A LONG TERM COLLABORATION PROPOSAL BETWEEN HAMBURG WASSER AND AUROVILLE

TOWARDS WATER SECURITY AND DISSEMINATION OF EXPERIENCE

October 2018

Brief

Hamburg Wasser(Germany) has expressed an interest in supporting Auroville (South India) in its endeavor of ensuring sustainable water security and accessibility and helping towards disseminating it's the gained experience to other organizations and populations.

While funding are reachable from Government of India or other sources, many aspects to be addressed for proper management of water cannot be budgeted these ways. It is around combining various sources, monitoring, human resources, metering, but also governance and support for dissemination.

In this given scenario, it is not anymore possible for Auroville to address the water scarcity and degradation of quality it is facing.

Specific support is seek out, either technical, financial and in term of training.

The subject of this proposal is about essential aspects which can turn the actual unsustainable situation into a coherent and resilient all.

Core Team and Agencies

In order to initiate a collaboration with Hamburg Wasser in that direction a core team and agencies have been selected and approved by Auroville's planning authority, L'Avenir d'Auroville.

Auroville core team members for the hamburg wasser program

Gilles Boulicot: Project coordinator, Engineering coordinator
Giulio di Anastasio: Data and Monitoring coordinator
Tency Baetens: Implementation coordinator, Finance
Aditi Rosegger: Governance and communications coordinator

Auroville's coordinating and executive agencies for hamburg wasser program

L'Avenir d'Auroville: Endorsement and authorizing body
Auroville Water Group: *Water think tank*
Auroville Centre for Scientific Research (CSR): *Project holder*

List of Abbreviations

GoI Government of India

DST	Department of Science and Technology, Ministry of Science and Technology, Government of India
HW	Hamburg Wasser
AWS	Auroville Water Service
AA	L'Avenir d'Auroville
CSR	Auroville Centre for Scientific Research
RZ	Residential Zone of Auroville

1. Introduction

Auroville, an international intentional community in South India, has been engaged in water conservation at local and regional levels since its founding in 1968. Over time, experience and expertise accumulated and included erosion control, environmental regeneration, water resources management, wastewater treatment, governance and social aspects.

Partnerships with research organizations from foreign countries resulted in several water-related studies focusing on technical and scientific aspects. Topics covered hydrology, hydro-geology, wastewater management, integrated water management, appropriate irrigation practices and governance issues. Auroville has the ability to organize trainings, dissemination programs and publications on water resources management and its application in various contexts.

Despite Auroville's in-house expertise, there are large gaps in formulating, organizing and implementing a coherent water security program not only applicable for the community but being an example for a wider context. Due to its legal set-up and land holding patterns, Auroville was forced to adapt a decentralised development, a pattern no longer suitable to facilitate a sustainable water management program. While the water conservation efforts spanning nearly 50 years benefited the larger local area, it is not enough any longer to halt the ongoing degradation of water resources within the bioregion. Groundwater is rapidly depleting resulting also in seawater intrusion combined with other degradations like encroachment in water bodies and obstruction of irrigation drains, thereby endangering water accessibility for a large population.

Providing water security is a priority to adequately address the challenges and use the experience as an example and possibility of sustainable water management.

The task required from Auroville's concerned water groups will be:

1. To define an appropriate framework for hosting Hamburg Wasser program proposal and to identify the individuals and agencies responsible for its implementation.

2. To define the necessary activities, timeline and budget requirements.

The potential collaborative support of Hamburg Wasser as a public company with outstanding expertise in the domain of water accessibility, drainage and wastewater management occurs as a timely intervention for the ongoing Auroville effort to initiate and facilitate the development of a sustainable and replicable water security policy, valid in the context of the bioregion, while attracting support through its example.

2. An initial Long Term vision for the collaboration with Hamburg Wasser

Proposal to develop an approach that acts on multiple levels simultaneously, for which time frames and indicators after the proposed pilot's phase frame of work is agreed upon.

