IPRO 325

Developing extremely affordable products for the poor of the world

Team Members:

Nikola Baltadjiev	Danny Kim	Sara Miller
Ricardo Gonzalez	Jeremy Locquiao	Tony Osborn
L. Justin Harris	Jaime McClain	Brian Schiller

Advisors:

Daniel Ferguson, Dr. Ken Schug, Ray DeBoth

The Problem

3 Billion people

live on less then $2 a day.

Semester Objectives

Fall 2006

- Identify problems facing the world's poor
- Identify what IIT can do

Spring 2007

- Build a water and energy prototype
- Increase IIT awareness of global poverty

Increase IIT Awareness of Global Poverty

Dr. John Duffy - U. Mass Lowell, Peruvian Andies

Zenia Tata - International Development Enterprises

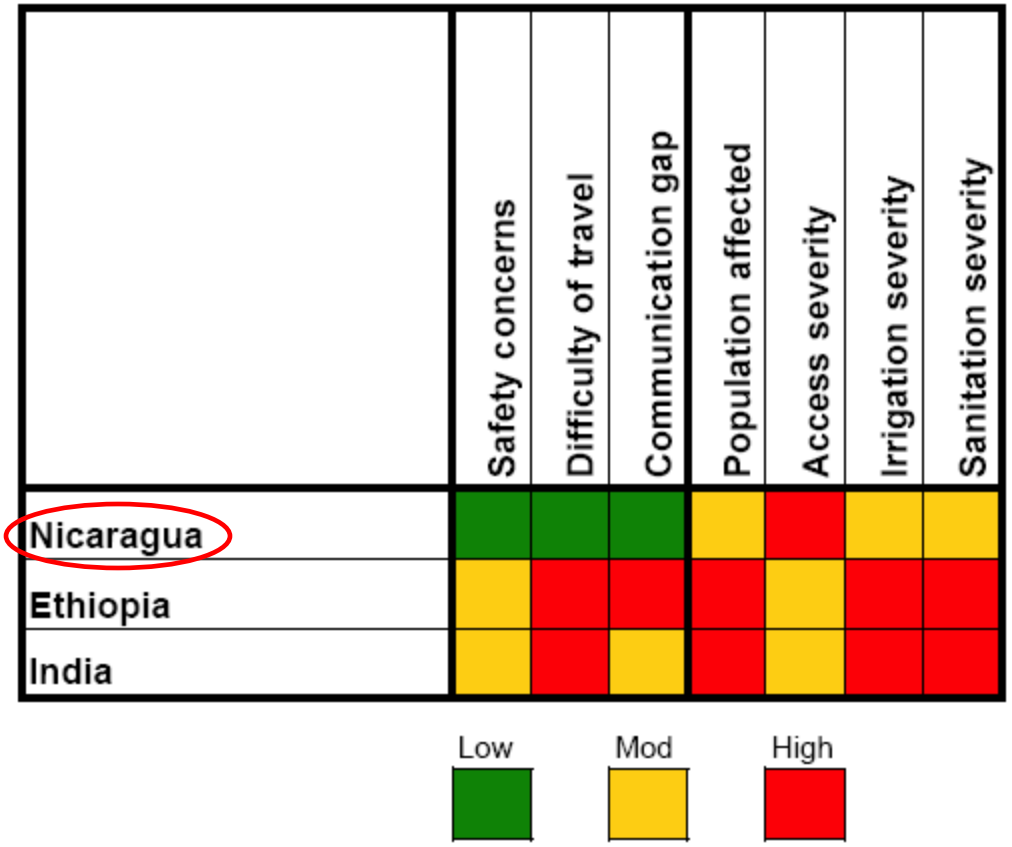
Water Sub-Group

L. Justin Harris, 5th year Architecture
Jaime McClain , 4th year Architecture
Tony Osborn , 5th year Architecture
Brian Schiller , 3rd year Chemistry

Reality:

1.1 billion people lack access to clean water; millions more lack enough to water crops

Country Selection



Nicaraguans Need Clean Water!

