



BACKGROUND

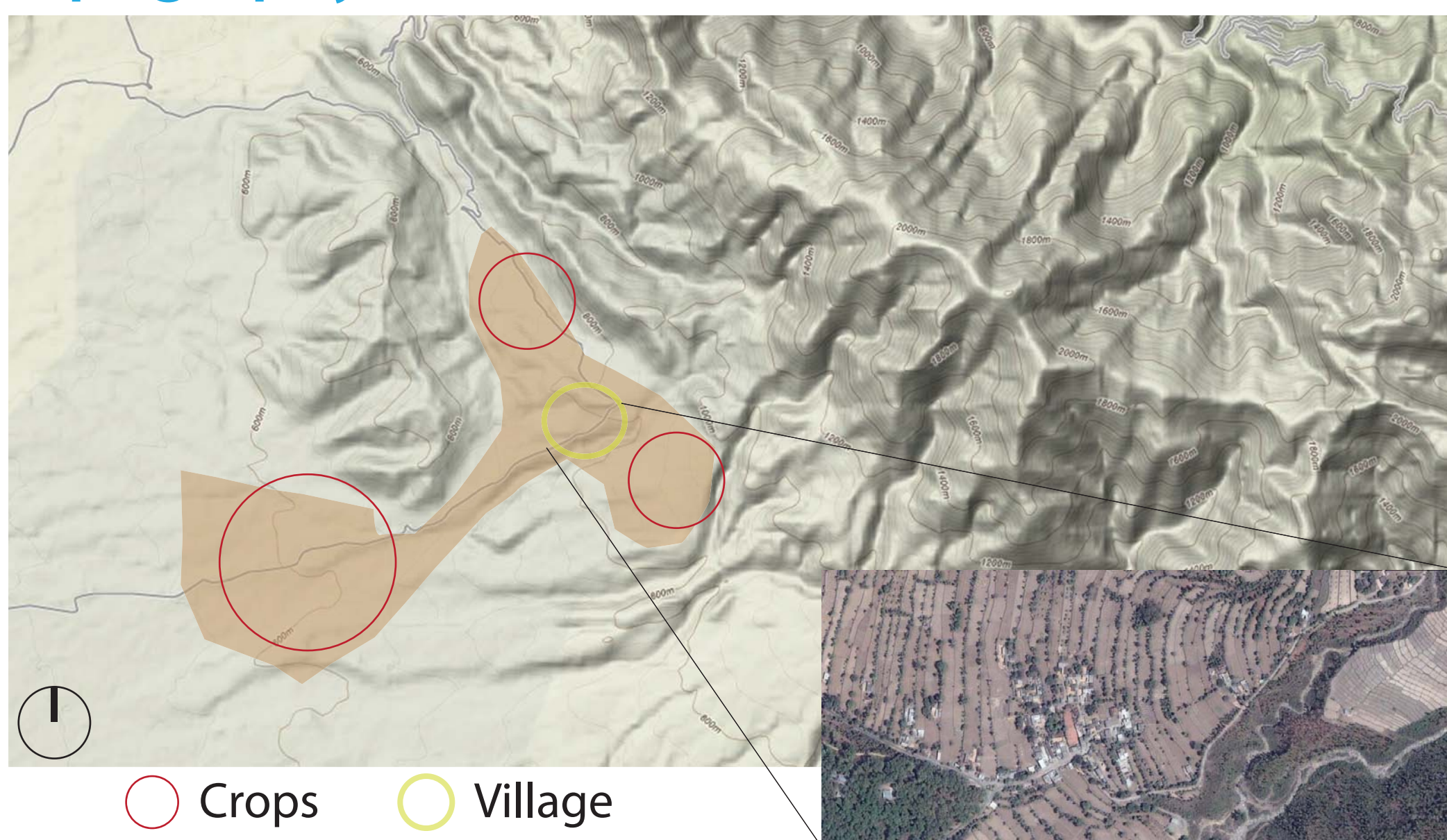
- India's massive and growing population is putting severe strain on the country's natural resources.
- The quantity of water is a major problem, mainly used for domestic, industrial, and agricultural needs
- The issue of drinking water has been addressed by many organizations, however other sectors of the community, especially irrigation, are still in need of solutions