The identified fields are:

Site investigation and monitoring	Topographic survey, GIS integration and processing
	Water monitoring, data analyses, supporting tools
	Metering
	Inventory of existing facilities and health check: check-dams, wells, supply systems, wastewater treatment systems.
Multi-sourcing infrastructure development	Storm Water collection and Rain Water Harvesting structures development
	Upgrading of wastewater treatment facilities
	Specific Groundwater extraction techniques
	Multi-sourcing supply system implementation
	Development of solutions for agricultural areas
	Urban Integration and upgrading of existing infrastructures
Governance	Creation of a water governance body
	On-line accessibility to information
	Community policy
	Awareness and documentation
	Water economics
	Communication strategies
Training, capacity building and dissemination	Internal Training program and capacity building
	Dissemination and technical capacity
	Communication with local and regional authorities
	Publications in newspapers and other media

	Open-source availability of information and training material
	Seminars at state, national and international levels.

This strategy would fit with Auroville's water vision, which identifies the fields of water sourcing, stewardship, governance and education, all sectors supporting a matching development.

3. Proposal for Pilot Phase

To initiate a long term collaboration with Hamburg Wasser it is proposed to start with a pilot phase during which essential projects of short duration can be completed and work methodology with Hamburg Wasser be developed.

This pilot phase is planned to be completed within 9 months starting at the date of agreement.

In this pilot phase, it is proposed to focus on 1) Site investigation and monitoring, 2) Multi-sourcing infrastructure development and 3) Governance and technical capacity.

Internal training and capacity building as well as dissemination will be developed at later stage of the collaboration program with Hamburg Wasser.

Through separate funding a number of standalone projects have already been initiated. These projects are listed below providing an overview.

While funding support is made available through various sources, some critical aspects cannot be addressed in the budget frame so far. As a result sustainable water security cannot be ensured. These aspects are mainly related to human resources, operation and maintenance, governance and the integration of various technical aspects of the work. As a result, essential activities are not convey or in a limited way only.

ONGOING PROJECTS WITH SOURCES OF FUNDING

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
Data acquisition, integration and processing	**Geomatics Studio Portal** In-House development of the Open Source Geomatics Studio Portal and PostgreSQL database is happening daily. Functions for data analysis through Pandas, GeoPandas and Jupyter modules in Python language are getting developed to enable quick analysis.		GoI		Ongoing The system is developped in accordance to data acquisition and request.	

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Topographic Survey Detailed Topographic survey for entire Auroville area. Material available in house: 1 Dual GPS, 1 Total Station.		GoI		Ongoing About X% completed – Matrimandir compound is completed and published, – To date 30% part of Residential Zone is completed. Sector 1 and 2 will be published by the end of November 2018 – International Zone – Industrial Zone – Cultural Zone – Outside area Due to high vegetation coverage and work methodology, delivery takes time. After conducting the field survey, data are processed and integrated into the database, and then published in the Geomatics Studio Portal. Web site: gis.auroville.org.in	Necessity to speed up the process for initial topographic map generation Completion of detailed survey

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
Monitoring & Metering	**Observation wells** Development of observation wells for ground water observation.	Done	Internal	NA	- First Aquifer 8 observation wells developed (4" diameter, about 50 meters deep) in adequate locations. - Second aquifer (system of aquifer) . No dedicated bore wells. -Third aquifer. No dedicated bore well	- 2 extra wells required to cover the entire area - 8 dedicated observation wells (~100m deep) necessary - 2 dedicated observation wells necessary (~200m deep)
	Automatic ground water level monitoring Piezometers for monitoring of water level in aquifers	Jan 2018	Internal	NA	- First aquifer, 11 wells equipped Calibration of sensors on 5 wells in the City area as well as Green Belt is ongoing. Radio transmission of data happens through LoRaWAN device. Installation of solar-powered transmission device in selected sites will happen after calibration. Three more wells identified and equipped in the Green Belt area.	Problems of radio transmission, solution still to be identified. Data will all be integrated in Geomatics Studio Portal

