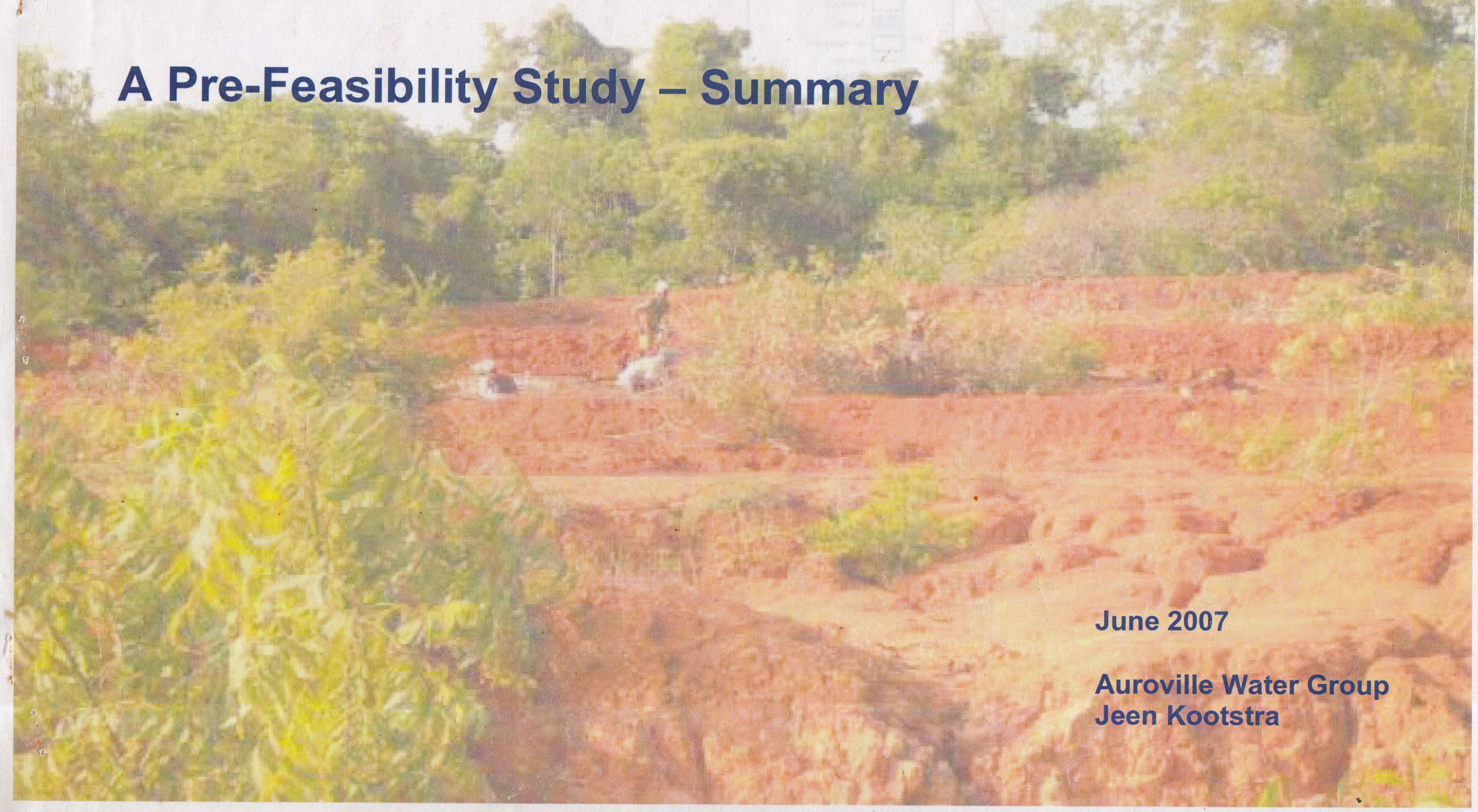
Integrated Water Management for Auroville and Surrounding Area

