

Appropriate Technology and Social Justice – What can get us there?

John Tharakan

Professor, Department of Chemical Engineering

Faculty Advisor, Engineers Without Borders, Howard University Chapter

jtharakan@howard.edu

Science for the People Conference

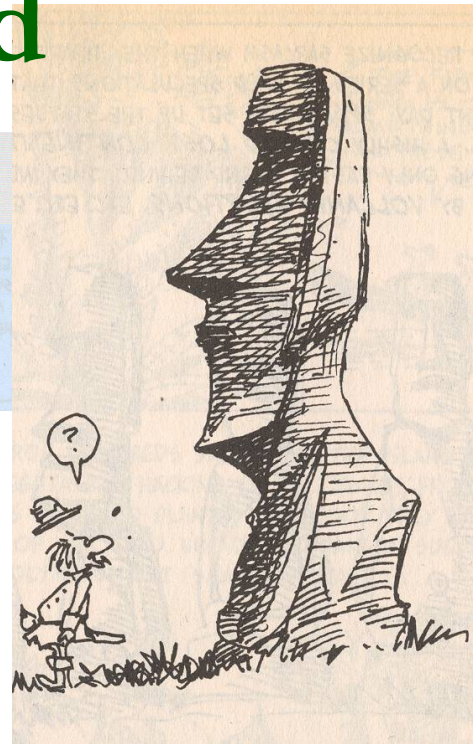
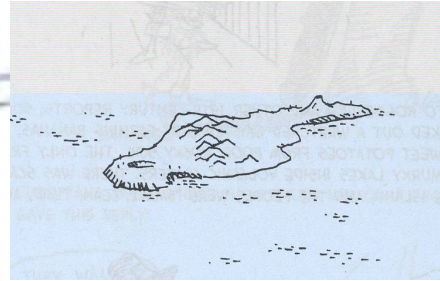
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Presentation Outline

- **Introduction**
 - **Easter Island**
 - **Unsustainable Resource Use**
 - **Appropriate Technology**
 - **Social Justice**
 - **What do we mean?**
 - **How do we get there?**
 - **Appropriate Technology for Sustainable Development to get Social Justice**
-

The Story of Easter Island



- 64-square mile island in Pacific Ocean
- 2300 miles from anywhere
- “Discovered” in the 18th century
- Described as a barren island with about 3000 very poor people eking out a living on bananas, sugar and sweet potatoes.
- Rocky soil, no fresh water
- Amidst all this, massive stone statues discovered scattered across the island
- When Europeans asked where the statues came from, the islanders sarcastically remarked that they walked there!