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Manual ground water level monitoring About 50 wells are monitored for their water level on a weekly basis. Many wells tap into multiple aquifers, therefore the scientific meaning of the data is hampered. Monitoring is done more for informing community about the water level in general.	NA	Internal	NA	On going Data are published in the Geomatics Studio Portal. Web site: gis.auroville.org.in	
	Ground water quality monitoring Not covered actually					Need for human resource and field equipment + lab analysis
	Automatic Weather Station setup One automatic weather station (Ambient Weather brand, model WS-2902A) has been purchased,		Internal		Transmission of data is being checked. Procedure for integration of data into database is ongoing. Data will be integrated in Geomatics Studio Portal. Web site: gis.auroville.org.in	

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Manual Rain gauges Fourteen manual raingauges are operating in Auroville territory.		Internal		Readings are not consistently taken, not abiding to our standards, their data rejected. Reliable data are published in the Geomatics Studio Portal. Web site: gis.auroville.org.in	
	Metering of treated wastewater at Residential Zone Wastewater Treatment Plant. Electromagnetic flow meter connected through Optical fiber network	2018	GoI		The installation and calibration has been completed. Data collection initiated as STP is in starting phase Data will be integrated in Geomatics Studio Portal. Web site: gis.auroville.org.in	
	Metering of water extraction and supply Several wells are equipped and some of the distribution systems.	Ongoing	Internal	NA	Meters are not well maintained. Data are inconsistent.	To install appropriate flow meters at key points with connection to network. To train dedicated team on O&M

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Wastewater treatment A preliminary survey of wastewater treatment plants in Auroville has been conducted.	2018	Internal	NA	Partly Completed Data are published in the Geomatics Studio Portal.	Detailed survey on health check-up of each plant, along with collection of data on other parameters needs still to be conducted
Infrastructure development including engineering	**Wastewater treatment plants** Auroville is equipped with multiple decentralized STPs	1995 till date	Divers	NA	Often not maintained properly so times dysfunctional.	To train dedicated team on O&M. To launch regular O&M program. To work on governance around wastewater management. Non served area to be equipped.

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Implementation of collective wastewater infrastructure in Residential Zone. This is including: -Sewer network and connection of 11 communities -60 KLD waste water treatment plant for treating waste water. -Return line for water recycling in connected 11 communities -Implementation of storage tanks for recycling of treated water at Matrimandir area.	2017-2018	GoI		1st phase completed by October end 2018. Storage tank by end of December 2018	Development of following phases. Extension of sewer system to allow for connection of more communities as per requirement. Modular extension of STP. Monitoring of freshwater consumption after implementation. Upgrading of treated water for in-house recycling
	Water supply Anything?		Divers			

Field of work	Short Project Description	Time Frame	Source of funding	Budget	Status	Next steps
	Rain Water Harvesting - Roof Rainwater harvesting - Surface Water Harvesting - Swale in HumanScapes - Swale and recharge structure Kalpana	12-2018 12-2018	Divers Internal Internal		- Several projects completed during last years. Often dysfunctional due to local conditions and poor maintenance. - To be started immediately - Ongoing	- - Integration of these 2 projects and turning it as a water resource - Large scale development of storm water control and surface water harvesting as a resource
Governance & Communication			NA		**No specific activities at this stage** Decisions are either project specific or decided by planning group in a pyramidal way chiefly from an administrative angle	To be developed entirely
Training and Dissemination	**Training on sustainable water management, dissemination of know-how**		NA		On going Turned chiefly towards outsideagencies	To develop more grass route training

4. Status of running projects in Auroville

			EXISTING				REQUIRED			
S. No.	Project Name	Description	Facilities Already Existing	Level of Completion	Funded by	Amount Already Funded (INR)	Required	Timeframe for completion (from Jan 2019)	Source of Funding	Approximate Budget (INR)
1	First Aquifer Observation Wells	Drilling of observation wells (4" diameter, about 50 meters deep), in specific locations where no data is available, so to integrate the already existing monitoring wells network	8 wells	Already existing, reching upto first aquifer only, and with limited interference	---	---	2 nos	5 months	HW	4,00,000