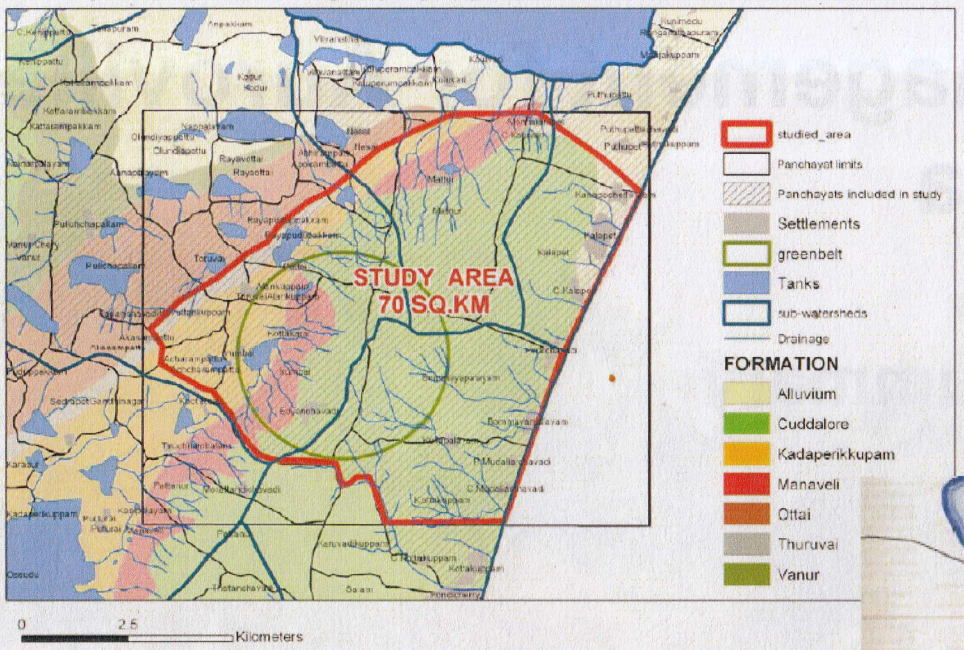
A Pre-Feasibility Study – Summary



June 2007

Auroville Water Group
Jeen Kootstra

Proposed study area according to hydrogeological parameters and administrative boundaries



The study area for the pre-feasibility study selected on a combination of administrative, hydrological and hydrological criteria.

A map of the city of Auroville Indicating the city area in red and The green belt in green.

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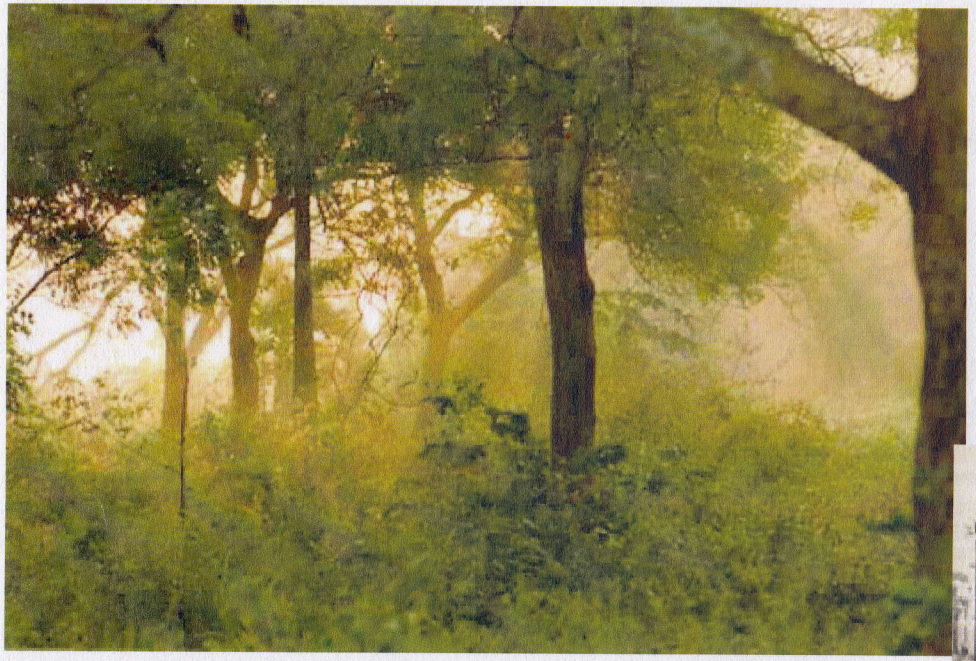


On the left a photo of the greenbelt around Auroville as it can be experienced today. Groundwater has served to create this out of the barren landscape of the photo below, which was Auroville in the 1960's. Without and integrated and well coordinated approach and action plan for the entire Bioregion, this beautiful image may well disappear .

CONTENTS

1 PREFACE

Water as source of life
Since its inauguration in 1968, water has been one of the many pillars on which Auroville has been based. As 'bringer of life', it nourishes the thirsty workers, binds cement, sand and gravel into concrete, binds clay and cement into earth bricks and causes the trees to grow, protect the vulnerable earth and provide shade.

Looking back
Before the foundation of Auroville, the area was barren due to the cutting of trees for firewood and overgrazing by cattle. Its surface was scarred by the rainwater flushing away the fertile topsoil and forming deep canyons. The eroded soil eventually reached the sea colouring it red as though the area was bleeding.

Water today
At present the situation has completely changed: the plateau on which Auroville is located has been turned in a large green area. Initiatives are taken by individuals and groups, to develop measures to prevent rainwater from running off and cause land erosion. Water is managed in order to reach a sustainable situation for all natural resources, including water.

Still far to go
This image could well return if the proper action is not taken in the coming years. Recent investigations have revealed that severe over-exploitation of in particular the Vanur aquifer is causing sea water intrusion. The reason that wells are still producing fresh water is an old fresh water buffer in the formations below the seabed off-shore. This fresh water is however rapidly depleted and once salinity has entered the Vanur aquifer and wells, the situation is irreversible.

Auroville as laboratory
Auroville has been recognised by the Government of India as a spiritual gift to the world. The initiatives and results in areas as forestation, building technologies, renewable energy, waste water treatment systems and so on are highly appreciated and renowned. Auroville considers herself also as a laboratory and continues to innovate and develop.

