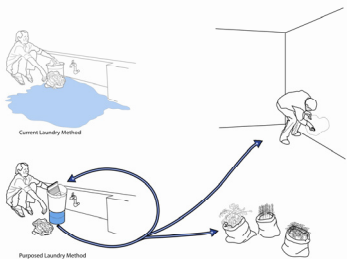


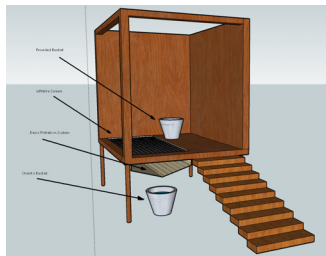
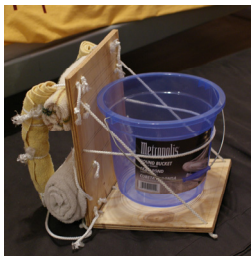
## ACARA 3

ACARA 3's final design revolves around the process of laundry. The mechanism is intended to create a closed system of water for cleaning purposes. There is an opportunity for savings if the water used for laundering clothes could be recycled. Through our primary research it was observed that the used laundry water is mainly discarded immediately after use because of an undesirable smell and odor. With a time tested method of basic sand/gravel filtration the detergents, solid matter, odor, and color can be quickly removed from the laundry water. Although this water may not be to adequate drinking standards it can be used for many other purposes.

After filtration, the cleaned water can be used again for laundry, cleaning the home, or sustaining a small garden. The filtering mechanism itself is extremely simple to construct with materials readily available to our target demographic. This method does require a one time investment in the buckets, gravel and sand. However, after the system is in place the user can grow a variety of plants at home helping to supplement their food supply and expenses. There are also a number of plants the user can grow whose seeds can later be harvested and used to replace the sand in the filter which helps to insure that the user never has to spend more money on the system. The recycled water can be used again for laundry or for cleaning the home, this not only helps to supply water to the individual user but it also takes stress off the entire water system in the community.



ACARA 3's Laundry Water Recycling Program.



ACARA 2's Water Carrying System Prototype and Shower Place.

## TEAM MEMBERS



ILLINOIS INSTITUTE OF TECHNOLOGY-CHICAGO

INDIAN INSTITUTE OF TECHNOLOGY-BOMBAY



TEAM	ILLINOIS INSTITUTE OF TECHNOLOGY-CHICAGO	INDIAN INSTITUTE OF TECHNOLOGY-BOMBAY
ACARA 1	Timothy Nystrand Christopher Lee Fransisca Dewi	Subrahmanyam Nallamolu Rupas Kumar Mesala Vishal Gangawane-Madhumanti
ACARA 2	Milos Leposavic Sang Hwa Lee Jeonghun Lee Shezami Khalil	Tarun Sagar Pradip Kalbar Jublee Jasmine
ACARA 3	Cheryl Mukai Stefan Matei Josh Gross Melissa Cheviron	Raja Sekhar Munna Kumar Shah Srinidhi Balasubramanian
ADVISORS	Dr. Linda Pulik Dr. Kenneth Schug Dr. Margret Hyuck	Dr. Ravi Gudi Dr. Virendra Sethi
ACARA INSITUTE	Fred Rose Erin Binder	

Front: Local girl collecting water from a main break.

Images courtesy of Acara Institute and IPRO office.

# IPRO 325A



Developing an affordable and sustainable mechanism for reuse and/or recycling of water in an economically disadvantaged area in Mumbai, India.

SPONSORED BY:



**IPRO** It takes a team!  
INTERPROFESSIONAL PROJECTS PROGRAM

## PURPOSE

In India, 800 million people are living without access to clean, drinkable water and more than 75 million people suffer from preventable, water borne and gastrointestinal diseases every year.

The city of Mumbai has 7 million people living in slums, most are living without adequate houses or clean water. Tap water is only on for an average of 3 hours a day, with lines forming up and petty fights over the precious resource occurs. As a result, slum dwellers are forced to purchase clean water from vendors which is unaffordable, or go without water.