The Story of Easter Island

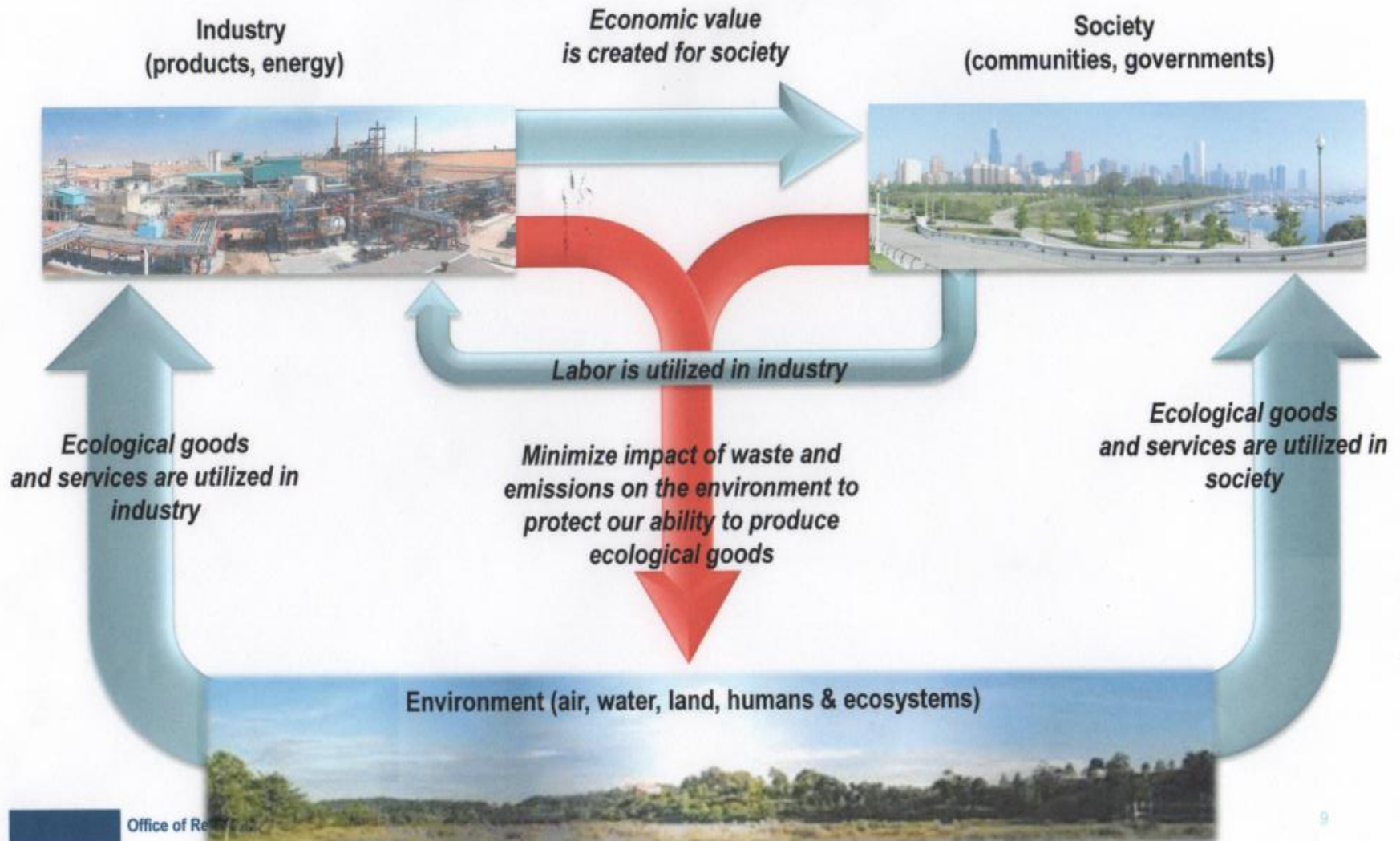
- Island was colonized in 400 AD by Polynesians
- At that time, EI was thickly covered with vegetation
- Polynesians cleared spaces and developed a prosperous agricultural society
- Yam, taro, breadfruit, banana, sugar, coconut, chicken and Polynesian rats (small and tasty)
- They had a rich life and in their spare time they carved stone statues, using trees to roll the huge statues to various sites
- By the year 1400, almost all the trees were gone
- Without trees, top soils lost their anchor
- No forests to absorb rain and replenish groundwater, so island's streams and rivers dried up
- Population peaked at 7000 and collapsed quickly
- So quickly that lots of unfinished statues were discovered in quarry's.



Lessons Learned?

- **Resources are finite**
 - **Human capacity to exploit the environment is “infinite”**
 - **Until it is not.**
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How we developed: Through mostly **UNSUSTAINABLE** Resource Use



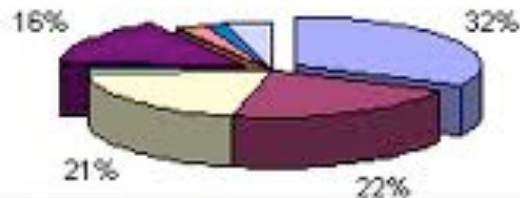
Energy Use, Population, Military Spending

Country	Pop.	Life Span	PPP/c	1997 KgOE/c	PPP/ KgOE	GINI Index	Mil-Exp/c
US	281	77	\$36,300	8,076	4.5	41	\$1,428
G7 w.o. US	419	79	\$26,028	4,223	6.5	29	\$431
OECD w.o. G7	438	75	\$14,826	2,787	5.5	37	\$161
ROW	5,096	65	\$3,824	857	4.5	34	\$28

