ENPRO 355: ACARA CHALLENGE

FINAL PRESENTATION

AFFORDABLE AND SUSTAINABLE WATER SOLUTION FOR UNDER-PRIVILEGED COMMUNITIES IN INDIA

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BACKGROUND

- ACARA Challenge
- Second IPRO Acara challenge at IIT
  - -1st focus on slums in Mumbai (last year)
  - -2nd Urban village focused Uttaranchal (this year)
- In collaboration with IIT Roorkee
- Our goal: to produce a business plan and model to provide a sustainable solution

PROBLEM STATEMENT

- Major Challenge
  - Water Supply is the problem
- **Increasing domestic supply is our problem focus**

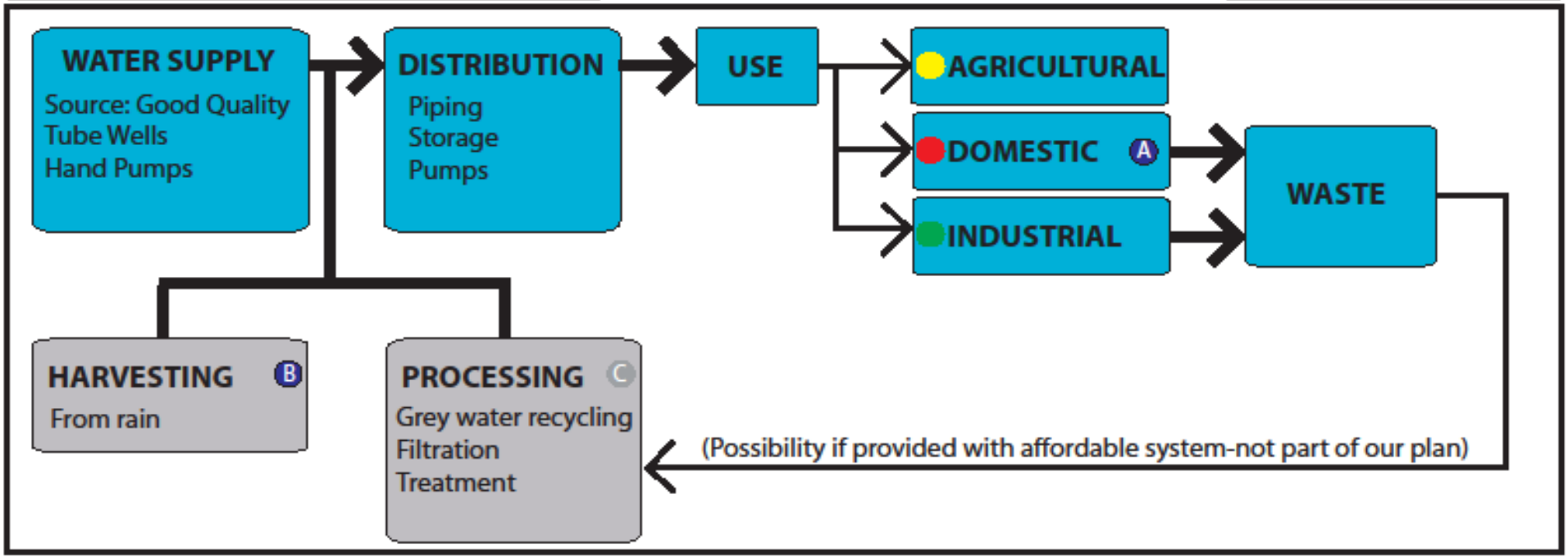
THE WATER SYSTEM

MACRO FACTORS

- Socio-economics
- Policy, Govt., + Economics
- Efficiency of use
- Energy conservation
- Benefit to poor
- Environmental impact
  - -Water table
  - -Deforestation
  - -Climate
  - -Rainfall

