

Form Apply (TECHNOLOGY DEVELOPMENT)

Upper cap funding Rs. 1,00,000

Applied For: TECHNOLOGY DEVELOPMENT

Name of College/Institution: Amrita Vishwa Vidyapeetham.

Coordinator Name: Dr.S. Kanagaraj .

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UBA Coordinator Contact No: 9943703604.

State: Tamil Nadu.

District: Coimbatore.

Block: Madukkarai.

Select your SEG Name: Water resource management (IIT Kharagpur & GSIT Indore).

Select your RCI: Tamil Nadu Agricultural University, Coimbatore

AISHE Code of the College: U-0436

Title of the technology: Develop a community-based Model Treatment system to Restore Water Quality of abandoned Open Well using Soil Biotechnology (SBT) and Copper Nanoparticle.

Village where it is to be implemented: Pichanur (Pichanur Panchayat, Madukkarai block, Coimbatore district).

Brief description of the problem:

The open well was discovered to be abandoned and to be full of various waste products and during the visit to Pichanur village. Also, an issue of water shortage has been acknowledged to the PI (Participating Institution). The water in the well is unused. It is untreated, the water continuously loaded with solid and liquid wastes resulting in poor water quality with extreme contamination. Therefore, it is essential to use effective and long-lasting Community based water treatment technologies to clean up large-scale water sources and make them usable again as clean water for various day-to-day purposes. The strategy chosen for solving this problem through the application of “Soil Biotechnology (SBT) method and Copper Nanoparticles induced.” By successful working conditions, 500 families in the village will benefit. The unused wells could be converted into

valuable communal resources for the entire village. Eventually this project would enable improved water services.

Objectives

1. Assess the water and environmental conditions of the abandoned Open well.
2. Develop and design the miniature model SBT method and unit of Copper Nanoparticle to treat the water.
3. Applying treated to water-specific use and monitoring the progress.
4. Study the cost-benefits and socio-economic benefits of the treatment system.

Methodology:

The standard process adopted involves taking a water sample from an abandoned well. Before designing any treatment plant, it is crucial to consider the properties of wastewater. The features of an equivalent determine the therapy process's length, effectiveness, and other aspects. The results of the numerous tests will be compared with State TNPCB (Tamil Nadu pollution Control Board) & CPCB (Central Pollution Control Boards) standards to apply in specific use.

Materials required:

1. Raw water tank.
2. Bioreactor.
3. Pumping equipment.
4. Electrical installations.
5. Treated water tank.
6. SBT treatment medium.
7. Nanoparticles: Copper or Silver Nanoparticles extracted via Phyto-synthesis
8. Plants: Green plants, especially with tap roots, serve as bio-indicators / Agriculture land
9. Underdrain: stone debris of diverse sizes, ranging from fine sand to gravel.

Biotechnology (SBT) method:

In the SBT wastewater treatment method, which is based on a bio-conversion process, natural processes like respiration, photosynthesis, and mineral weathering occur in a media that contains micro and macro-organisms that produce the necessary purification. All forms of water, including

home, municipal, and industrial water, can be treated with SBT because it is an oxygen-supplying biological engine (Vision Earth care, 2013).

Phyto-synthesis of the Copper nanoparticles:

Step 1: Spices like star-anise/ nutmeg were dried at 45°C in an incubator. Dried spices were crushed into fine particles using a grinder in the dark at indoor temperatures (35°C) placed into containers, and sealed.

Step 2: Typically, 5 g of each dried spice material was dissolved in 50 mL of water. The aqueous solution containing spice material was heated in a heating mantle at 60–80 °C for 20 min and filtered using Whatmann No.1 paper.

Step 3: After 0.5 M of copper sulfate solution was prepared freshly, it was added to each spice extract at a 1:1 ratio and kept in the dark at 37 °C for 24 h.

Step 4: A colour change of the solution from bluish-green to brownish-red was noted by visual examination. This confirmed the synthesis of CuNPs using spice extracts.