- Pop - Population Size in millions
- Life Span (Years)
- PPP – Purchasing Power Parity - Income
- KgOE/c - Energy usage per capita (KgOE – kilograms of oil equivalent)
- GINI Index – a measure of inequality
- Military expenditures per capita (1997 dollars)

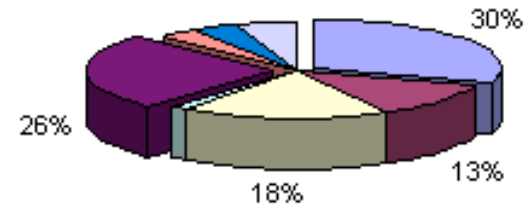
World's Energy Consumption

Percent of World Energy Consumption 1980



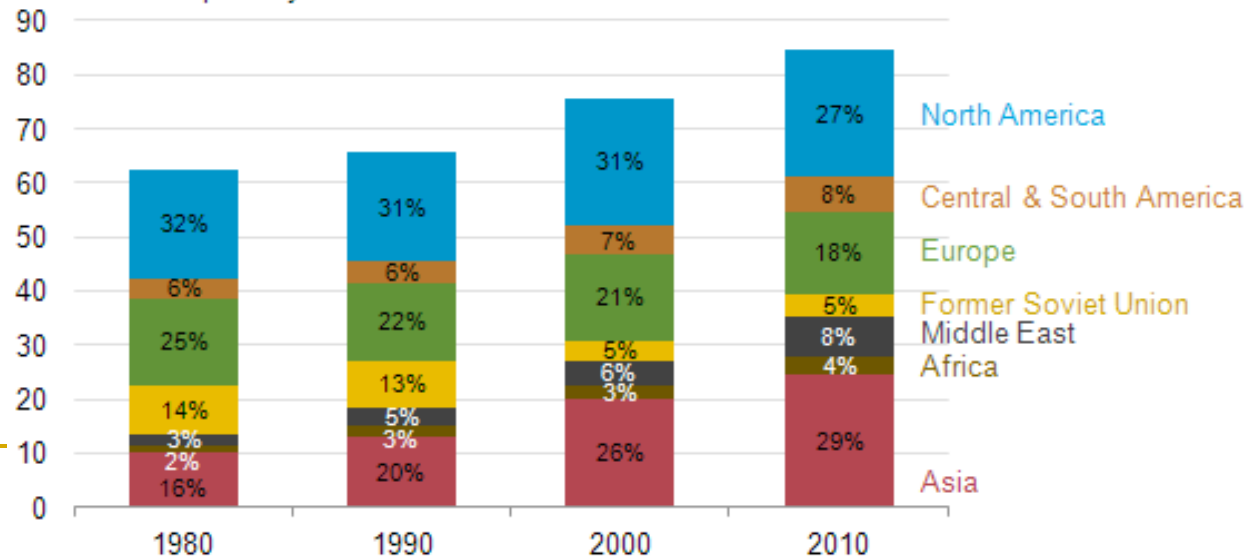
■ N. America %
 ■ Eastern Europe & Former USSR %
 □ Western Europe %
 □ Oceania %
 ■ Asia
 ■ Africa %
 ■ Middle East %
 □ Central & S. Amer %

Percent Consumption 2000



■ N. America %
 ■ Eastern Europe & Former USSR %
 ■ Western Europe %
 □ Oceania %
 ■ Asia
 ■ Africa %
 ■ Middle East %
 □ Central & S. Amer %