OUR PROPOSALS

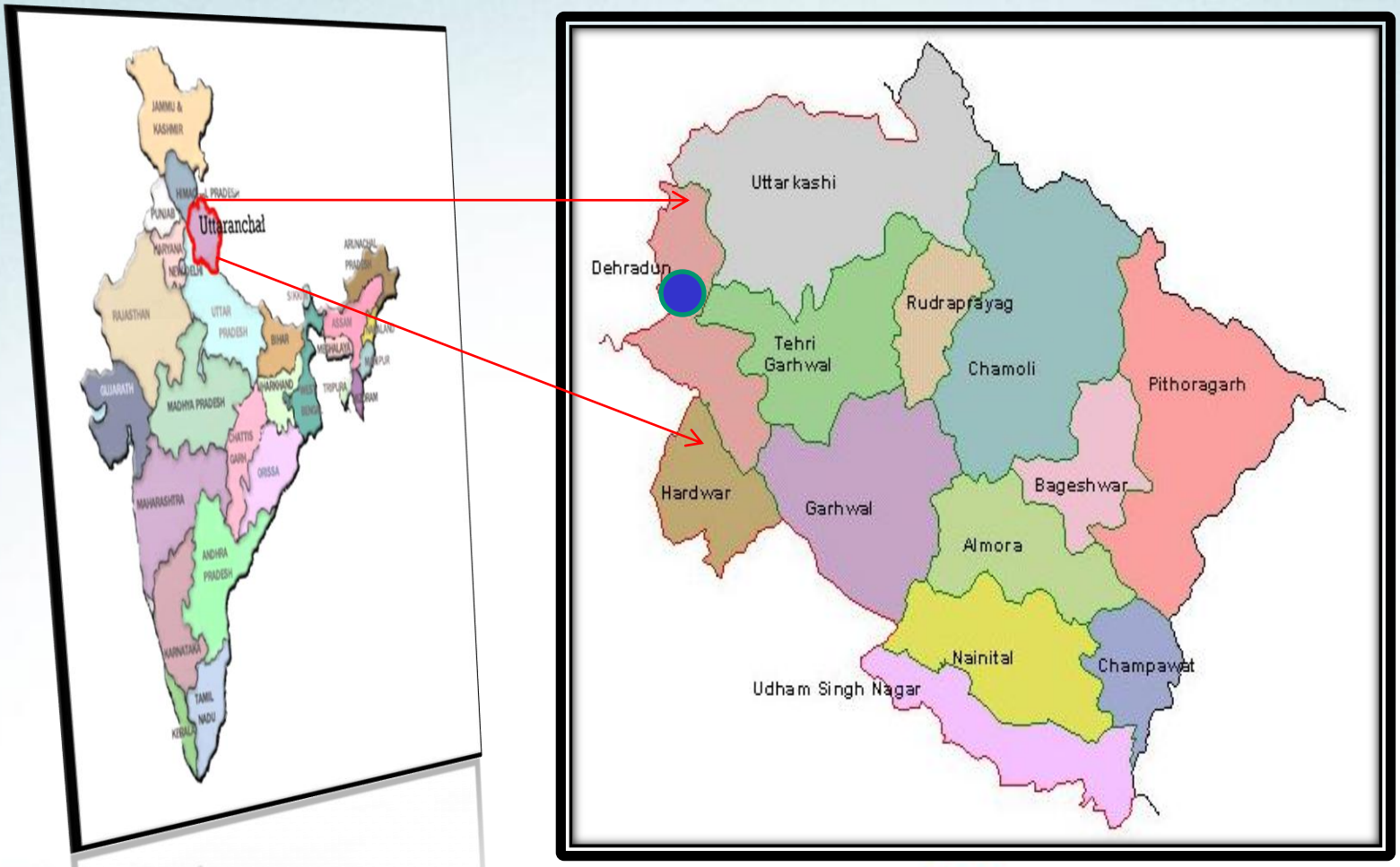
- A Portable Washer
- B Rain Harvesting
- C Recycling/Reuse



KEY FACTORS	BENEFITS
• Quality • Volume • Costs	• Health • Quality of life • Socio-economic • Equity • Energy Use
• Timing • Volume • Labor	• Productivity--Food • Employment • Revenue
• Volume	• Productivity--Food • Employment • Revenue

SYSTEM LOSSES IGNORED
(Evaporation, Leakeages, etc.)