Chharba in INDIA | Study Location

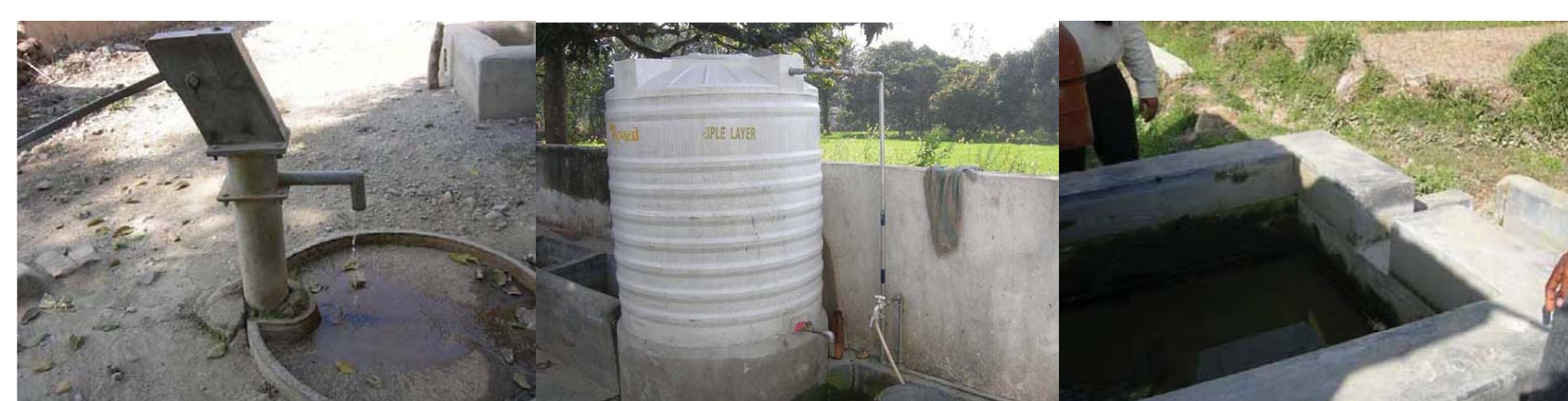


Population: 1540 families, 800 below the poverty line
 Occupation: Mostly agriculture
 Electricity available for 16 hr/day
 Selected by our partner team IIT ROORKEE

Topography of Chharba



Supply Of Water



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

Typical Consumption Pattern in Chharba

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

Non-Potable Water Use

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

BUSINESS MODEL To Deliver Value Properly

Proposal

"To Maximize Quantity and Access to water by its efficient collection and utilization"

Primary Business | A manual Portable washing machine

PROBLEM STATEMENT

Provide a low cost solution to the labor intensive, time consuming, environmentally unfriendly task of doing laundry in the developing world.