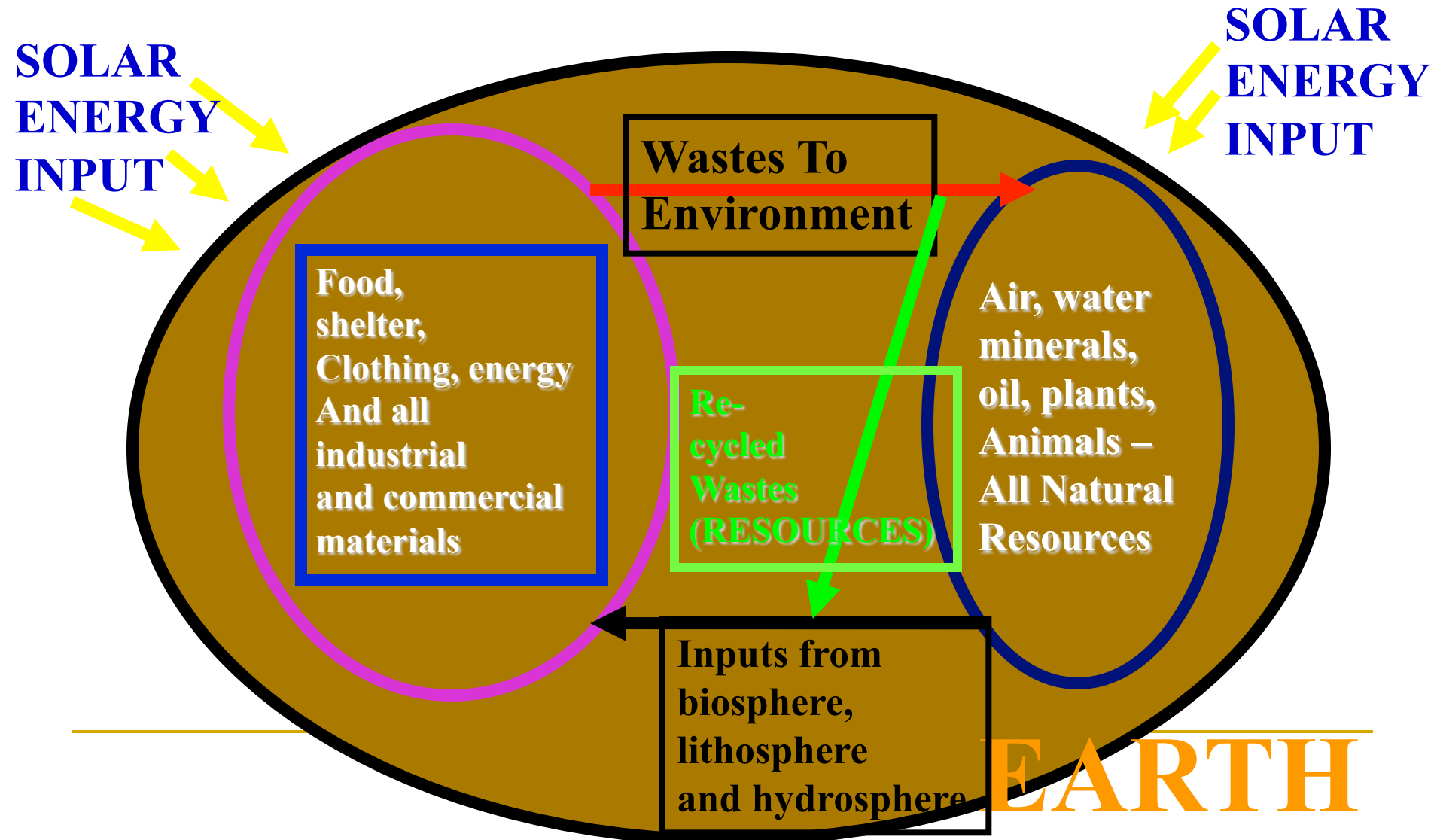
World petroleum consumption by region, 1980-2010
million barrels per day

