URBAN ARCHITECTURE FOR RURAL EAST AFRICA: A Sustainable Solution

For Development Efforts in East Africa

Dr. Craig Baltimore, SE
Cal Poly at San Luis Obispo
Department of Architectural Engineering
Order of Presentation

Introduction

Lessons Learned

Implementation of Knowledge

Past Experience

Current Project

Questions
Introduction

Knowledge Transfer on Their Terms

Not Ours
Collaboration Between

ACADEMIA

NGO

INDUSTRY
Introduction

Architectural Engineering
Architecture
City & Regional Planning
Construction Management
Landscape Architecture
Lessons Learned

First Develop Relationships
First Discover the Culture
Second Determine Resources
Third UNDO Western Thinking (labor vs machines)
Inquire and Problem Solve for Long Term
Recognize You Are in for the LONG Haul
Implement Assess
Implementation of Knowledge Transfer

A Sustainable Solution

for

Urban Spaces

of

Rural Areas
A Sustainable Solution

is defined as adaptation of technology to the resources (materials, skills, and culture) of a local population, and in such, allow the technology to be incorporated directly into the culture where betterment of life; self-empowerment; and growth can occur without continued outside influence. In the bush area of rural East Africa the resources and minimal (compared to the standards of a developed nation)
Implementation of Knowledge Transfer

A Sustainable Solution

adaptation technology

resources local

incorporated culture

betterment of life; self-empowerment; growth

without continued outside influence
Implementation of Knowledge Transfer

Urban Spaces of Rural Areas
Past Experience - Kenya

Nyumbani

- Republic of Kenya
- Kiswahili word for “home”
- Est. 1992
- Children’s Home
- Diagnostic Laboratory
- Village Project
Nyumbani Village

- Eastern Province
- AIDS Affected Community
- “Two Forgotten Generations”
- 1,200 Target Capacity
- 1,000 Acre Site
- Sustainability Model
Past Experience - Kenya

Nyumbani asked for specific help (find solutions)

Senior Project
- Cement Stabilized Soil Blocks
- Impact Loading
- Medical Supplies
Past Experience - Kenya

**DESIGN+ HOPE**
- Cal Poly Arch. Student: Matthew Ridenour & David Aine
- Cal Poly Arch. Eng. Students
- Church from O.C., Calif.
- Namanga, Kenya
- Rural Maasai people in Malai Tisa, Kenya (20,000 pop.)
- 2 hr. Walk to Nearest Clinic
Current Project - Tanzania

- United Republic of Tanzania
  - Kilimanjaro Region
  - District of Same

- Catholic Diocese of Same
  - Primary Schools
  - Secondary Schools
  - Medical Clinics
  - Orphanage
  - AIDS Education
Current Project - Tanzania

Where do you start?

Undoing what you know!
Current Project - Tanzania

- **Establish Relationships**
  - Western Ways don’t work.
    - Schedule and Tasks
    - Money and Materialism
  - Rural African Ways
    - Trust and Friendship
    - No clocks

- **Determine Resources**
  - Materials
  - Skill Sets
  - Lots of Labor
  - Little Machinery

- **Discover the Culture**
  - What is important?
  - What is the need?
  - What is success?
  - What is happiness?
The Same Polytechnic

Build a sustainable Polytechnic School

• To Serve
  • Local Area
    • Rec. Fields
    • Commerce
  • Extend Rural Area
    • All Religions
    • Non-Commuter
• To Demonstrate
  • We May Be Poor
  • But Look What We Can Accomplish
  • Source of Learning
  • Source of Pride
• To Educate
The Same Polytechnic

- Degree Programs
  - Accounting & Finance
  - Administration & Management
  - Agriculture Technology
  - Auto Mechanics
  - Computer & Electronic Repair
  - Construction Management
  - Development & Social Work
  - Hotel Management & Hospitality
  - Nursing
  - Teacher Certification

- Educate in Terms of Life
  In Rural East Africa

Year 1 & 2

Relationships
Defining and Understanding
Culture

Resources
The Same Polytechnic
Design Team

- Cal Poly at SLO
- Arup
Design Goals

- Performance
  - Serviceability
  - Life Safety
  - Thermal Comfort
  - Energy Efficiency
  - Energy Independence

- Constructability
- Affordability
- Replication Model
Design Challenges

- Available Building Materials
  - Masonry units
  - Cement
  - Aggregate
  - Reinforcement
  - Steel
  - Timber
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Design Challenges

- **Work Force**
  - Reasonable skill level
  - Available tools
  - Labor cost
Design Challenges

• Work Force
  • Reasonable skill level
  • Available tools
  • Labor cost
Design Challenges

- Climate
  - Arid/Semi-Arid Land
  - Dry & Rainy Seasons
  - High Temperatures
  - Humid Conditions
  - Solar Radiation
Proposed Systems

- Natural Ventilation – Thermal Comfort

[Diagram showing natural ventilation system with notes explaining the process of cool fresh air being drawn into the classroom and hot layer being exhausted through openable glazing.]
Proposed Systems

- Natural Ventilation – Thermal Comfort
Proposed Systems

- Thermal Mass – Thermal Comfort

![Graph showing temperature variations with and without thermal mass cooling.]
Proposed Systems

Daylight – Energy Efficiency
Proposed Systems

Confined Masonry

To prevent the appearance of air pockets in columns use a concrete mix with less stone in the first batches.

Vibrate concrete with a long rod to prevent air pockets.

Lightly hit the forms externally with a rubber hammer.

Use braces to hold the forms.

Use a plumbbob to verify that the formwork is vertical.
Forward Progress

• Conceptual Design
  • Space programming
  • Site survey
  • Master planning
  • Design narratives
Questions