- **Access:**
  - In rural areas 72% of people lack access to potable (clean) water
- **Sanitation:**
  - Almost 3% infant mortality rate
- **Irrigation:**
  - Agriculture per capita has diminished consistently over last 20 years

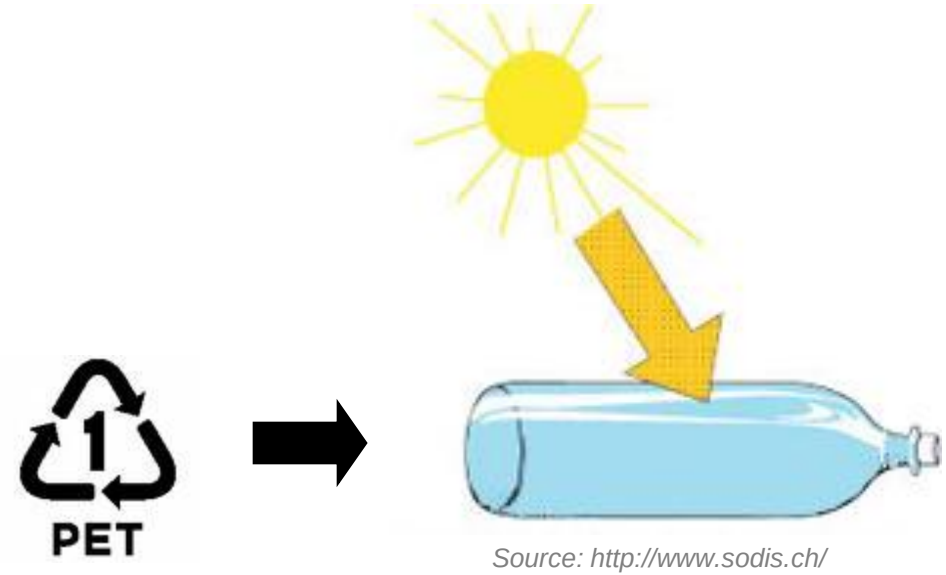
Area of Focus

SODIS Process

(Solar Water Disinfection Process)

Benefits:

- Rids water of bacterial contaminants
- Widely-available components
- Scaleable
- No operating expense