## THE ACARA CHALLENGE

The Acara Institute has issued the following challenge to teams in Illinois Institute of Technology (IIT-Chicago), University of Minnesota (Minnesota) and India Institute of Technology-Bombay (IIT-Bombay): Develop an affordable and sustainable mechanism for reuse and/or recycling of water in an economically disadvantaged area in Mumbai, India using design thinking and remote research. 3 teams in IIT-Chicago, and 5 in Minnesota were each partnered with research teams in IIT-Bombay who conducted remote research for the American Design teams. With the research notes, Design teams are then challenged to create, test and refine prototypes of the products. Teams then present their products to judges and the winning team will be awarded a trip to Mumbai for a chance to field test the product they have designed.

## ABOUT THE ACARA INSTITUTE

The Acara Institute is a new non-profit organization that whose global mission is to advance collaborative start-up project for social change. It was created with the purpose of connecting individuals and organizations together to tackle the large challenges of the globe by creating sustainable business solution. Currently, the Acara Institute has presence in Minnesota, Illinois, Mexico and India and involves people from a multiple number of discipline.



Buckets of water outside a home.

## BACKGROUND INFORMATION

The 3 ACARA teams exist as groups of students whose aim is to develop a understanding of the water problems affecting the people that live in the economical disadvantage areas of Mumbai in order to provide a human-centered and sustainable solution.

In collaboration with graduate students in India, each team studied a slum of Powai, Mumbai to understand the problems they face regarding water. The IIT-Bombay students did the fieldwork such as taking picture and gathering answers to questionnaires provided by the design teams. Mentors from various institutions were made available to assist teams, provide insightful information into the design of a sustainable business models as well as being a large source of encouragement. Along with the primary means of research, secondary research was done through articles, books and the internet. This led teams to a better understanding of Indian life and help teams focus on their product designs.

The Research teams' field visit to Powai, Mumbai indicated that the one of the main problems residents have is the lack of the quantity of water, not the quality. The limited water pipes that families share with each other are only on for 3 hours a day and with 15 families sharing a typical pipe, the amount of water each person receives reduces to about 10 Liters of potable water a day rather than the daily recommended 32 Liters. Another observation made was that water was being put into open containers which then could be contaminated by bird, insects, and wind borne diseases.

Residents also said another problem is having enough water for washing clothes and bathing themselves. Currently, dirty water from lake is used for this purpose. Moreover, there are not enough places for bathing. People usually use 10-15 Liters of water for bathing. The government provides sanitary blocks called "MAHDA" for bathing and toilet usage. However, it has only 4 rooms for 450 people and people use it only for toilet because it is not maintained. This forces residents to bath in public streets with their clothes on.

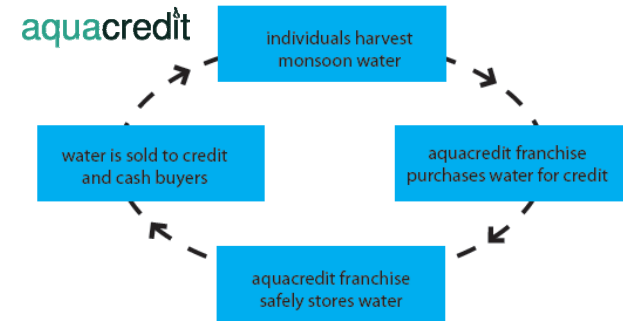


A government provided "MAHDA" sanitary block.

## ACARA 1

ACARA 1's main focus was on the lack of water pipeline access and the storage of water. Several issues surfaced during the discussions on possible solutions including the lack of space, low quality construction of homes and size of the product. ACARA 1 came up with a water bag prototype made from a used 5 gallon milk bag from a food service place. Currently, IIT Dining Services throws away these milk bags and this product opens up an opportunity for IIT Dining Services to be sustainable in a partnership with AquaCredit.

AquaCredit is a business model that helps solve the lack of quantity of water and ensuring the high quality of water when it's distribute. Just like a bank, residents can bring in excess rain water to the entrepreneur who will then give the resident a credit for part of the water brought in. The entrepreneur will then treat the water with a filter or use a water treatment tablet, fill the storage bags and seal it. Residents can later redeem their water credits and purchase additional water as needed, giving the entrepreneur a source of income by running this community water bank.



ACARA 1 testing a water storage bag prototype made from a 5 gallon milk bag.

## ACARA 2

ACARA 2 wants to offer clean water to bath and recycling system. Moreover, we need to support people to carry their water easily from the lake. As a result, we worked on the shower place, water recycling system, and water carry system. (Photos on other side.)