2	Piezometers for First Aquifer	Water pressure sensors, cabled, with transmission of data via radio to a base station (LoRaWAN setup)	11 piezometers	Calibration is ongoing for 5 piezometers, next step wil be safe installation on site. Expected completion by january 2019	DST	3,00,000	---	10 months	---	---
3	Second Aquifer Observation Wells	Drilling of observation wells (4" diameter), reaching the second aquifer (about 100 meters deep), to monitor water level of this particular aquifer, for which no specific recent data are available.	---	---	---	---	8 nos	5 months	HW	16,00,000

4	Piezometers for Second Aquifer	If LoRaWAN technology is working fine, then the same kind of setup can be used, otherwise alternative needs to be explored for automatic logging and transmission of data	---	---	---	---	8	10 months	HW	2,00,000

5	Water Distribution Meters Check-Up	Check-up, calibration and maintenance of part of existing water distribution system flowmeters to assess ground reality	Centralized distribution of water to Residential Zone and Administrative Zone, OverHead Tank, pipeline network, meters	The present system is serving about 940 people (about 20% of present Auroville population)	AWS	Information Not available	Meters need to be checked, re-calibrated and/ or replaced with other models less prone to errors due to local conditions (weather, lime content, presence of sand, etc)	10 months	HW	??
6	Centralized Wastewater Treatment Plant	60 KLD Plant	Commissioned	The present system is designed to serve 450 people	AA	50,00,000	---	---	---	---
7	Metering of Treated Water Quantity	Quantification of volume of treated water	Electromagnetic flowmeter newly installed	Completed	AA	1,50,000	---	---	---	---

8	Water Analysis of Treated Water	Regular (Twice a month) bio-chemical analysis of treated water quality	---	---	---	---	Financial support for setup of regular bio-chemical analysis	10 months	HW	1,02,000
9	Topographic Survey	Topographic Survey of Auroville with high accuracy (2 cm in x,y,z)	Team fully trained on DGPS survey. Matrimandir compound already completed, Residential Zone Sector 1 & 2 ongoing	Residential Zone Sector 1 & 2: about 50% completed	DST	4000000 (not counting equipment)	Drone Survey Test on 2 square Km, to verify accuracy under dense tree canopy	3 month	HW	2,00,000
10	Weather Monitoring	Weather data collection	12 manual rain gauges already collecting data, 1 newly purchased automatic weather station under testing	The automatic weather testing will be completed within 1 month	CSR	50,000	1 additional weather station	3 months	HW	50,000

11	Human Resources	Technical Support Team	1 software development engineer, Web Gis interface (gis.auroville.org.in) with integration of collected data	Not applicable, always developing	CSR	2,40,000	1 field monitor, 1 data processing operator, 1 software development engineer, 2 GIS operators	duration of the pilot phase	HW	15,00,000

5. Tabular Summary for the Pilot Phase

Vision	The overall aim is to ensure a system of effective long-term water security and accessibility that is easy to replicate and disseminate outside of Auroville.
Mission	Provide water security for its inhabitants and contribute to the water security of the surrounding areas, considering the natural environment as part of one interconnected system.
Guiding Principles	Responsibility, transparency, fairness and accountability.
Time Frame	December 2018 – October 2019

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
Multi-Sourcing Infrastructure Development in Residential Zone	Surface water harvesting towards reuse in Humanscapes and Kalpana communities,Residential Zone (RZ) - Interconnection of local swale - integration to local context - Development of storage, purification and pumping facilities for local usage - Connection to end users - Overflow structure for storm water control. - Study for optimized integration of surface water harvesting at larger scale.	9 months	Reduction of groundwater despondency by 30 to 50%.	- Funding for Infrastructure requirement - Funding Human Resource for study, trouble shooting and quality control during implementation	₹ 23,00,000.00