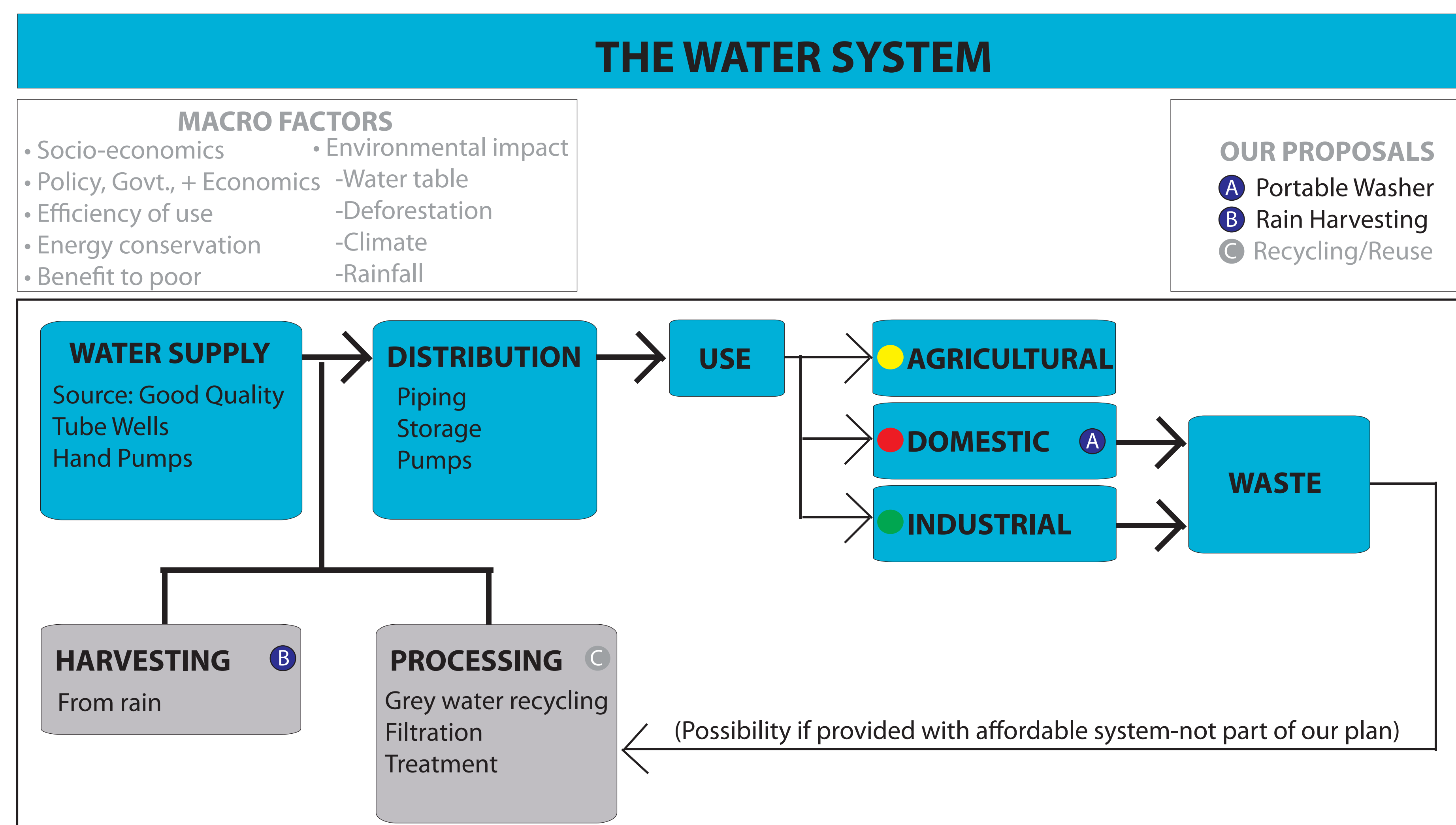
- Low Cost
- Easy operation
- Portable
- Low resources use (less water, detergent)
- Fast performance (quick washing)

Complimentary Business | Grey Water Reuse + Rain Harvesting

PROBLEM STATEMENT

Design a low cost environmentally sustainable solution to provide access to sufficient quantity of water for daily household use and moderate irrigation.