Water organised
There lies a new giant challenge for water management of Auroville's Bioregion. Auroville in particular has the ability and capacity to take up this challenge. Through a water organisation in Auroville, efforts can be bundled and efficiently directed towards a more sustainable water management both inside and outside Auroville.

This summary
This summary provides an overview of the existing resources and their particular difficulties and harmonising the demand with the resources It presents the issues and choices to be made and provides a general action planfor the coming years.

This summary is based on the comprehensive report Integrated Water Management for Auroville and surrounding area – A Pre-feasibility study of May 2007.

2 AN INTRODUCTION

A brief history

Water has been a focal point in Auroville for the last 4 years: the study by Harold Kraft in 2002, opposing reports from concerned Aurovillians in 2003 and a seminar on 'sustainable water resources management for Auroville and its Bioregion' in September 2004. From the water conference, a pre-feasibility on water resources for Auroville and its Bioregion was started, a pilot project introduced an integrated approach for water management in Kottakarai, studies are carried out towards the use of excess water from Kaluvelly, the University of Paris is conducting studies towards the groundwater resources in Vanur and Cuddalore and several smaller projects and studies are ongoing.

A self appointed 'water group' has been active in Auroville since 2004. It was this water group, supported by several others that signalled the need for the organisation of water in some way. They are also the driving force behind the pre-feasibility study for Integrated Water Management for Auroville and surrounding.

Another study and another report

Perhaps again another report, but written with the specific purpose to reach all Aurovillians and those concerned outside Auroville in a comprehensible way. The purpose of this report is also to present all essential information in such a way that a decision about future directions for development of water resources inside and outside Auroville can be taken.

Why a study

In 2003 Harald Kraft presented his Masterplan for water resources in Auroville. Soon after the final presentation, much criticism came up on the report and the basis on which it was built. This resulted in a counter report by Concerned Aurovilians, the involvement of a German Research Institute/Consulting Firm (LGA) producing a critical report and a second opinion report prepared by undersigned studying the Kraft Study, the report of concerned Aurovilians and the LGA report.

All reports agreed that although the Kraft study contained valuable ideas and sound engineering, the entire system was superimposed without any regard to the surrounding area and not based on the latest information although this was available at the time of preparing the Kraft Study.

In the aftermath of the 3-day seminar of September 2004 organised by the Auroville Centre for Scientific Research and by the Auroville Water Service – Harvest, it was agreed between some members of the Water Group, some International Experts and Aurofuture to prepare an alternative for the Kraft Study that was comparable.

In the course of this study, it became clear that so many and such involving decisions had to be taken, that such completely worked out concept would neither be feasible, nor justifiable or realistic. The feasibility study then focused on a transparent presentation of the issues and choices to be dealt with and a valuation of possible solutions.

What is a pre-feasibility study
To understand and appreciate the contents of the main report and this summary, one needs to understand what a pre-feasibility study is. In a pre-feasibility study, the problems and related questions are identified, an inventory of possible solutions is presented and the solutions are valuated from different points of view. The most optimum solutions are then recommended to be further investigated in a feasibility study.

In a pre-feasibility study, no designs are made other than conceptual designs. Dimensioning is not yet done and also financial implications are only qualitatively dealt with.

What about sustainability
The Bruntland Report popularised the term *sustainability* for human and environmental development when it was published in 1987.In the report, *sustainable* activities were defined as ones where the needs of the present generation are met without compromising the needs of future generations.

This principle applied to water management, results in the following definition: Sustainable Water Management (SWM) is simply to manage our water resources while taking into account the needs of present and future users.

Sustainable urban planning
Sustainable urban development is a form of urban development that uses all opportunities to achieve a higher spatial quality combined with a lower environmental impact. Both spatial quality and limited impact are maintained in time as future generations can share in this as well.

The lower environmental impact is realised by using the natural underground of an area in the urban planning. Low lying areas for example are reserved for water and wet ecology and ecological precious areas become green corridors and parks.

The Auroville Masterplan
The Auroville Masterplan is the result of a long process of planning and has been generally adopted by the community. The plan was conceived in the 1960's with the insights of urban planning at that period. Recent practice in sustainable urban planning promote much more a bottom-up approach using the natural underground as a footprint for the urban plan.

The Auroville Masterplan can not be discarded. However it does clash in certain areas with the natural underground, whether precious canyons, an existing dam site or a valuable groundwater infiltration area. Flexibility in the implementation of the Masterplan will then provide a higher quality and more sustainable living environment. The city is after all experienced from within and not from the drawing board.

structure and is fed by rainfall from its command area. The lake is one of the largest wetlands in peninsular India, and is considered a wetland of both national and international importance by the IUCN and the National Wetland Conservation Program. It is currently threatened by encroachment from agricultural fields, wildlife poaching, loss of the surrounding forests, and increased commercial prawn farming.

Present use
The main function of the tanks is domestic purpose, cattle and irrigation. Although some temple tanks and village ponds last throughout the year, the majority dries out during the year and the irrigation tanks only last for 4 months. There is little scope for extension of the tanks as this will affect downstream users.