Source: http://www.sodis.ch/

Prototype Testing

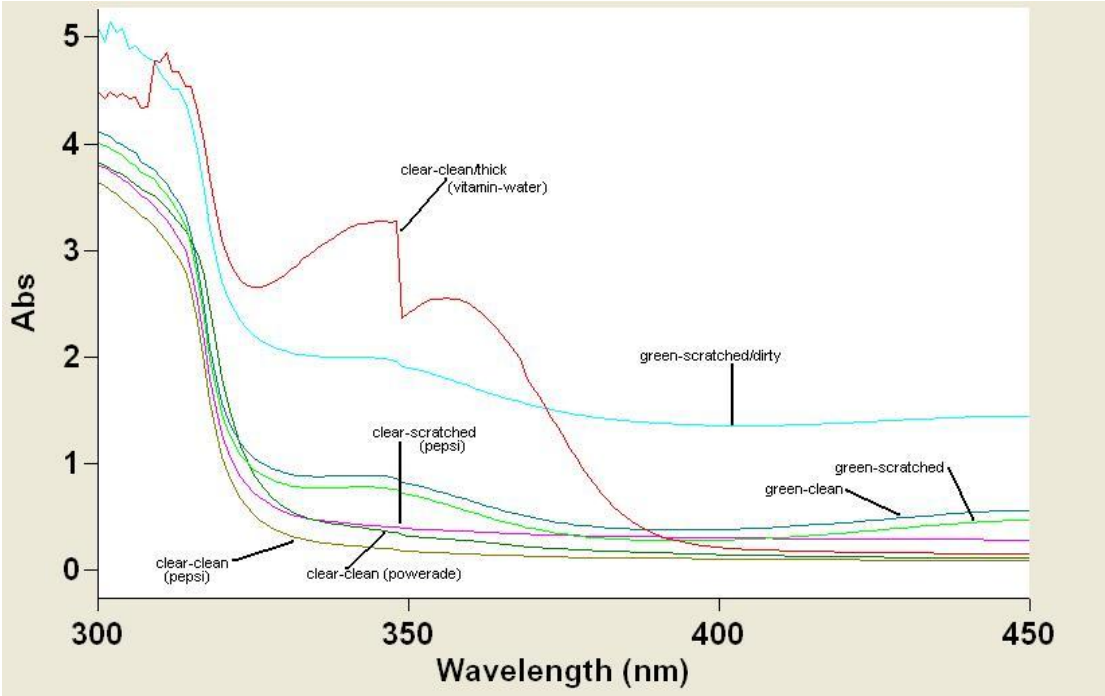
Procedure

- Measure UV light penetration through salvaged PET bottles

Subject

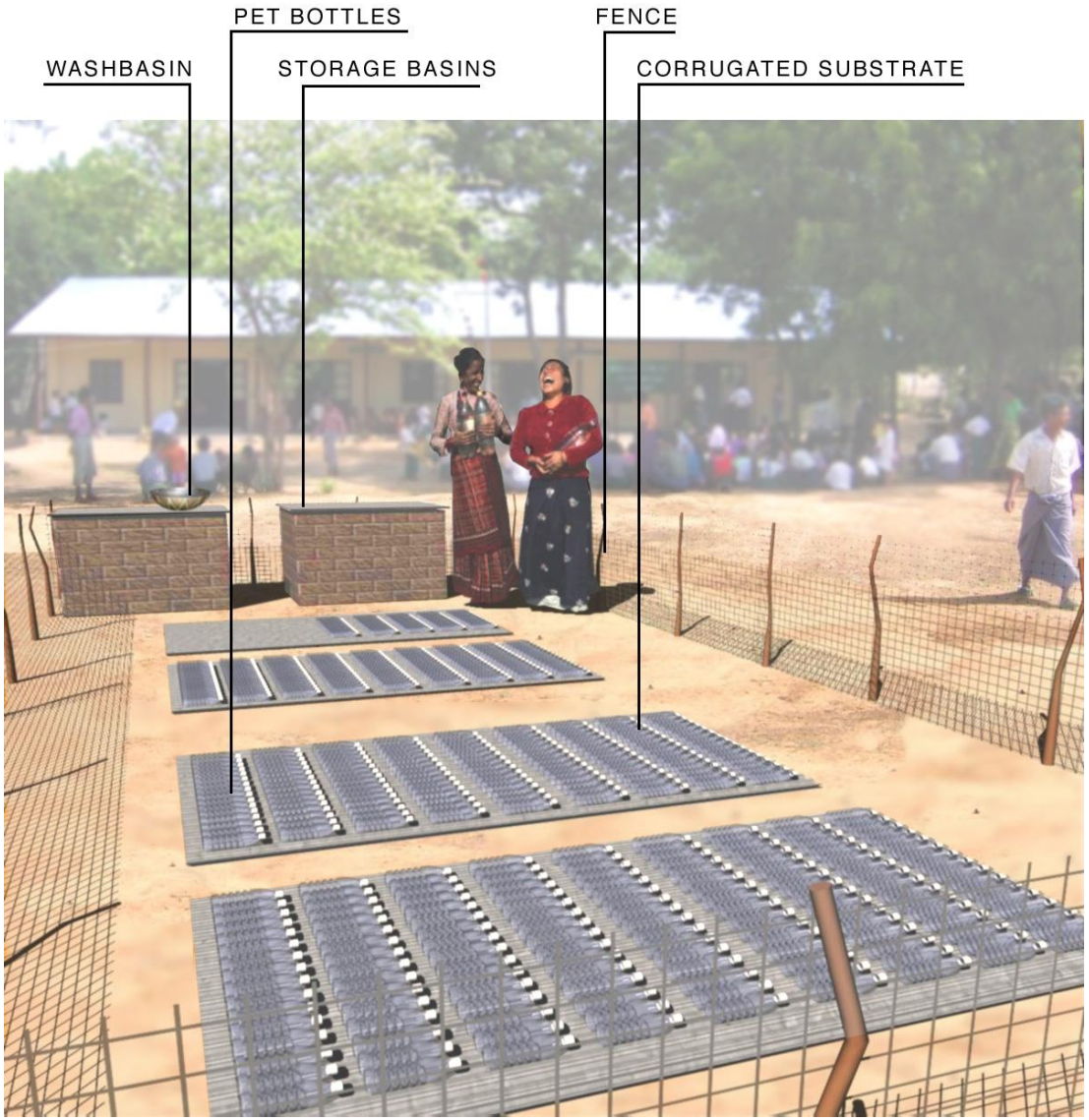
- Testing opacity/color, condition, and wall thickness of PET bottles