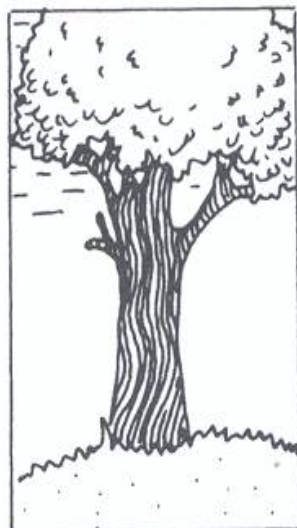
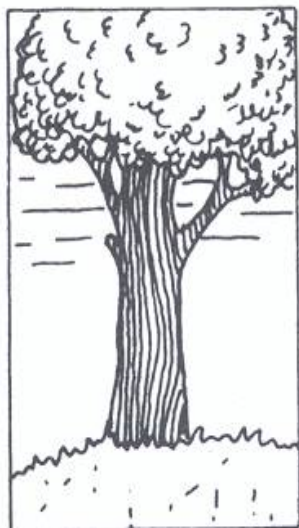
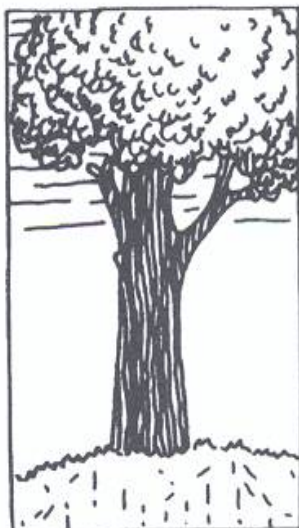
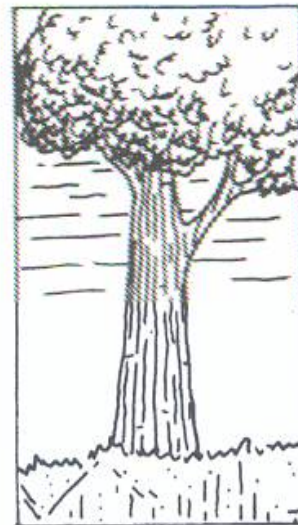
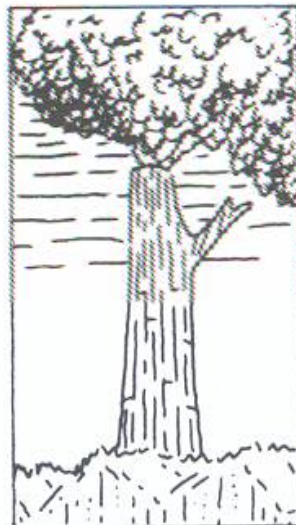
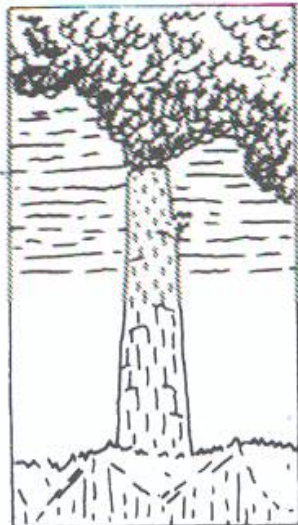
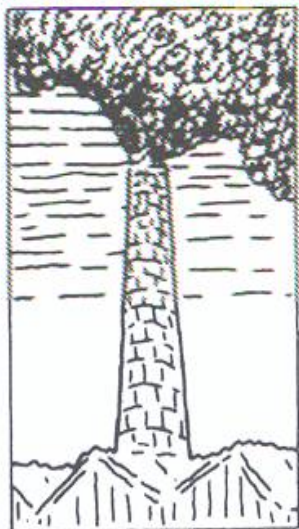
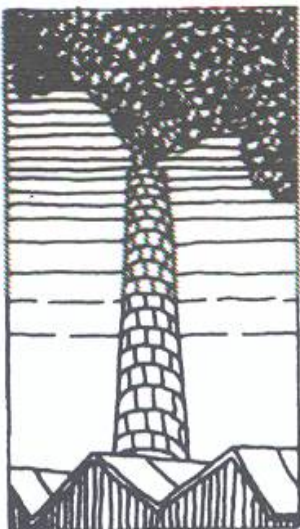


Energy and Equity – Percentage Basis

Country	Pop.	Pop. %	PPP (\$)	PPP %	1997 KgOE	Ene rgy %	Mil- Exp	Mil- Exp %
US	281	5%	36,300	22%	8,076	24%	1,428	51%
G7-US	419	7%	26,028	23%	4,223	18%	431	23%
OECD–G7	438	7%	14,826	14%	2,787	13%	161	9%
ROW	5,096	82%	3,824	41%	857	45%	28	18%

GLOBAL RESOURCE USE (MATERIALS AND ENERGY USE)





Social Justice – Is this – should it be - the goal of Development?