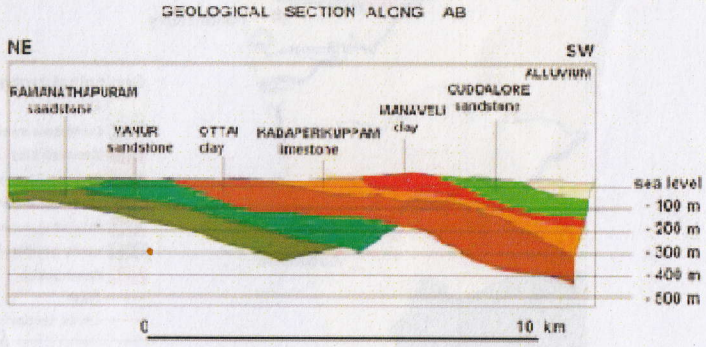
The dysfunctional shutter of the Kaluvelly swamp

Potential use
Evaporation is the largest enemy of surface water. With an impressive 2,000 mm, the potential evapo(transpi)ration makes it unattractive to store water at surface. Another issue is the lack of relief of the area causing open water bodies to be relatively shallow and being ineffective in water storage.

Kaluvelly has a storage capacity of 34 Mm^3 with a surface area of 71.5 km^2. The amount of water going through Kaluvelly in an average year amounts to 200 Mm^3.

3.1.3 Groundwater

Description
In the study area a succession of water containing layers (aquifers and aquitards) is found gently sloping towards the sea. The aquifers (layers that are used for production of groundwater) that most widely used in the area are the Vanur aquifer in the west, the Cuddalore aquifer in the east and the alluvium near the Kaluvelly swamp and along the coast.



The underground near Auroville showing its built-up

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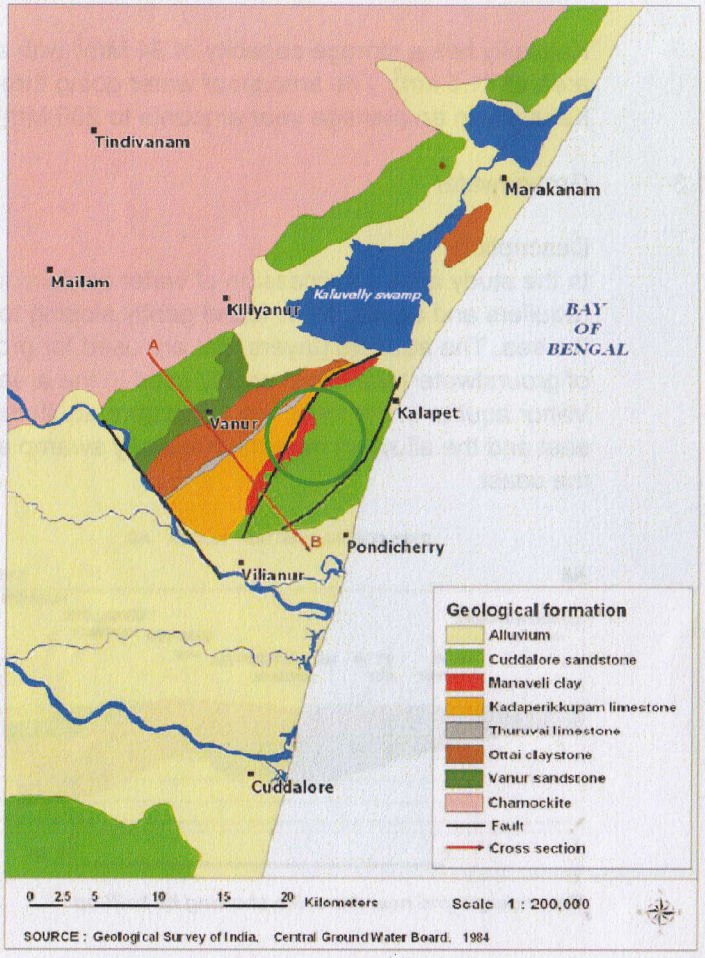
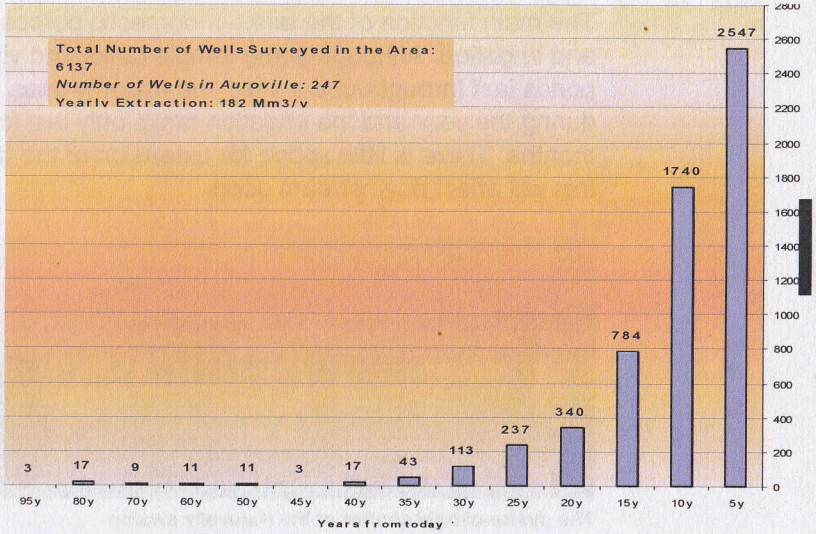


Present use

Groundwater is most widely used in the study area as a water source both for domestic and agricultural purpose. In particular the agricultural sector has been debit to the excessive lowering of groundwater levels by increased drilling of wells and installation of pumping capacity. This development goes on and even aggravates due to Government Programmes on ownership of irrigation pumps and provision of electricity for farmers.



