantity of yield can slightly *increase* the net income of a farmer.

The gained experience is presently materializing by bringing an organic farming promoting program in the area. This program is including trainings, research and several demonstration plots on interested farmer's land. We are working with the existing network of farmers interested in ecological farming, create connections with training centers and demonstration spots and try to encourage more members. Due to the high running it is not include the research farm around the Naidu House.

Students & Volunteers

The Students & Volunteers Program facilitates the intervention of students on project work or research studies. In a view to bridge the solution seekers and their beneficiaries, applied research institutions are invited to design project with Harvest. We frequently host volunteering professionals and students.

Students & Volunteers	Qualification & Origin	Subject	Duration
Marilou	M.A. Sociology (USA)	Auroville water survey: Aurovilians' relation to water	1 month
Jerome & Deval	Electronic engineer (French), architect	Auroville water survey: all communities baseline data	3 months
Adeline Salvary	M.Sc. Agri., Dijon, France	Socioeconomic study: the choice of sugarcane	5 months
Emmanuel Buovolo	M.Sc. Agri., Dijon, France	Technical study: Casuarina, soil fertility and water use	5 months
Jean-Francois Beuscher &	B.Sc. Agri., Angers, France	Farm practice in organic cashew cultivation	2 months

Mathieu			
Laurent Stravato	M.A. Geography Grenoble France	Spatial socio-economic influence of the Sedarapet industrial estate	4 months
Lovis Willenberg & Jan Kielmann	B.Sc. Landscaping, Berlin, Germany	Xeriscape, a plant catalogue for dry landscaping	5 months
*Lelia Cappon & Marike Mevis	B.Sc. Environment Tech., The Netherlands	Sources of soil toxicity and their impact on cashew cultivation	5 months
*Elisabeth Belaunde	Industrial Engineer, Bilbao, Spain	Micro-watershed development study; Auroville water survey: data integration	6 months
Eve Gentil, Etienne Vidal	Ecole Superieure d'Agriculture – Angers – France	Farm practice and farm map set-up	5 weeks
Lucie Durel	Ecole des Arts et Metiers – Lille – France	Organic farming in Avl: description & proposals for the agricultural development in India	14 weeks
Nathalie Kobes and Colin Gril	ENESAD – Dijon – France	Cropping pattern evolution and impacts on water	2 months
Malika Paulik	ENSAR Rennes Departement of Sciences de l'ingenieur	Study of south coast management of Kaluvelli swamp	6 months
Marie Edith Sanial & Sophie Lartigue	Enesad / Enitac	Casuarina Study	6 months
Beatrice Poulon & Nicolas Mousserin		Fair Trade & Soil Fertility	5 months
Gwladys Mathieu	B.Sc Agri Sciences ENSAM	Organic Farming	5 months
Cecile Arnaud	Master Degree in tropical agronomy in CNEARC	Irrigation Cane	3 months
Barbara Bentz	CNEARC - France	Irrigation tanks in the Vanur tanks, south India – a history of social water management of traditional rainwater harvesting structures	5 months
Grischa Erxleben	Humboldt University of Berlin, Germany	Integrated of Geophysical System for Water Resources Management	7 months
Pierre Jorcin	Chambrey University of France	Application of GIS in Water Resources Management	2 years
Matthew S. Raske	Washington University	Preliminary concept of Storm water management for the International Zone of Auroville	3 months
Paul Roberts	Washington University	Preliminary concept of Landscaping for the International Zone of Auroville	3 months
Coy Morris	Washington University	Preliminary concept of Wastewater for the International Zone of Auroville	3 months
Sara Albee	Geo-Common program, University of Oregon	Water management and sanitation for Kottakarai village	1 year

Steffen Blume	University of Applied Sciences and Berlin Business School	Preliminary concept of sanitation and rainwater harvesting for the International Zone of Auroville	5 months
Anja Krause	Diploma engineer in landscape architecture from Germany	Plants for the International Zone of Auroville, a comprehensive study	3 months
N. Mahalakshmi	Pondicherry Engineering College	Groundwater Resources for Wider Auroville Area	3 months
S.Ponmalar	Pondicherry Engineering College	Groundwater Resources for Wider Auroville Area	3 months
Aude Vincent	University of Paris 6 – Pierre et Marie CURIE	Hydrology of the Pondicherry-Kaluvelly Basin, PhD thesis	5 weeks, then 6 months

All individuals of goodwill and service are warmly invited to take an active part in making this world a better place.

Address any query to:

Auroville Water Harvest

Centre for water resources Management

Naidu House, Kottakarai

Auroville-605 101

INDIA

Tel: +95 (0) 413-262-2333, Fax: +95(0) 413-262-22690

E-mail: harvest@auroville.org.in

Web: www.auroville.org