Test Results



PET Bottle Properties	Thickness	Opacity/ Color	Condition
Acceptable	**Thin**- Coke, Pepsi, Aquafina, etc	**Clear**	**Scratched/ scuffed**
Unacceptable	**Thick**- Sobe, Vitamin Water, etc	**Colored**	**Dirty**- must clean or use new bottles

Water Farm Proposal



Adopting the IDE Micro-Enterprise Model

Benefits:

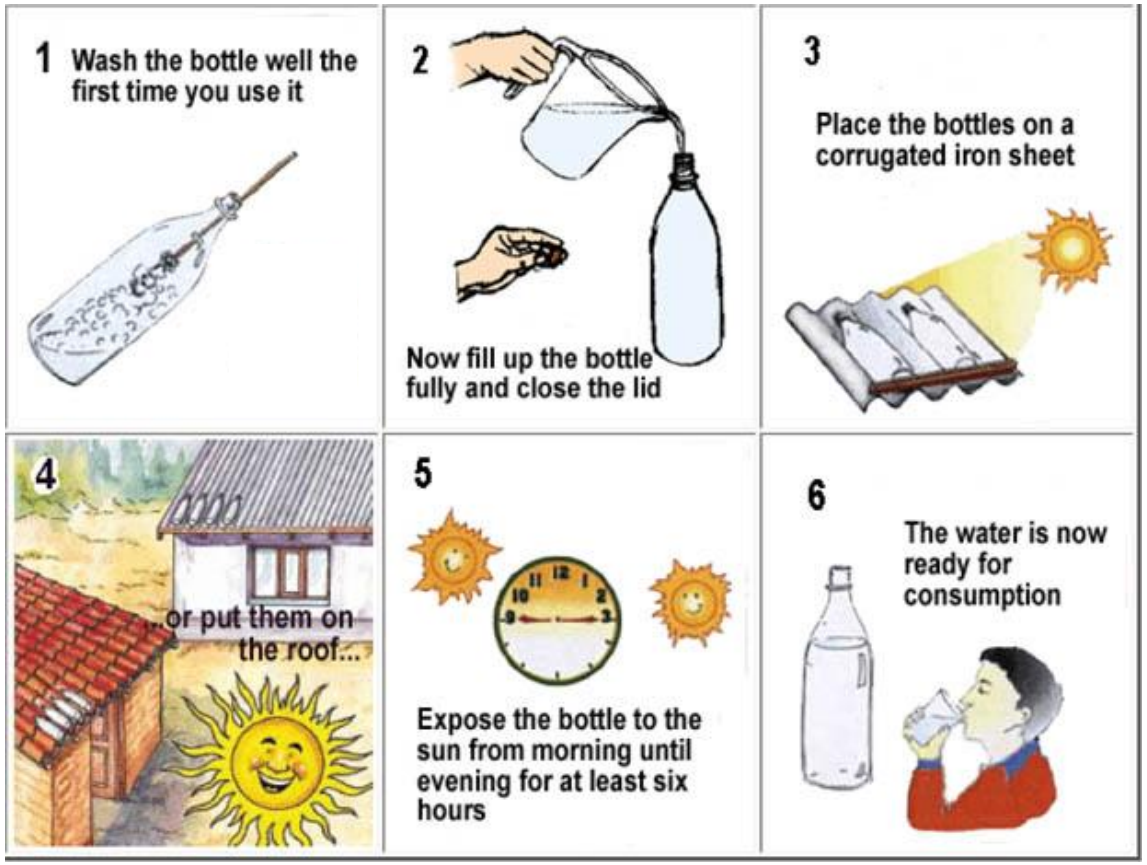
- Provides a villager with income
- Provides operating capital
- Ensures proper disposal