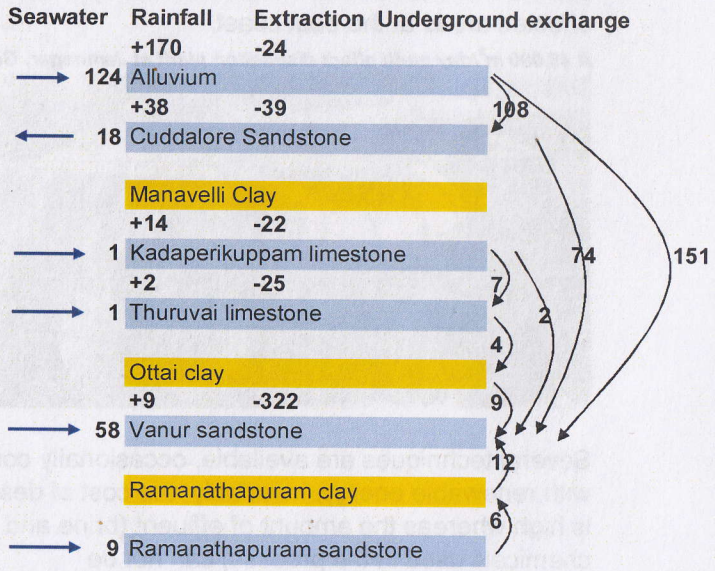
Development of wells around Auroville 1910 – date

Potential use

The potential for groundwater development is very limited. Recent research (Aude Vincent, Hydrological and hydrogeological study of the coastal sedimentary basin of Kaluvelli-Pondicherry (Tamil Nadu – India) has shown that

the aquifers being used in and around Auroville are heavily overexploited and will become saline in the near of far future. Based on a calibrated model, a water balance was produced for 2006, which is presented below. The Vanur aquifer is heavily over exploited and as a result attracts much water from the sea, from the seasonally saline alluvium and from the sulphate rich (not potable) water from Ramanathapuram formations.

Groundwater balance 2006 (Mm3/year)



The Alluvium is also heavily overexploited and attracts (seasonal) water from the sea. The Cuddalore formation seems to be in balance, but the number of wells is underestimated in this study as this mainly focussed on Vanur.

To understand why salt water intrusion has not yet been observed, the possibility of an impermeable boundary between the sea and the land (fault zone) would be present. Model runs however showed that this was not possible. It was finally concluded that the aquifers extending under the seabed, a reserve of fresh water has to be present. Would this reserve not be present and was seawater in the formations at the location of the shoreline, then model runs showed that within 6 months half of the Vanur formation would be saline.

These findings leave little scope for further groundwater development.

3.1.4 Waste water

Description

Waste water is produced at every place where water is being used and increasingly re-used, sometimes even for drinking water if other water sources are unavailable (Windhoek, Namibia). More commonly, waste water is treated to sufficient level and disposed into the surface water system or allowed to infiltrate into the underground. In general, there is consensus that treated waste water can be used as irrigation water.

Present use

Auroville is treating some 40% of its sewage to sufficient quality to be re-used in irrigation or gardening. Re-use of treated sewage is not structurally taking place and is

mainly organised at household level or in small communities.

Around Auroville, sewage is not re-used at all. Occasionally some small scale agriculture develops along drains containing sewage and irrigation takes place with untreated sewage water.

The effluent from the Pondicherry sewage treatment plant also is not being used.

Potential use

The potential for effluent re-use is considerable, though not popular for obvious reasons. It can be used for secondary purposes such as gardening, irrigation and controlled groundwater recharge. Auroville presently produces 655 m3/day (200 l/c/day) of waste water. Some 75% could be effectively re-used.

Villages around Auroville produce less waste water as they consume less water per capita. With 50 l/c/day and a population of 61,000, there is a large potential of waste water re-use, primarily for irrigation and an infiltration facility for the excess waste water.

For the Pondicherry waste water, this lies differently. The waste water contains much more toxic substances and therefore has to be treated. Currently an initiative of Auroville's CSR and Harvest has lead to a collaboration with the Smithsonian institute on the treatment of Pondicherry waste water with algae. First purpose is to prevent further deterioration of the underground. Second purpose is to create a source of irrigation water which should lead to a reduction of groundwater production in the area.

3.1.5 Seawater

Description

Extreme shortages of fresh water in the Mediterranean area and the Middle east has resulted in the rapid development over the past 10 years of salt water treatment techniques. These techniques are now also available at smaller scale such as recently in the Tsunami-effected areas at the east coast.

A 48,000 m^3/day multi effect distillation plant at Jamnagar, Gujarat

Several techniques are available, occasionally combined with renewable energy. Invariably, the cost of desalination is high whereas the amount of effluent (brine and chemicals used in the process) can not be underestimated. Development area however fast and processes become increasingly efficient and less costly.