Dehradun, Uttarkhand in India



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PROJECT FOCUS

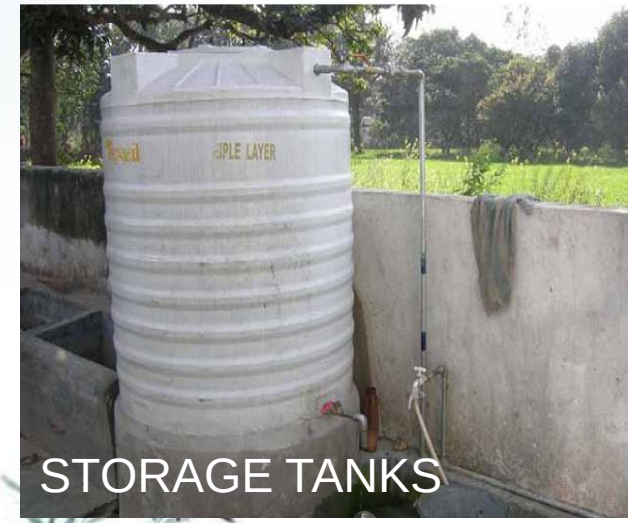
The Village of Chharba, Dehradun

- Area: Second largest village in Uttarchand state, 60 sq km
- Population: 1540 families, 800 below the poverty line
- Economic conditions vary greatly
- Occupation: Mostly agriculture. A few work in nearby factories.
- 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

SUPPLY OF WATER


HAND PUMPS


TUBE WELLS


STORAGE TANKS

Wealthy people can store water for later use

Tube well (main water source)

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

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OTHER WATER USES

DAIRY FARMING

WASHING

Sugar Cane

AGRICULTURE

Rice

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OUR BUSINESS PROPOSALS

1. A Portable Washing Machine

2.Rainwater harvesting and water storage

"To maximize quantity and access to water by its efficient collection and utilization."

Typical domestic water consumption in Chharba

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

Non-Potable Water Use

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

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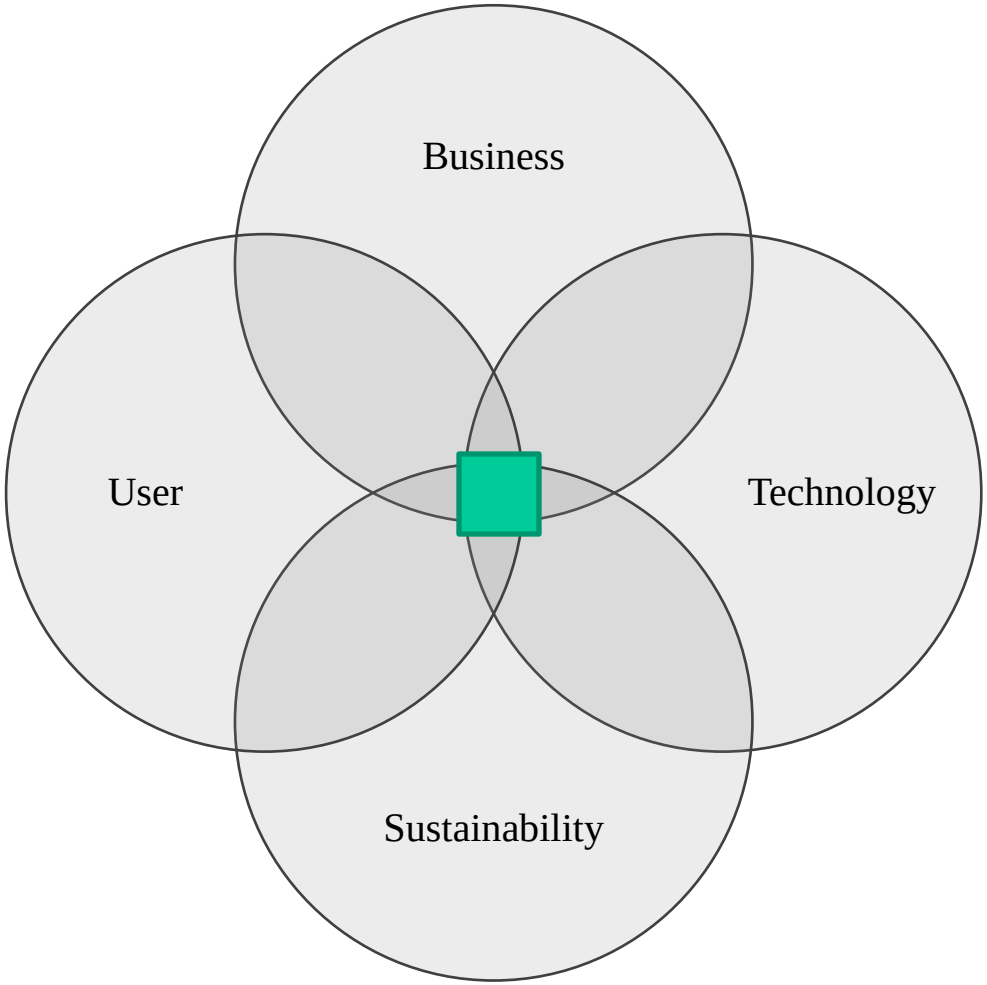
Our Approach