Nanotechnology induced SBT Method:

The wastewater is first gathered in a holding tank, and then it is pumped into a bioreactor. Construction of the bioreactor involves excavation, which is then waterproofed. The base is where the under drain is placed. The tank is then layered with media and cultural elements and selected nanoparticles. Rows of plants line the bioreactor's exterior. The incoming wastewater is distributed uniformly over the surface of the bioreactor by a surface network of perforated pipes. Another vertically arranged pair of pipes is also extended into the bioreactor for aeration. Through the network of perforated pipes, water is pumped over the bioreactor and starts to trickle down the filtering media. Another vertically arranged pair of pipes is also extended into the bioreactor for aeration. The top media prevents the wastewater's suspended particles from flowing out. Dissolved contaminants are eliminated as the water flows through the remaining levels, and then treated water exits the tank's bottom outlet and is collected in a storage tank for treated water that has been built next to it.

Both the SBT method and Nanotechnology have independently demonstrated their contribution to the enhancement of water quality. However, both taken together can indicate the same. When used

in conjunction with the SBT method for water treatment, copper/silver and many other nanoparticles that have antibacterial, antifungal, and heavy metal digesting capabilities would improve water quality by lowering dangerous microorganisms.

Total cost of the product/technology: Rs.1,00,000/-

SI No	Expenditure Head	Cost
1	Electricity Cost	5000/-
2	Equipment/Machinery cost	50,000/-
3	Manpower Cost	10,000/-
4	Miscellaneous Expense	10,000/-
5	Running Cost	10,000/-
6	Site Preparation Cost	15,000/-
	Total	1,00,000/-

Project Timeline

Activities	1	2	3	4	5	6
Partnership with village community						
Baseline Study						
Restoration of Open Well						
Implementing SBI and Develop Cu Nano Particles						
Monitoring Water Quality						
Application of Water in Specific use and follow-up study						
Final report Submission						

Funds raised from: Gram panchayat and Village community members

Details of the funds raised from any other agencies apart from above-mentioned: NA

Role of PI at various stage of the project:

PI has already established network with key stakeholders who are the Panchayat officials and community to understand the need and intervention to create renovating the well for various purposes as necessary renovating the well for various purposes is necessary for community resources.

Next, upon the project is approved PI will play a significant role in renovating the unused well with the participation of villagers and panchayat officials.

Process of execution of the project

Step 1: Cleaning of the well.

Step 2: Collection of unused well water.

Step 3: Water treatment.

Step 4: Collection of purified water.

Step 5: Application of treated water in various uses and study the output.

PI has a significant role in implementing the project successfully and after that periodic inspection and utility of the project will be monitored. PI will ensure sustainability through the effective participation of the local panchayat. After the implementation, this will be taken as a model to implement similar projects in other villages because in most of the villages there is at- least one unused well which is causing a huge threat to the safety of many people.

Potential impact of the technology on the beneficiary & village:

Mostly under privileged Scheduled Caste people in the village. The renovation of the unused well would be done in association with Pichanur panchayat which will ensure the sustainability and maintenance of the project. Participating institute would ensure establishing the technological structure to use the unused well into community resource which would benefit the entire community of 500 families and the population of 1800 including for agriculture and become a model to implement similar projects in other villages. The main impact would be to solve the water crisis of the village.

Duration of Project: 6 months

Principal-Investigator: Dr. S. Rajendra Kumar (8903475890)

Co-Investigators: Dr. Janci Rani P.R. (9486034723)

Dr.S. Kanagaraj (9943703604)

Students involved in the project:

1. Ms. Sunkara Keertana sai srjitha (8978338974)
2. Anjali S (9207372975)
3. Sourav B R (9188273887)
4. Manisha R Pillai (7012692655)
5. Madhavaram T (8848871106)

Role of stakeholders in maintaining sustainability after the project duration:

The project will be done in association with Pichanur village panchayat who will further maintain the established structure and ensure sustainability.

Execution of the project along with role of all participating stakeholders:

The main stakeholders are the Pichanur village panchayat and people residing in the AD Colony of Pichanur panchayat. PI explained the project to panchayat officials and people, and stakeholders responded positively to further execution of the project. They also expressed that this would solve the water crisis in the village.

Impact of this work on learning of students/teachers:

It would be a great learning for the students and teachers to resolve the community-level water crisis and create community resources from unused wells. This creates awareness among students about the challenges in villages and inculcates to develop thinking skills to mitigate such issues. The crisis was there for so many years, but no one came forward to make it a usable one hence this project would benefit all the stakeholders of the project.

Name and Contact details of peoples those will be involved in this project (From UBA connected / adopted village):

Mr. P. Maruthachalam, President, Pichanur Panchayat- 97876 75558.

I agree all information provided is real & I agree with all terms & conditions mentioned.