Present use

In Auroville, desalinised water is not used as groundwater is still available. Desalination plants are however being considered for Chennai and several other urban areas along the coast where saline intrusion has occurred as a result of over-exploitation.

Desalination is often presented as thé solution for fresh water problems. The costs, environmental impact and the actual cause of the lack of fresh water reserves are often conveniently forgotten. Desalination in general is the last resort when all other possibilities are not available or otherwise unfeasible.

Potential use
The potential of the use of brackish or seawater for desalination is large. The source is abundant, it is a process that requires careful planning and supervision and lots of energy but is otherwise relatively stable and easy to operate.

In particular in tropical countries, the potential is larger as the sun can be used for a large extent. This can be done at a small household level or as a centralised large scale unit.

3.2 How do the sources compare

No single answer
Not one single source is in itself capable of providing sufficient water to Auroville and surrounding area: groundwater is not sustainable, rainwater is not available throughout the year unless stored at tremendous cost, waste water is only a secondary source and can only serve to reduce demand from the primary source and seawater can only be produced at exorbitant cost.

Integral use of water resources
Only a combination of sources can form a reliable basis for further development. Rainwater should be harvested and utilised during and directly after the monsoon season, waste water should be continuously recycled for secondary use, groundwater remains the primary source for potable water and desalinised brackish- or seawater or could replace groundwater for domestic use when aquifers turn saline.

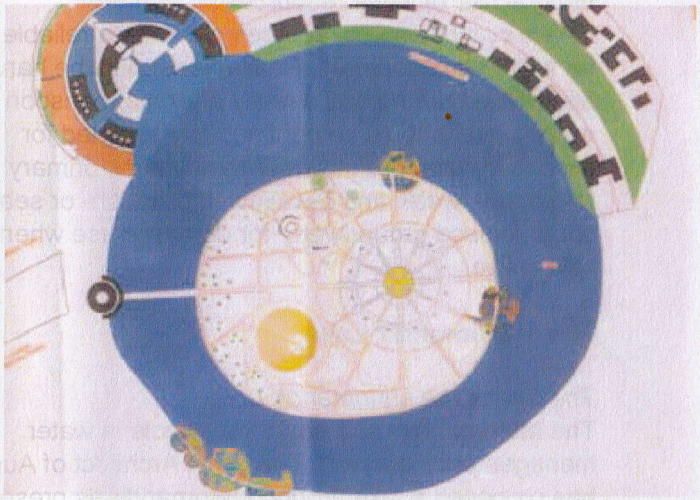
3.3 The Matrimandir Lake

The role of the Matrimandir Lake
The Matrimandir Lake could play a role in water management if allowed. The Chief Architect of Auroville has proposed a lake around Matrimandir as presented in the figure below with a number of design conditions.

The present design
These design conditions are:

- Purpose/function of the lake would be:
  - To create an island on which the Matrimandir and the Matrimandir gardens are located;
  - To create an isolation zone between the Matrimandir and the city centre
  - To be part of the city water supply system
- Size of the lake surface about 162,000 m2;
- The depth for aesthetic purpose ≥ 2.0 m;
- Top level of the lake 0.25 m below the oval path;

- Water level variation maximum 0.75 m between the highest and the lowest point;
- Uniform water level.



The design of the Matrimandir lake, October 2005.

Contradicting boundary conditions
Unfortunately these boundary conditions can not all be met. Either a choice has to be made for a fixed size and level without a role in water resources. Or size and level should be considered flexible and vary with the seasons allowing water storage in the lake and a considerable role in water management.

Some flexibility allowed
From water management point of view, it is recommendable to at least allow the lake to fluctuate with the natural rainfall to prevent that water has to be diverted to other areas causing extra water losses, expenses and water infrastructure. The lake can be replenished with stored rainwater or even with groundwater provided that this would not aggravate the water situation. Whatever will be decided on the Matrimandir Lake, its symbolic value and aesthetic aspects will always remain the main purpose of the lake.

ecology
The ecological management of the lake is crucial for the lake, the water quality and the appreciation of its beauty. This will have to be experienced at pilot scale in order to assess which biotopes will harmonise and prevent the water quality in the lake to turn bad.

Salt lake city
Some have proposed to fill the lake with salt water. This is technically possible and measures can be taken, at substantial cost, to prevent leakage of the salt water to the underground. Auroville would then create an unnatural phenomenon in the midst of its own recreation of nature! The lake will have to be replenished requiring a borehole into saline aquifers or a long pipeline to the sea. Such and initiative will certainly lead to a storm of national and international criticism and would severely damage Auroville's image as ecological city.

3.4 How much water is needed

The estimate of the amount of water required depends on the development of population and agriculture in the area. The prognosis for population in Auroville is listed below (Auroville Masterplan and subsequent documents).