Profitable



User friendly

Effective

Environmentally +
Socially Positive

How to tackle these problems?

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Tackling these problems

- **Proposed solution should reduce:**
  - Labor
  - Time
  - Water Use
  - Detergent Use
- **To successfully market, our product should be:**
  - Compact
  - Portable & easy to use
  - Few moving parts
  - Low maintenance
  - Economical
  - Competitive
  - Energy Conserving
  - Convenient

Existing Competition

TYPES OF PRODUCTS (electrical devices):

- Fully automatic machines
- Semi-automatic machines
- Front loading washer
- Top loading washer

MAJOR PLAYERS

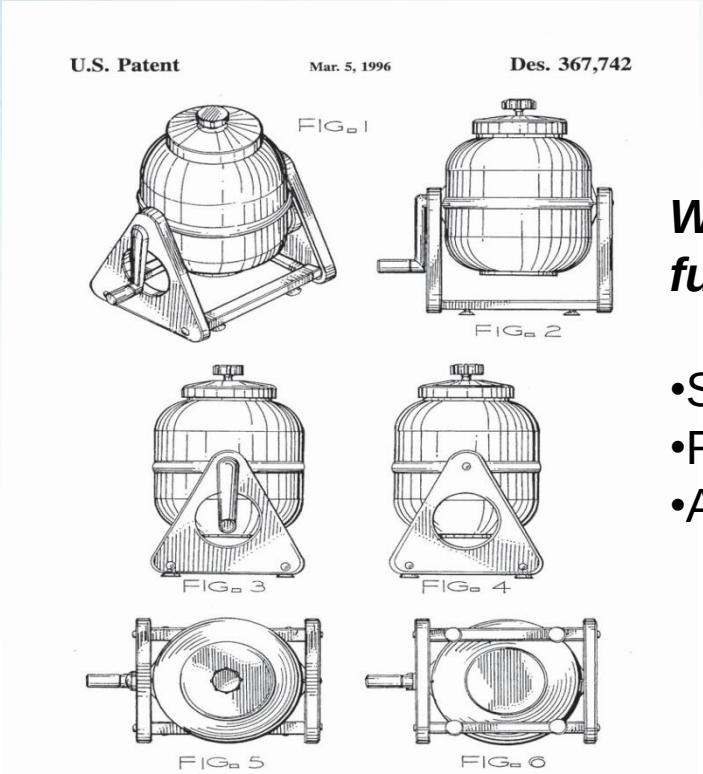
- LG is the leader with 27% of market share.
- Whirlpool has a market share of 17%.
- Samsung has a market share of 14%.

OUR COMPETITIVE ADVANTAGE:

Price, simplicity, no electricity, portable, water-saving

Our Solution

Based on a product made by The Laundry-Alternative Inc.



