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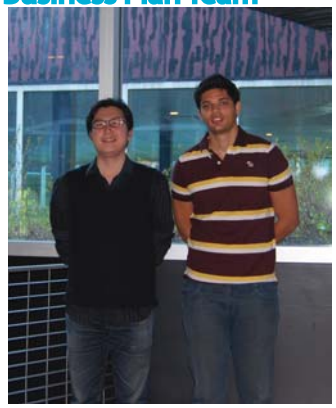

A SPECIAL THANKS TO...

- Everyone enrolled in this ENPRO for thier hard work and dedication.
- The Indian Institute of Technology, Rookee, for their outstanding contribution to our project.

Making a difference, each drop at a time

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ENPRO 355 ACARA CHALLENGE

AFFORDABLE AND SUSTAINABLE WATER SOLUTION FOR UNDER-PRIVILEGED COMMUNITIES IN Chharba, India

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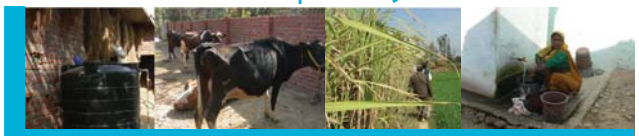
BACKGROUND

India's huge and growing population is putting severe strain on all of the country's natural resources. Most water sources are used on a domestic, industrial and agricultural basis. The quality of the water used is presumed to be the major problem that the people face, but the real problem is the quantity of water supplied. In order to increase the availability of water to the people of Chharba, it is necessary that the people have alternative means of supply of water, and a strong sense of the value of water.

Chharba in INDIA | Study Location



Population: 1540 families, 800 below the poverty line
Occupation: Mostly agriculture
Electricity available for 16 hr/day
Water available for 2-3 hours daily in the morning and evening
Selected by our partner team IIT ROORKEE

ABSTRACT

The primary purpose of IPRO 355 is to develop a sustainable business plan that provides solutions for the water problem facing the underprivileged communities of India. The team H2OPE strives to bring about change. A change where we could provide a solution which benefits the affected community as well as it can allure investors for the betterment of living standards for the people.

In collaboration with the Indian Institute of Technology, Roorkee, we found an approach that address the water issues of the village of Charba, Uttaranchal. With resources obtained through research protocols sent to IITR, and through investigation of the village, we identified user needs, and came up with feasible ideas to tackle the water quantity crisis affecting the village. Our primary proposal is a portable washing machine that reduces the amount of water and detergent consumed during washes. It also has the added benefit of capturing used water which can be re-used for irrigation either in a small garden or farm. Our secondary proposal is to build water collectors located on the roof of the homes, which is called the rain water harvesting initiative.

OUR APPROACH

Solutions were designed using a holistic approach by carefully analyzing the entire water system and consumption patterns of the residents of our target Indian village. The latent needs of Indians were discovered through secondary research and by employing the 'design thinking' method. Solutions were designed to enable large scale deployment in disparate environments both within rural as well as urban population centers.

Current Supply Of Water | Chharba

8 tube wells provided by the government
Each well about 250 feet deep
Water available for 2-3 hours in the morning, evening

Consumption Pattern in Chharba

	Type	Liters / person / day
	Cooking	4
	Drinking	3
Non-Potable Water Use	Bathing	15
	Laundry	8
	Ablution (toilet use)	9
	Other Miscellaneous	10

Our business aims to conserve and optimize
the use of non-potable water in households;
thereby reducing the strain on the limited underground water resources

Note: Villagers in Chharba use potable water supply for **ALL** consumption types

PROPOSALS

Primary: Portable Washing Machine

This is a compact container, pressure sealed lid, which is controlled through agitation by hand or by foot (pedal) for 2-3 minutes. I t works on the principle of expansion of hot air under pressure.

This machine will provide a low cost solution to the back breaking, labour intensive, time consuming, unpleasant task of doing laundry in the developing world. It requires low cost, low effort, low energy and low resources. It is portable, and has the added benefit of being very fast and time efficient. The potential market for washer is the large middle class in India.

Secondary: Rain water harvesting

The primary idea to have a simple water collector located at the top of the roof of buildings. This is a low cost, low maintenance initiative aimed at households. Materials will be obtained from local suppliers. Installation will be done manually by local villagers with little technical know-how required. It is a self sustaining business venture, operating at a low profit margin. It will provide profits for the village community.

Competition

	Washing Stone	Electrical Washer	Proposed Washer
Price	Outdoors (n/a)	Expensive (+ installation cost) Considered a luxury item.	Affordable (no installation cost). 1/6th cost of local brands
Environmental impact	Chemical effluents flow directly into rivers/ponds. Mixing with water table.	Requires hot water, Huge water consumption, disposal is a burden on municipal facilities.	Cuts down water use by 1/2, detergent by 1/3, and enables easier collection, reuse, and disposal of
Power	No power	High power requirement. Dependent on gov't for electricity provision.	No power requirement.

CONCLUSION

After constructing a detailed research protocol, and identifying user needs through our connections with IITR students in Chharba, we identified the scope of our project in order to solve the problem of water shortage. From our studies of various solutions, the options that seem most successful to address the water supply issue are the washing machine and the rain water harvesting initiative.

Learning from our approach this semester, one major recommendation for a future IPRO team will be to establish a strong line of communication from the beginning with the partner team in India. Next would be to develop a good breakdown and sub-team relationship of the work very early on. Create a research protocol as soon as possible in order to define the user needs. Then proceed to solving the engineering and design aspect of the project through tests and iterations.