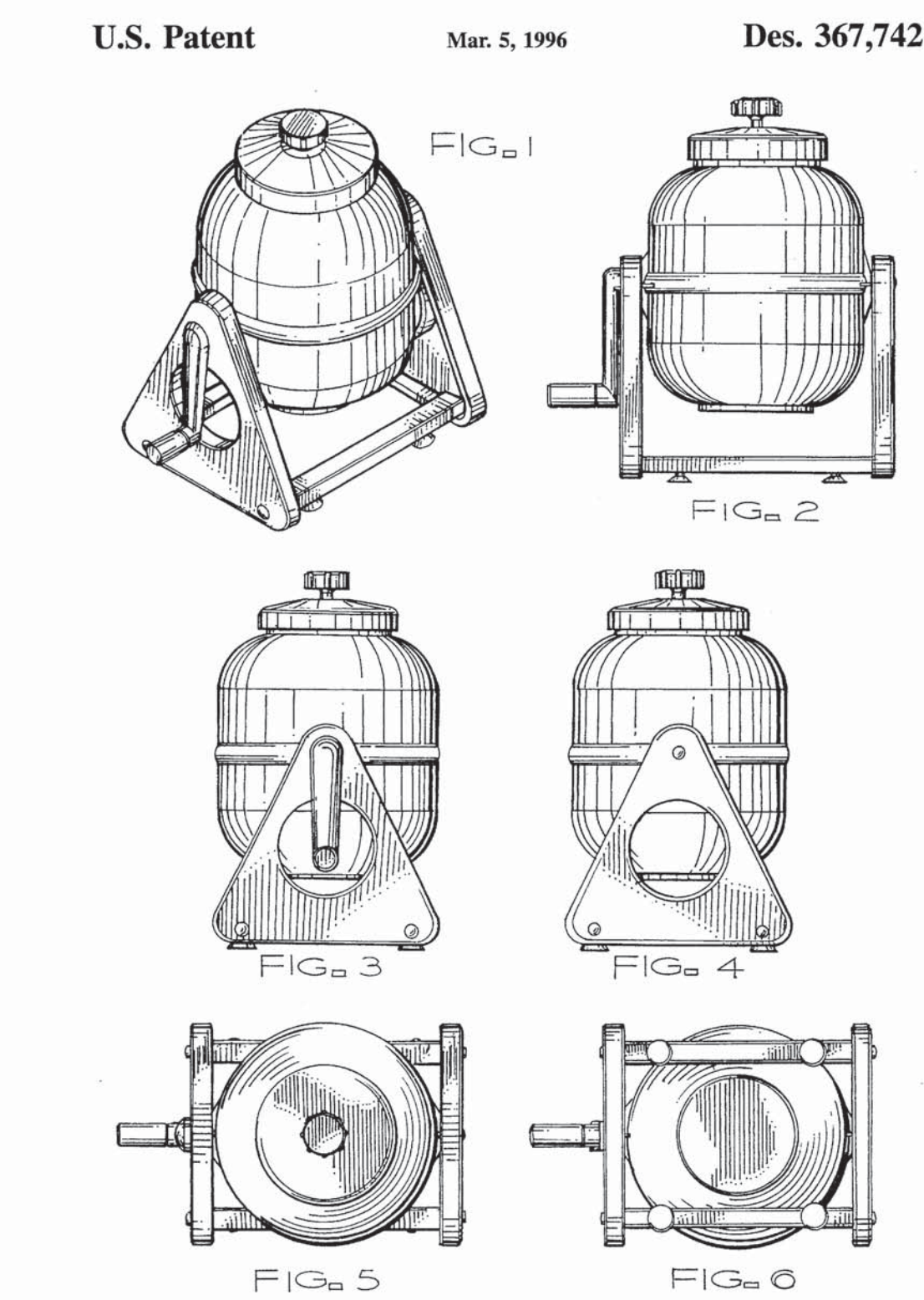
- Low equipment cost (upfront)
- Low operations/maintenance cost (overhead)
- Modular design (ease of deployment and scalability)
- Efficient reuse of household greywater and collection of rainwater
- Adaptable to different settings



KEY FACTORS	BENEFITS
<ul style="list-style-type: none"> Quality Volume Costs 	<ul style="list-style-type: none"> Health Quality of life Socio-economic Equity Energy Use
<ul style="list-style-type: none"> Timing Volume Labor 	<ul style="list-style-type: none"> Productivity--Food Employment Revenue
<ul style="list-style-type: none"> Volume 	<ul style="list-style-type: none"> Productivity--Food Employment Revenue

SYSTEM LOSSES IGNORED (Evaporation, Leakeages, etc.)