We will improve the operation and functionality of this product

- Simplify Design
- Reduce manufacturing costs
- Affordable

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Technology

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

Customers

- Initial Target: middle + upper income classes
- Subsidized prices for low income residents
- Dhobis (traditional clothes washers)
- Long-term goal: Expansion to rest of India

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Strategy

- Local Manufacturing
- Strategic alliances (detergent producers, microfinance institutions)
- Creative marketing and branding (emphasize sustainability)
- Continuous improvement and innovation

Marketing + Distribution

- Direct marketing
- Door to door sales
- Cultural and social channels, e.g. promotional stalls at festivals.
- Product exhibitions, training and information sessions.
- Local retail outlets

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Washing Machine - FIVE YEARS PROJECTED CASH FLOW

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
INCOME							
Yearly Total Income ($)		5,625.00	7,305.00	9,985.50	13,626.90	18,597.25	55,139.65
EXPENDITURE ($)							
Yearly Total Expenditure ($)	6041	6743.5	5423.4	9313.40	12379.60	14914.40	48774.30
Yearly Net Income ($)	-6041	-1118.50	1881.60	672.10	1247.3	3682.85	6365.35
Investment Capital ($)	10000						
Cumulative Yearly Cash flow Position ($)	3959	2840.50	4722.10	5394.20	6641.50	10324.35	10324.35
Cost of production per unit ($)		10	9	9	9	9	9

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Washing Machine - FIVE YEARS PROJECTED CASH FLOW

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
SALES							
Price of Product ($)		15	15	15.75	16.5375	17.364375	79.651875
Sales Volume		375	487	634	824	1071	3391
Total Income ($)		5625	7305	9985.5	13626.9	18597.2456	55139.64563

Rain Harvesting Business

- Simple set up to collect rain water
- Low cost, low maintenance aimed at households
- Materials from local suppliers
- Installation by local villagers
- Self sustaining business
- Profits for the village community through materials and installation

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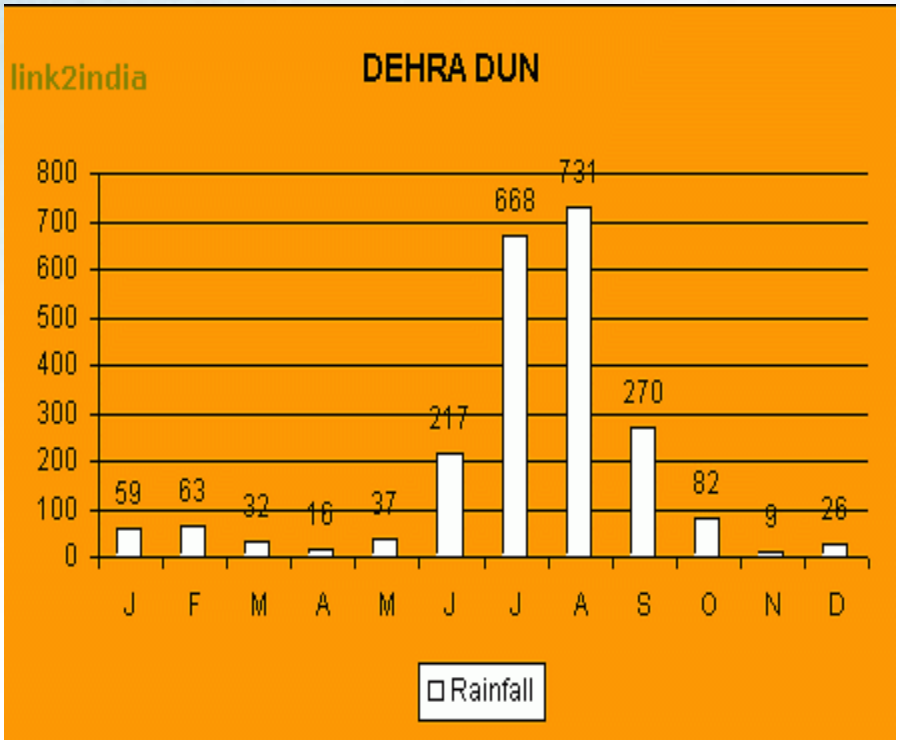
Rainfall in Dehradun District



Data shown in mm
Approximately 2210 mm/year
= 90 inches/year

Currently not much work is done on rain water harvesting in the village.

This would result in a reasonable increase in water needed for domestic use.