Zone	2008		2010		2025	
	Fixed	Variable	Fixed	Variable	Fixed	Variable
Residential zone	3,750		12,000	150	40,000	500
International zone	100		180	450	600	1,500
Industrial zone	300		540	3,000	1,800	10,000
Cultural zone	100		180	1,050	600	3,500
City centre	450		1,500	450	5,000	1,500
Green belt	300		600	0	2,000	0
Total	*5,000*	*2,000*	*15,000*	*5,100*	*50,000*	*17,000*
Grand total	**7,000**		**20,100**		**67,000**	

Auroville presently uses 600 m^3/day whereas the villages in the Bioregion are using 3,800 m^3/day for domestic purpose. The agricultural sector is using a multitude of this with an estimated present consumption of 152,000 m^3/day. The ratio between domestic and consumption will only worsen as agriculture goes through a much faster development than population.

The population development around Auroville goes much faster than the population development within Auroville.

Demand can be managed. In several countries, practices such as flooding irrigation or wet rice, are not allowed due to limited availability of resources. Other irrigation methods are promoted and water saving crops are introduced to control the demand. Dual water use is introduced to save water of drinking quality and in houses, water saving devices are used.

3.5 How can Auroville manage the water

Small entity in large environment
Auroville has to realise that it is a small part of a much larger environment. Therefore every attempt of Auroville to manage its water on its own will fail. Sustainability can only be reached when intensely interacting with the Bioregion at all levels.

Community society
At present Auroville is a community of 1,800 inhabitants and a number of visitors mounting to some 3,500 in the high season. Aurovilians are spread over a large area and communities have a very low population density. In these conditions, there is no question that centralised systems for either water supply or waste water management can de adequately constructed at affordable cost. Auroville is a large group of small communities and these facilities will have to be organised by community or even by group of houses. Therefore a de-centralised approached has to be followed at this stage. Centralised solutions for drinking water and waste water can come later when the development of Auroville allows so.

Standardisation
Little is done on standardisation in Auroville with respect to water management, water saving devices, water harvesting systems, waste water treatment systems etc. The construction of new houses and rehabilitation of existing is an excellent occasion to impose these standards in the interest of better water management.

Optimisation in water resources management
On the short term, the present water resources in Auroville should be shared more equally. Some communities lack water as they are in a hydrogeological difficult area. Other communities have abundance in water. Instead of drilling new wells, a better sharing should be established between the existing wells.

Being the role model
Auroville is critically looked at and is taken as an example of sustainability. Local and regional authorities in the surrounding area take Auroville as an example. Therefore Auroville has to be cautious with its water consumption. Even though it is only a drop compared to enormous amounts used by the agricultural sector, Auroville has to take the lead and can not be permitted to be looked at.

3.6 How can Auroville relate to the Bioregion

Averting disaster
The perspective for groundwater resources in the area is disastrous. Looking at the way authorities in India deal and have dealt with water resources under these circumstances, it will have to be Auroville that takes the lead in breaking through this negative scenario.

Auroville alone?
The question arising is also if Auroville should work for water for itself. The answer is that this would not be possible. It is not within the scope and character of Auroville nor would it be accepted by its environment to seek solutions only for its own problems. Auroville now has knowledge about future development in groundwater that few others have. It has the duty to share this information, to share the problem and to share the solution.

Repeat history
Auroville has proven to be able to have a tremendous impact. The reforestation and more recently the emergency assistance after the Tsunami show what Auroville is capable of once united.

Coordinated offensive
For the issue of water resources a well coordinated offensive has to be carried out. Contacts have to be sought with local and regional authorities. Agreement has to be reached at technical level on the seriousness of the problems. Workshops and conferences have to be used to carry out the message.

Use of contacts
Recently Auroville has received a visit of the President of India, particularly focussing on Water Resources. This and other contacts should be used to deliver the message to the larger public. Also the press should be involved through careful communication via selected channels.

Participate in international financed projects
International financial aid is currently used to embark on large scale water resources improvement projects such as IAMWARM. Auroville participate as an NGO, through units such as CSR, Harvest and Palmyra.

It is clear that these efforts require a careful planning and organisation.

3.7 How can it be organised

Reference is made to the report Organisation of Water in Auroville, India – Luxury or necessity. In the period of February-November 2006, several visits were made by a small team to Auroville, investigating ground for some form of water organisation. The outcome was clear and to a large extent unified:

- Auroville needs a water organisation;
- The water organisation should start soonest possible;
- The water organisation should be staffed with technical people rather that people with management skills;
- The internal water supply and water management including waste water should be a first point of focus;
- Starting within Auroville, the water organisation should gradually gain ground and confidence;
- Once proven able, it can be integrated in the Auroville organisation and become the formal voice of Auroville;
- On behalf of Auroville, this organisation should liaise with local, regional and national authorities regarding water resources planning and development;
- On behalf of Auroville this organisation should participate in ongoing projects and programmes in water management;

4 CONCLUSIONS

4.1 Resources

Groundwater is the main resource at present and recent research has proven that the ongoing pace of exploitation will certainly lead to salinity increase in the main aquifers. This disastrous scenario will lead to strong migration of farmers out off the affected region, possible influx of small scale industry not depending on water resources, loss of value of land etc.

Further investigations into the progress of this phenomenon require deep off-shore drilling, soil investigations, water sampling and analysis. Auroville can not afford such expenses and it is doubtful that the Indian authorities are willing to provide funding.