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
Site Investigation & Monitoring	- Drilling of 2 observation wells (4" diameter, about 50 meters deep), in specific locations where no data is available, so to integrate the already existing monitoring wells network - Installation of Water pressure sensors, cabled, with transmission of data via radio to a base station (LoRaWAN setup)	5 months 10 months	- Consolidated coverage of groundwater table level fluctuation - Reduced despondency on human resources, Integration on existing platform	- Funding for drilling equipment and well development - Aquisition of equipment for sensors and transmitters already covered - Related installation costs	₹ 4,00,000.00

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
	- Drilling of 8 observation wells (4" diameter), reaching the second aquifer (about 100 meters deep), to monitor water level of this particular aquifer, for which no specific recent data are available. - Installation of Water pressure sensors, cabled, with transmission of data via radio to a base station (LoRaWAN setup)	5 months 10 months	- Consolidated coverage of second aquifer system, main source of water for Auroville today, table level fluctuation - Reduced despondency on human resources, Integration on existing platform	- Funding for drilling equipment and well development - Aquisition of equipment for sensors and transmitters already covered - Related installation costs	₹ 16,00,000.00
	- Acquisition and installation of 8 contactless connectable flow meters for wells and key part of supply system in RZ	3 months	- Calibration of actual water extraction and distribution - Informed decision about future development - Communication with residents and stakeholders	- Aquisition of equipment - Related installation costs	₹ 3,85,000.00
	Check-up, calibration and maintenance of part of existing water distribution system flowmeters in RZ to assess ground reality	10 months	Data aquisition of reliable information	Funding of Human Resources	₹ 3,75,000.00

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
	Water Analysis -Once a month basic analysis of ground water quality - Once a month basic analysis of water supply quality - Once every three month basic wastewater analysis	10 months	- Follow up on evolution of water quality indicators. - Decision support tool for planning - Initial development of pollution control capacity	- Purchase of field analysis equipment - Human Resources - Lab analysis	₹ 63,000.00
	Drone Survey Test on 2 square Km, to verify accuracy under dense tree canopy	3 months		- Rent service of qualified company - Support for best work methodology in dense tree cover areas	?
	- Regular monitoring - Data segregation, integration and processing - GIS based map and report generation	10 months		- Funding for Human Resources	₹ 5,40,000.00
	Weather data collection				?

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
Governance & Communication	In the context of the surace water pilot project, water governance will be experimented with, documented and learned from. To set the stage for an effective future water governance, areas which will form the preliminary focus will include: - Establishing working relations, interactions and communication flows with all parties about the concrete actions detailed in the previous columns - Conducting surveys, together with the data collection team, and community interactions to gain an understanding about how water is used in the RZ;	10 months	This can then help pave the way to the development of an effective economic model for water use in Auroville ;	Funding for Human resources to help with conducting surveys and facilitation.	₹ 1,50,000.00
	Working on establishing a system to enable the acquisition and flow of data through the community;	10 months	Ease of exchange between involved actors, awareness within the community about and success of overall pilot project as a start…	Funding for Human resources to help with conducting surveys and facilitation.	₹ 1,50,000.00
	Learning from all of the above to lead to the proposal of a participatory water governance structures in Auroville.	10 months	Framing of a water governance structure		₹ 1,50,000.00

Strategic goals	Mission	Time frame for Completion	Indicators	Requirements	Budget (not yet consolidated) INR
Education, Training & Dissemination	Training of technician for maintenance of flow meters and wastewater treatment facilities installed in Residential Zone	10 months	- Building capacity in operation and maintenance - Well monitored distribution system - Towards opeartional water adn wastewater facilities	- Pier to Pier support for training - Funding of Human resources	₹ 60,000.00
	Documentation of activities	10 months	- Self learning - Communication towards Hamburg Wasser, end users and decision making bodies - Begining of training and dissemination material	Funding of Human resources	₹ 75,000.00
Administrative expenses & Overhead					₹ 3,12,400.00
	TOTAL BUDGET FOR PILOT PHASE				**₹ 65,60,400.00**