



IPRO 308

TSUNAMI RELIEF

Team Members

Mayuri Amarnath

Derya Civelekoglu

David Dela Vega

Nathan Godfrey

Jonathan Murawski

Anca Pitariu

Timothy Winter

Advisors:

Jay Fisher

Francisco Ruiz



The Tsunami

- **Magnitude:** 9.0
- **Date / Time:** Sunday, December 26, 2004 at 7:58:53 AM
- **Location:** 3.307° N 95.947° E
- **In total,**
 - More than 280,000 people were killed,
 - 14,000 are still listed as missing,
 - Over 1,100,000 were displaced



Problem

- How can all levels of the IIT community (faculty, students, and alumni) collaborate in a long-term effort to provide support to the victims of the tsunami in their time of need?



Approaches

An aerial photograph of a coastal town, likely in a developing country, showing dense residential areas with colorful roofs. The town is situated along a coastline with a prominent white sandy beach and turquoise ocean waves. The image is used as a background for the presentation slide.

- Pinpoint viable solutions
- Contact NGOs for possible sponsorship and direct relationship
- Help set up future IPROs for further research and investigation of IIT's aiding services

Approaches

An aerial photograph of a coastal town, likely in a developing country, showing dense residential areas with many small buildings. The town is situated along a coastline with a sandy beach and waves breaking. The ocean is a deep blue-green color. The image is used as a background for the presentation slide.

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Solar Desalination of Water

- **Aim:**

- Overcome the shortage of potable water

- **Technique:**

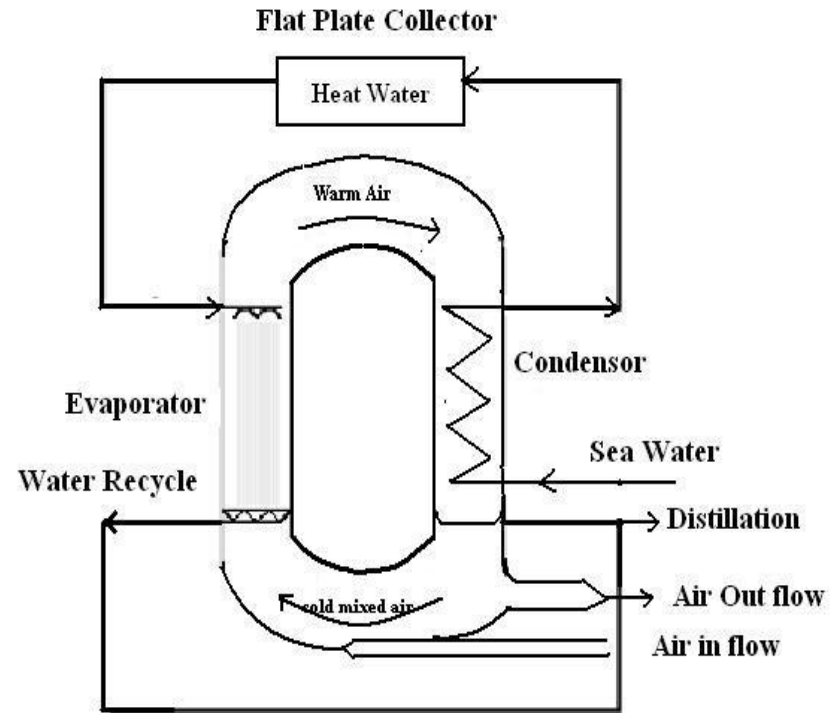
- Humidification-Dehumidification Cycle

- **Advantages:**

- Flexibility in capacity,
- Low operating costs
- Simplicity,
- Possibility of using low-grade thermal energy
- 100 liters of fresh water out of 8.5 m² collector area