Alternatives for groundwater are rainwater, re-use of treated waste water and to limited extent desalinised seawater. Only a combination of these resources would be sufficient to meet the present demand.

Under these circumstances it is neither necessary nor possible to work out a detailed or even conceptual design of a water management plan for Auroville and surrounding area. Too many issues have to be dealt with and too many choices have to be made.

4.2 Demand

The demand exceeds by far present resources. The demand is mainly coming from the agricultural sector, but also the domestic demand could be better managed, to start with in Auroville.

In the agricultural sector, one sees not only an absolute development of irrigated area but also a relative increase by farmers applying water irrespective of the actual necessity as it is freely available and there is a strong conviction that water results in growth.

The management of this demand in Auroville and outside Auroville, both domestic and agricultural requires a strong organisation.

4.3 Organisation

A change from groundwater to a combination of other resources requires a careful planning and organisation. It also requires liaison with and cooperation from local and regional authorities and international financing agencies.

Also for the management of demand, a strong organisation is required to deal with Auroville's population, work on water saving programmes in surrounding villages and deal with regional and national authorities to demote free electricity and pumping sets.

Auroville has at present the knowledge and experience to handle this difficult tasks. Auroville should take up this task and make it to one of the core issues of the coming period. Auroville is however not sufficiently organised and would lack manpower on the long term to take up this gigantic task.

5 RECOMMENDATION - ACTION PLAN

Years have been used to discuss and study on water in and around Auroville. There is an overwhelming amount of information and studies all clearly directing Auroville towards integrated water resources management in a step-wise approach cautioning the use of groundwater due to lack of sustainability. Whatever conclusions or recommendations are given and have been given, the essential issue for Auroville is unification and coordination. Without this and without the backing of the community at large and essential parts of Auroville's organisation, any initiative is deemed to fail.

5.1 0-2 year

Auroville, technical aspects

- Oblige and standardise rainwater harvesting;
- Oblige and standardise waste water treatment;
- Abolish gardening and irrigation with groundwater;
- Optimise water resources between communities;
- Groundwater use has been reduced by 20%;
- Continue decentralised approach in drinking water and water management;
- Prepare for desalination for drinking water (study, available land);
- Investigate ecological- and water management 'frictions' of the Auroville Masterplan;
- Determine possible solutions to deal with these frictions.

Bioregion, technical aspects

- Conduct studies towards the use of the excess water from Kaluvelly for infiltration;
- Conduct studies towards the use of the Pondi waste water and carry out a first pilot;
- Study the possibility to introduce water saving measures in the agricultural sector.

Auroville, organisational aspects

- A water organisation should be set up starting with the implementation of the technical recommendations;
- The organisation should mainly focus on Auroville;
- The organisation should unify Auroville in a strategy and mission in water;
- Initial contacts should be sought with local and regional authorities.

Bioregion, organisational aspects

- Determine which Auroville units will interact at what way with the Bioregion;
- Determine which programs (government and NGO) are ongoing and how Auroville could be involved;
- Establish contacts with local and regional authorities for joined action in water management;
- Establish contacts with international financing agencies;
- Determine valuable contacts for Auroville and start a publication campaign.

5.2 2-5 year

Auroville, technical aspects

- Construction of more centralised facilities for waste water treatment and re-use for nearby communities;

- Construction of more centralised facilities for rainwater harvesting and infiltration for nearby communities;
- Standardisation is introduced for drinking water installations and water saving devices in-house;
- Wells are 'managed' in order to share water between communities in difficult areas;
- Groundwater use has been reduced by 50%;
- Desalinised water is used a small scale for domestic purpose;
- Gardens and parks are turned into self-sustained units that require little to no additional irrigation;
- All gardens and parks are irrigated with harvested rainwater, recycled waste water or groundwater originating from infiltration;
- The Masterplan is revised to harmonise with the natural underground and ecological sensitive area, without compromising its essential aspects.

Bioregion, technical aspects

- Construction of recharge structures for excess water from Kaluvelly is completed;
- Villages and small towns are provided with waste water treatment facilities and effluent is re-used for irrigation;
- Villages and small towns are provided with rainwater harvesting structures. Rainwater is either used or infiltrated;
- Groundwater use for farming has been reduced with 20 % by introducing alternative sources and water saving techniques;
- At least 50% of the effluent of the Pondicherry Waste Water Treatment Plant is being treated and either used or infiltrated.

Auroville, organisational aspects

- The water organisation has been institutionalised and should now actively work outwards to the Bioregion, local and regional authorities;
- Auroville water organisation in coordination with several Auroville units has established ties with NGO's and local and regional authorities in its Bioregion;
- Auroville is recognised at national level as an authority in sustainable water management;
- Auroville has established strong ties with international financing agencies.

Bioregion, organisational aspects

- Auroville has acquired budget for its programmes in sustainable water management from international funding agencies;
- Auroville is internationally recognised as a major change agent in water management in the region around Auroville;
- Auroville has well established contacts with regional authorities on ongoing programme in water resources management.

5.3 5-10 year

An action plan for the period after 5 years is of little use as all important actions have to be taken in the coming 5 years. After 5 years, the short term actions will have to be consolidated and further developed. Auroville will be a leading entity in sustainable water management in the Bioregion.