SOLUTION



PRIMARY SOLUTION: PORTA WASHER

The Device:
 Compact Container
 Air Tight Pressure sealed lid

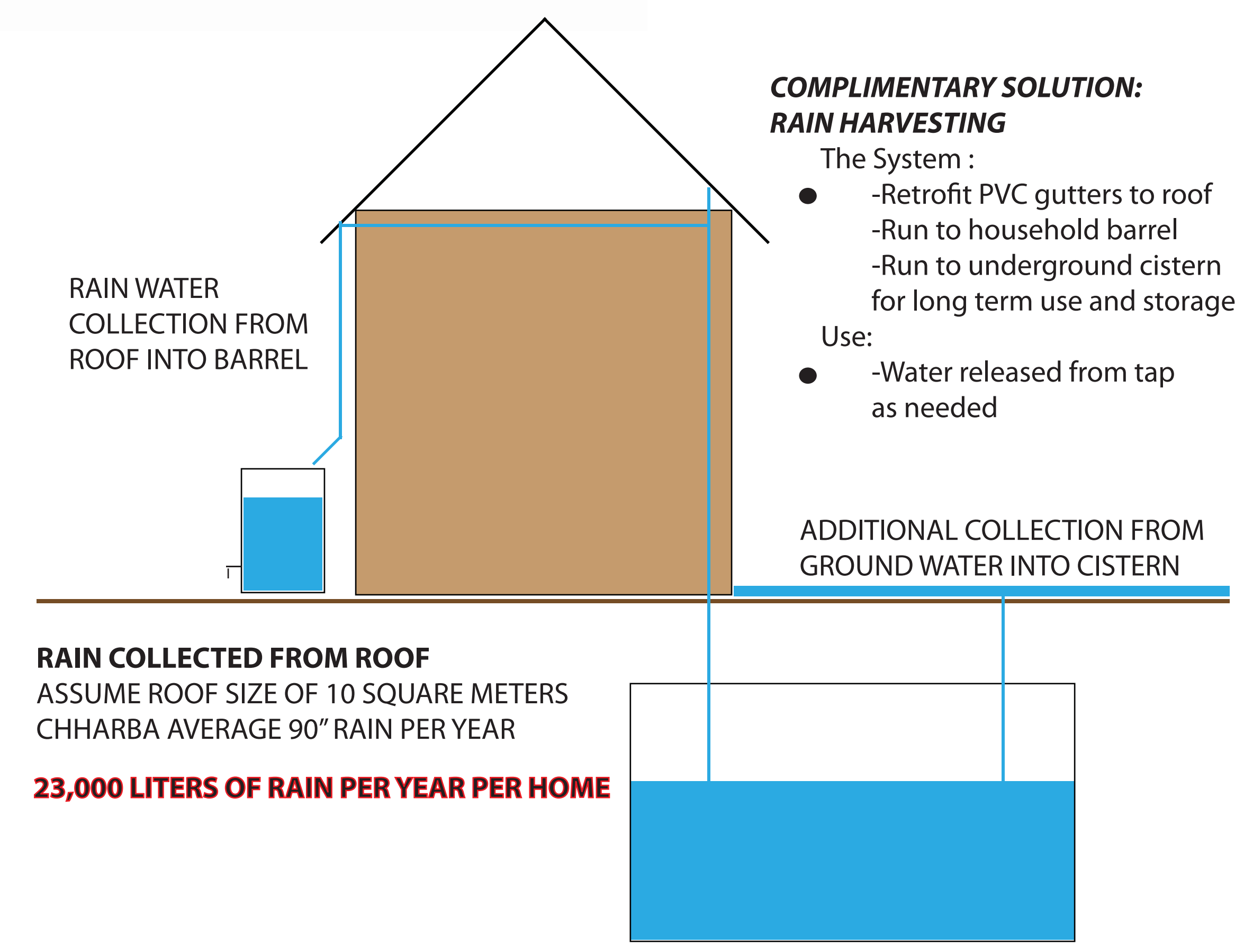
- Agitation: Container rotated by hand crank
- Cleansing Action:
 - Hot water, detergent, clothes are mixed and agitated.
 - Hot air expands in the pressurized container, and forces the detergent through the fabric and dislodges dirt,
- Rinsing:
 - Drain out dirt water, and rinse with clean water to remove detergent residue

IMPORTANT FEATURES

- CUTS DETERGENT USE
- CUTS WATER USE
- SAVES TIME

[Total Time For Wash: 3 minutes/5lb load]

These specifications and accompanied schematics are based off of an existing model in the US market. We seek to make further improvements in functionality and operation



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.