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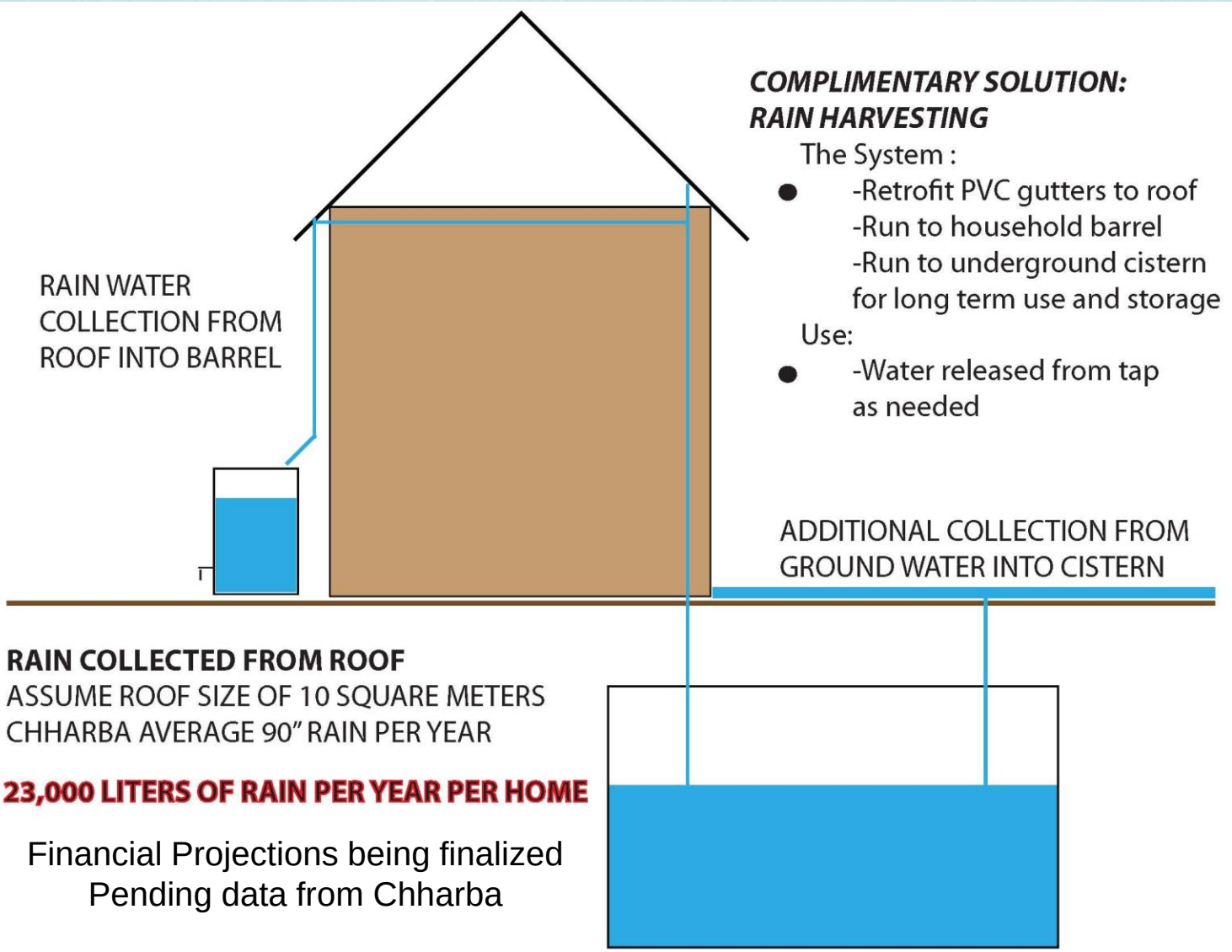

COMPLIMENTARY SOLUTION:
RAIN HARVESTING

The System :

- -Retrofit PVC gutters to roof
  -Run to household barrel
  -Run to underground cistern
  for long term use and storage

Use:

- -Water released from tap
  as needed

RAIN COLLECTED FROM ROOF
ASSUME ROOF SIZE OF 10 SQUARE METERS
CHHARBA AVERAGE 90" RAIN PER YEAR

23,000 LITERS OF RAIN PER YEAR PER HOME

Financial Projections being finalized
Pending data from Chharba

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Acknowledgments

- Mentors
- Institute of Design
- IPRO management and staff
- Villagers of Chharba
- Acara Foundation
- Students and Faculty from IIT Roorkee

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Thank you

Any questions?

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