- Micro-loan Investment:
  - Purchase clean, full plastic water bottles
  - Purchase soap

IDE
INTERNATIONAL DEVELOPMENT ENTERPRISES UK

Education Materials

Instructional Diagrams



Source: www.sodis.ch

Energy Sub-Team

Nikola Baltadjiev, 3rd year Aerospace
Ricardo Gonzalez, 4th year Political Science
Jeremy Locquiao, 3rd year Mechanical Engineering
Danny Kim, 4th year Architecture

Reality:

Two billon people across the world don’t have access to affordable energy

Alternative Energy Sources Explored

- **Electrical**
  - Wind
- **Mechanical**
  - Water
- **Thermal**
  - Biogas
  - Solar

Team Objective

- Create and test an energy prototype that can be constructed for less than $5.

Solar Cooker Prototypes

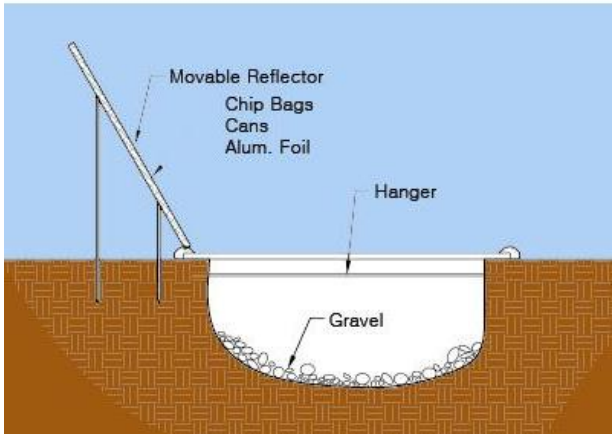
- Benefits over conventional
  - Renewable, free energy
  - Zero pollution
  - Low operating cost
- Disadvantages
  - Increased cooking time
  - Adjustment to Sun
  - Cultural Barriers

