We need to look beyond our borders
Complicated: 6.7 B people
Let’s look at a simpler example ...
Mali

- size of Texas
- 12 million people
- median age: 16 years
- life expectancy at birth: ~50
- access to clean water: 50%
36% of Malians live on less than $1/day

Human Development Index (combined GDP, literacy, life expectancy): 3rd lowest in world

DATA FROM CIA FACTBOOK, CARE INTERNATIONAL, THE ECONOMIST
still too complicated ...
an even simpler example ...
Nana-Kenieba

Village in Mali:
• about 1000 people, with median age of 16
• average household income $10-200/month
• 22 “families”

Major challenges:
• nutrition
• illness
• lack of education
• lack of economic opportunity
• ...
low technology

no electricity

limited tools

“three-stone” stoves
How can we understand a village?
A village is complicated

people, buildings, work, play, money, life, death, resources, energy, ...
it is easiest if we divide the different aspects of the village into categories

as a first step, consider social, environmental, and economic structures
social
culture, religion, family, hierarchy, government, gender roles, ...
Religion

Predominantly Moslem (90%):  
• a polygynous society (1-4 wives, 2 is usual)  
• women and men have different expectations and rights

Animist religions also prevalent in villages:  
• heavy influence on daily life even for most Moslems
Families

Families live in groups and share a compound:

- brothers and their wives, children and parents
- up to 40 people or so
- compound consists of sleeping huts, a cooking hut, storage huts, surrounding a central plaza
- women cook collectively
Map of Nana-Keniela
women’s roles

gather wood, grow crops, pound grain, 
take care of children (they have many), 
take care of husband, be part of a multiwife family, be part of a multi-“family” family, cook for family, sew clothes for family, ...
men’s roles

grow crops, build, hold traditional positions (blacksmith, hunters), govern the village, ...
Men
Lighting

Situation: these villages are off the grid and likely to be so for > 20 years

Challenge: provide technology for sustainable off-grid power

Solution: centralized power charging of lead acid batteries and linear fluorescent lights
sustainable power, changes a life
life changing, sustainable
They also have fun ...
environmental

energy, water, weather, waste treatment, ...
THE DRY SEASON

DECEMBER - MAY

LATE MAY 2008

DAYTIME TEMPERATURES > 100 F
(38 C)
The rainy season: “water is life”
June - November
Energy: Cook Stoves

Typically cook over open fire
- inefficient
- smoky (health issues)
- dangerous (burns)

Gathering fuel is increasingly difficult
New Stoves

Termite mounds are source of clay.

Stoves made out of clay (termite mounds) mixed with straw.

More efficient, safer, less smoke.

Assembling stove from mud bricks

Stove in operation
sustainable?

deforestation caused by use and by selling of wood/charcoal to the big cities
local climate change

deglaciation of Kilimanjaro caused by local deforestation
economic

income, agriculture, manufacturing, banking, ...
Economy

Principle economic activities:
- subsistence farming with few crops for sale
- wood/charcoal for export to large cities
- local crafts: tailor, blacksmith
- crafts for export: baskets
- can buy items in local markets (by bus)
- local bank for saving and loans
Local technology

Blacksmith makes and sells most of the simple tools used in the village.
Making a hoe
commerce limited by transportation system
banking

300 accounts
11.5 M CFA ($25 K total)
biggest account: 1.5 M CFA ($3400)
average account: $83
generalized reciprocity

moral obligation to help family members - it is not acceptable to have too much money and not share
balanced reciprocity

much commerce in village
done by bartering
redistribution (taxes)

each villager must pay 1500 CFA per year in taxes to the central government or go to jail until it is paid (about $3.50)

in Mali, total taxes are about 2 B or 15% of GDP ($160 per person)
redistribution (tribute)

male villagers have to pay the chief of the village for permission to do certain things (e.g., marriage)
redistribution (marriage)

man pays a bride price (depends on wealth) to the bride’s family for losing a worker

woman brings a dowry to start the household
market exchange
(markets are in nearby villages)

• simple manufactured goods (mostly from China), e.g., pots
• food, including cooking oil, rice, and other non-local items
• local agricultural products (meats, millet, ...)
• local manufactured goods (e.g., baskets)
it is all connected
economy, social structure, and environment are all linked in a complex way
if a village is so complicated ... 

... imagine how difficult it is to describe global issues
the world today

developed world
1.3B

emerging middle class
(< $10/day)
2.6B

poor (<$2/day)
1.2B

extreme poverty
(<$1/day)
1.4B

2005:
6.5 B PEOPLE
the people in the village are poor with low literacy and little technology ...
... and are intelligent, hard working, and want a better life

... and we cannot forget them in the discussion of a sustainable world
Questions?