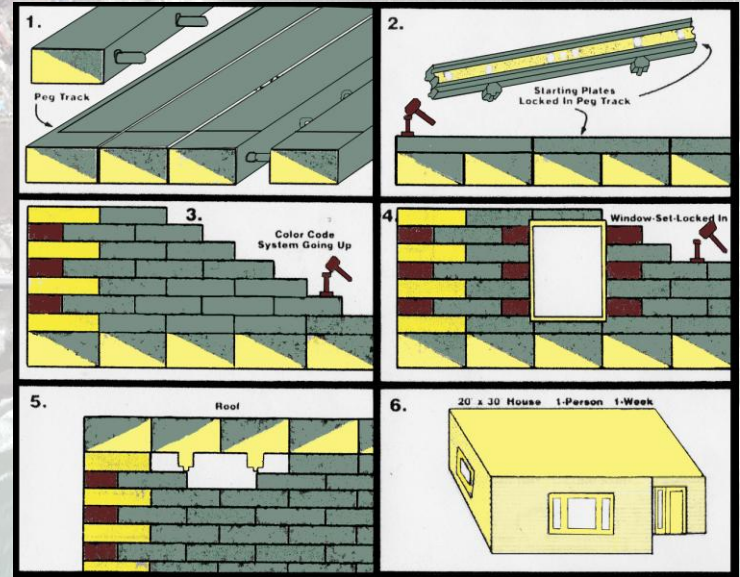
- **Needs for Development:**

- High capital costs
- Not commercially developed



Lama Homes

- **Aim:**
 - Low cost housing
- **Technique:**
 - Self-help mail order home kit
 - Color-coded wall pieces and peg tools
- **Advantages:**
 - Low costs
 - Promotion of unskilled labor
 - A 10 year-old can build it
 - One person can build a 20 ft by 30 ft house in a week
- **Needs for Development:**
 - To date the Lama Home project is searching for an investor and manufacturer
 - Does not use indigenous materials



Low-Cost Water Purification System

“CLAY POT”

- **Aim:**
 - Meet an urgent demand for safe water in developing countries
 - Provide employment for local potters
- **Technique:**
 - Porous clay filter unit saturated with silver as a germicide/disinfectant
- **Advantages:**
 - Eliminates 99.88% of water-born disease agents
 - Low cost, \$6.00 investment per household
 - Cited by the United Nations' Appropriate technology Handbook
 - Used by the International Red Cross and Doctors Without Border
- **ENPRO project for IIT students next semester**



Approaches

An aerial photograph of a coastal town, likely in South Africa, showing a dense residential area with many small buildings, a winding road, and a beach area with waves breaking onto the shore. The ocean is a deep blue-green color.

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National Government Organizations

- Architects Without Borders
- Architecture for Humanity
- Association for India's Development
- CARE
- Catholic Relief Services
- City Team
- Engineers Without Borders
- Habitat for Humanity
- Institute of Civil Engineers
- Kiwanis International Foundation
- LDS Humanitarian Aid
- Lions Club
- Oxfam
- RedR India
- The Sri Lanka Foundation
- WaterAid
- Water for People
- WMinE

ILLINOIS INSTITUTE OF TECHNOLOGY

IT's Expertise and Supporting Faculty

College of Architecture

The college of Architecture has expertise in cost-effective building, high-density housing, city and regional planning, and environmentally sustainable design.

supporting faculty:

- Thomas Goettsch - environmentally sustainable design

Department of Civil and Architectural Engineering

The Department of Civil and Architectural Engineering has expertise in: Structural Reliability, Analysis, and Design; Failure Analysis; Bridge Rehabilitation and Design; Earthquake and Wind Eng.; Construction Eng. and Management; Construction Materials Eng.; Modeling and Simulation; Pavement and Road Design; Geotechnical Eng.; Traffic Eng.; Transportation and Infrastructure Planning and Management; Architectural Eng.; Interior Systems Design; Fire Protection and Control; Lighting; Acoustics; Renewable Energy Conversion System; Energy Eng. and Management; Thermal Science and Engineering.

supporting faculty:

- Dr. Sidney A. Gurski (Prof. Emeritus) - Structures, Construction Materials Research
- Dr.
- Dr.
- Dr.

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College of Architecture

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supporting faculty:

- Thomas Goettsch - environmentally sustainable design
- Peter Land - cost-effective, high-density, earthquake-resistant housing; urban planning; ten year experience with the UN
- Nancy Hamill - renewable and energy efficient technologies
- Peter Raczek - low-cost, high-density housing; green building
- Peter Ruchnitski - urban development, city and regional planning, cost-effective housing

Department of Chemical and Environmental Engineering

The mission of the C&EE Department at IIT is to meet the present and future needs of society and industry in the fields of biological engineering, nanotechnology, and process miniaturization. The Environmental engineering wing of C&EE is about the preservation of our planet by focusing on the design of environmentally benign technology. Significant research is also conducted through its three interdisciplinary research centers: the Center for Electrochemical Science and Engineering, the Energy + Power Center, and the Center of Excellence in Polymer Science and Engineering.

supporting faculty:

- Paul R. Anderson - Precipitation kinetics, Evaluation of oxide adsorbents for water and wastewater treatment
- Krishna R. Pagilla - Water and wastewater engineering, Environmental microbiology, Biological nutrient control, Soil remediation, Sludge treatment
- Said Al-Hallaj - Energy Storage and conversion

The Department of Electrical and Computer Engineering



The Department of Computer Science has expertise in: Communications and signal Processing, Computers and Digital Systems, Electronics and Electromagnetics, and Power Control.

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Approaches

An aerial photograph of a coastal town, likely in South Africa, showing a dense residential area with many small buildings, a winding road, and a beach area with waves breaking. The town is situated on a peninsula or near a large bay, with the ocean visible in the foreground and background.