Area of Focus: Peru

- In collaboration with Dr. John Duffy
- The Peruvian Kitchen

Our Designs

Earth Cooker



Adobe Brick Cooker

Prototype Test 1

Adobe Brick Cooker v. Sun Oven

Goal Temperature = 250 F

Ambient Conditions

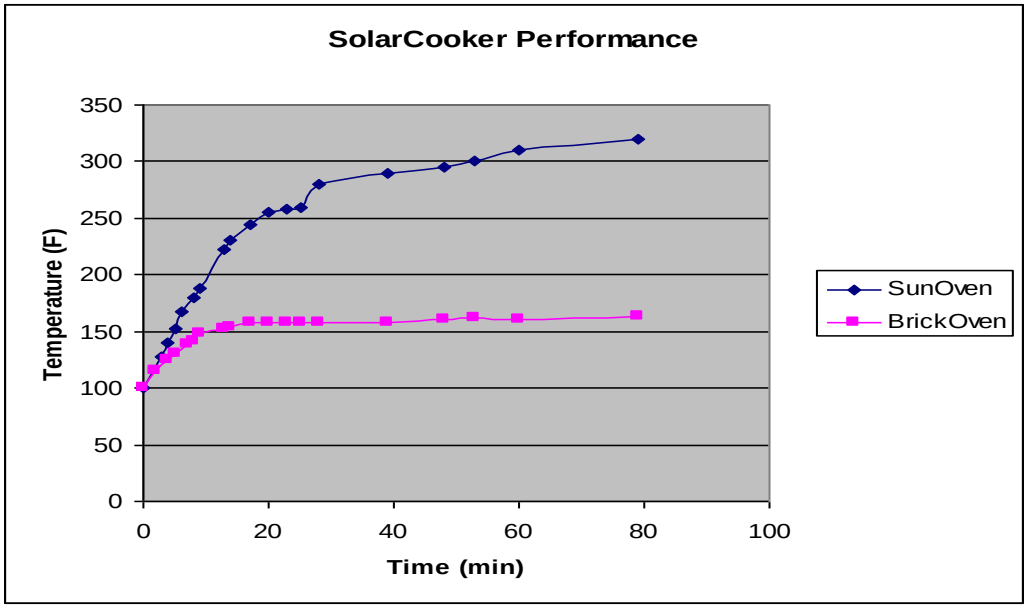
Humidity: 31%

Outside Temperature: 51F

Condition: Fair

Wind: 10-14mph NW

Test Results



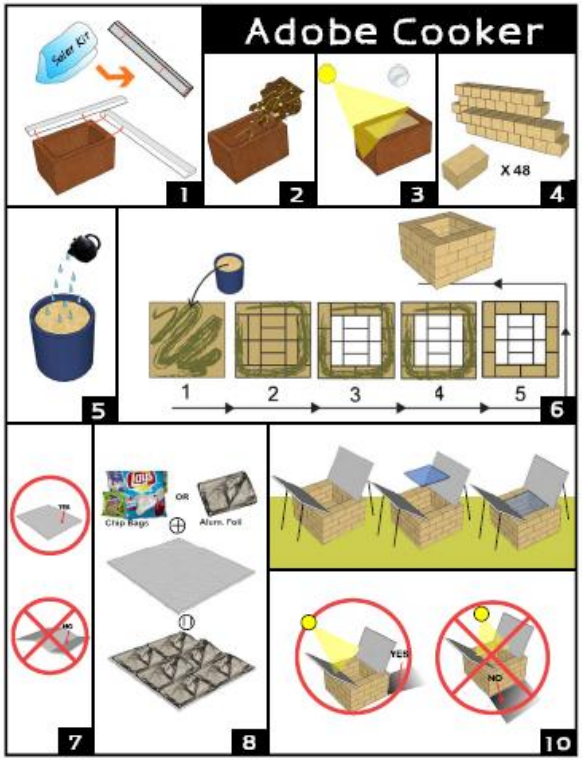
Sun Oven Max temp: 320F
Brick Cooker Max: 160F

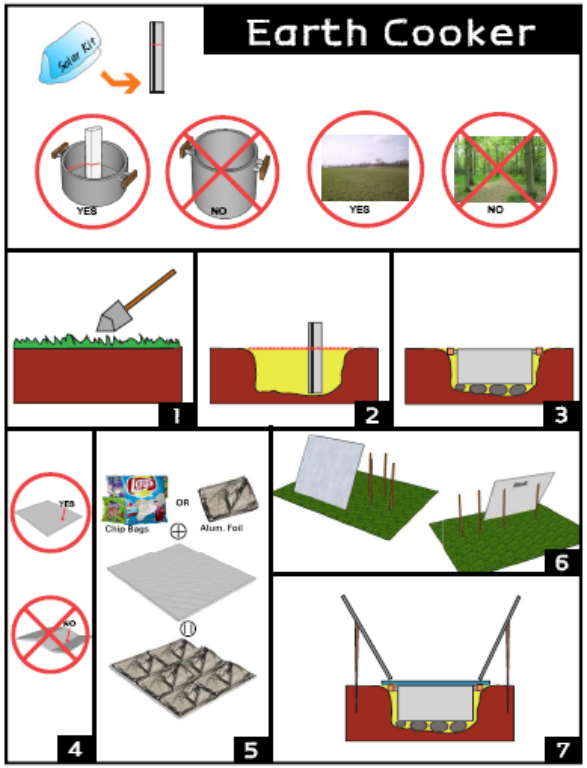
Not ready for implementation

- Improve on Reflectors
- Improve on gasket
- Improve Interior

Educational Materials

Instruction Manuals





Conclusion

What's Next?

- Future Semesters
- Involvement in the field
- IIT Affordable Village

Thank You

IPRO 325 Would like to thank all the people who have helped us along the way:

Dr. John Duffy PhD, Professor,
University of Massachusetts at Lowell

Zenia Tata, Executive Director,
International Development Enterprises

Sun Oven International

Advisors:

Professor Daniel Ferguson

Professor Ken Schug

Professor Ray DeBoth

Questions?