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Engineers Without Borders™

Building a Better World One Community at a Time



**ENGINEERS
WITHOUT
BORDERS
USA**

A non-profit volunteer humanitarian engineering organization.

Engineers Without Borders™

Vision:

EWB-USA's vision is of a world where all people have access to adequate sanitation, safe drinking water, and the resources to meet their other self-identified engineering and economic development needs.



Engineers Without Borders™

EWB-USA Goals:

- **Improve quality of life**
- **Empower communities**
- **Develop globally and environmentally sensitive engineers**
- **Advance sustainable engineering practices**

EWB-IIT Goals:

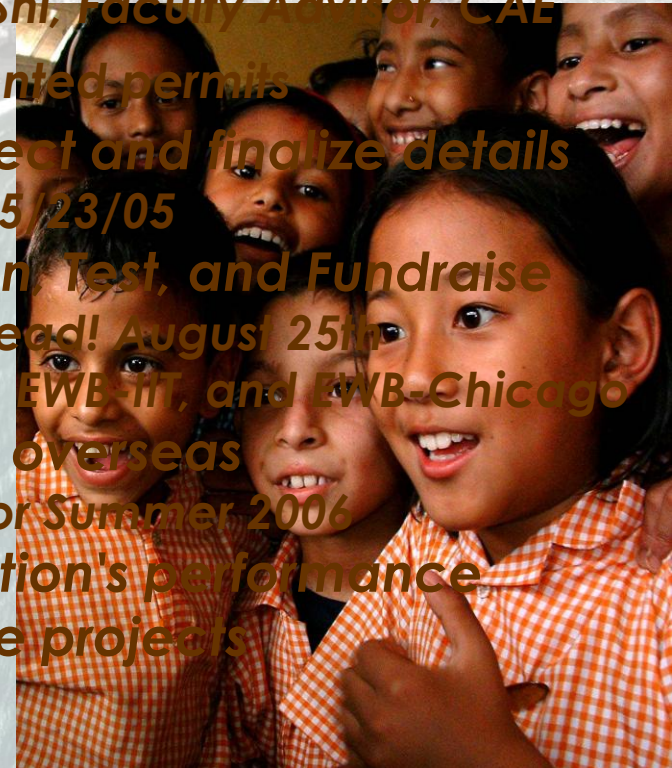
- **Raise awareness**
- **Explore service learning with IPROs**
- **Create relationships (professional, academic, humanitarian)**



Engineers Without Borders™

Moving Forward...

- Contact EWB-Chicago; discuss possibilities to support IPRO 308
 - Mr. Gary Jones, PE, Sergeant in Dr. Jonathan Shi, Faculty Advisor, CAE
- Propose IPRO 308 (Fall 2005) • 6 students granted permits
 - Approved!!
 - Propose for project and finalize details
- Advertise for student interest • Proposal due 5/23/05
 - Research, Design, Test, and Fundraise
 - 50 students signed mailing list
 - Full Steam Ahead! August 25th
- Hold a meeting
 - with IPRO 308, EWB-IIT, and EWB-Chicago
 - 20 students attending (less implementation overseas)
 - Executive Board Elected
 - Spring Break or Summer 2006
- Register as a student organization
 - Monitor the Solution's performance
 - Propose for more projects
 - Dr. Krishna Pagilla, Faculty Advisor, CHEE
- Submit Student Chapter Agreement



– The Design-Build of Site Specific Sustainable Building Systems

- What is sustainable building?

- **Locally available, renewable resources**

e.g. bamboo, cobs, earthbags, clay, thatch, sewage sludge

- **Collaboration of traditional and technological building techniques and systems**

e.g. passive heating and/or cooling methods cheap efficient procedures

- **Cost effective building**

human labor VS capital

- **Design-Build Approach**

a rapidly produced product that is feasible and possible



– The Design-Build of Site Specific Sustainable Building Systems

IPRO APPROACH

- Develop or improve a building system originating from traditional building customs and locally available materials.
- **Design:**
 - Investigate of local customs, materials, and common construction methods
 - Decipher appropriate local materials
- **Build:**
 - Full scale mock-up of building



– The Design-Build of Site Specific Sustainable Building Systems

Site: Meulaboh, Indonesia

- More Than Half of Meulaboh's Population is Dead or Missing
- Distribution of aid and evacuation efforts are hampered by the lack of petrol
- Available natural resources as well as recyclable materials



An aerial photograph of a coastal town. A river flows from the top left towards the center, then turns right. The town is densely packed with buildings, mostly with red-tiled roofs. The town is situated on a peninsula or near a coastline, with a large body of water (the ocean) visible in the bottom right. The water is a deep blue-green color with white-capped waves breaking against the shore. The text "THANK YOU IIT" is overlaid in the center of the image in a bold, brown, sans-serif font.

THANK YOU IIT