- **Application of justice principles on a broad social scale**
 - **Equitable distribution of the earth's resources**
 - **Eradication of poverty**
 - **Literacy → 100%?**
 - **Health Care for All (Who all?)**
 - **Bringing the Global South to parity with the Global North?**
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Late 20th Century Pollution and Waste Management

- ❑ Regulations of Hazardous Materials and Environmental Wastes
 - ❑ Sophisticated End of Pipe Treatment
 - ❑ Focused Remediation of Industrial and Hazardous Waste Sites
 - ❑ Pollution **Minimization** → **Old Green Engineering**
 - ❑ **Minimize Adverse Environmental Impact**
 - ❑ Cradle to Grave – Producers Responsibility
 - ❑ Reduce, Reuse, Recycle – 3 R's
 - ❑ Reduce/Minimize adverse environmental impact
-

21st Century Pollution and Waste Management Imperatives

- ❑ **Reduce, Reuse, Recycle, Recover, Treat/Convert, Dispose**
 - ❑ **Pollution Prevention → New Green Engineering**
 - ❑ **Zero Waste – Respect, Rethink, Reduce, Reuse, Recycle, Recover – 6 R's**
 - ❑ **DO NOT THINK WASTE → THINK RESOURCE**
 - ❑ **Cradle to Cradle**
 - ❑ **Positive Environmental Impact**
-

Technology and Humanity

- **First technologies developed to satisfy the needs of the community and enhance that community's capabilities to survive, endure and, if possible, prevail.**
- **Subsequent technological developments addressed other needs**
- **Shift from addressing human need to addressing the need solely for profit – hence needs began to be created as required by capital**
- **Incredible and amazing creativity and technological capabilities of humankind**

Need for a Shift in Technology Focus?

- **Nevertheless, of the 6.5 (give or take) billion people on the planet:**
 - **Over 2 billion people lack clean, potable drinking water access**
 - **More have no access to sanitary waste disposal**
 - **More than half have no light**
 - **More than two-thirds have no access to the world wide web**
 - **Need to refocus technological development and implementation**
-

The Relevance of an “Appropriate Technology”?

- **Need to refocus technological development and implementation**
 - **Appropriate Technology becomes increasingly relevant for empowering these communities**
 - **We must re-engineer the engineer and engineering and technology education.**
 - **Critical in the global south**
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SURVIVAL ETHICS

- **SCIENTIFIC GROUND OF CONDITIONS FOR SURVIVAL**
 - **CLEAN AIR**
 - **ADEQUATE CLOTHING AND SHELTER**
 - **POTABLE WATER**
 - **NUTRITIOUS FOOD**
 - **BASIC HEALTHCARE**
 - **BASIC EDUCATION**
 - **CONNECTION TO THE WORLD WIDE WEB**
-

Appropriate Technology

- **Technology to Empower People**
- **Appropriate – Suitable, sustainable**
- **Empowerment:**
 - ❑ **Clean Air and Water**
 - ❑ **Nutritious Food**
 - ❑ **Adequate Shelter**
 - ❑ **Clean Energy and Clean Environment**
 - ❑ **Good Health and wellbeing – physical, psychological**
 - ❑ **Education and Information**

Appropriate Technology Values

- We believe that **communities must be empowered to access and manage the resources** they need to be self-sufficient and sustainable.
 - We trust and **value the ability of local communities to shape and create their own vision for their future**, as well as the path to move toward it.
 - We believe that transparency and **participatory decision-making is central to the goal of social justice and sustainability**.
 - We believe that **working toward ecological sustainability must be a priority for all societies** to ensure peace and prosperity for all peoples.
 - We **appreciate and respect the diversity and differences** among our constituents and our collaborators.
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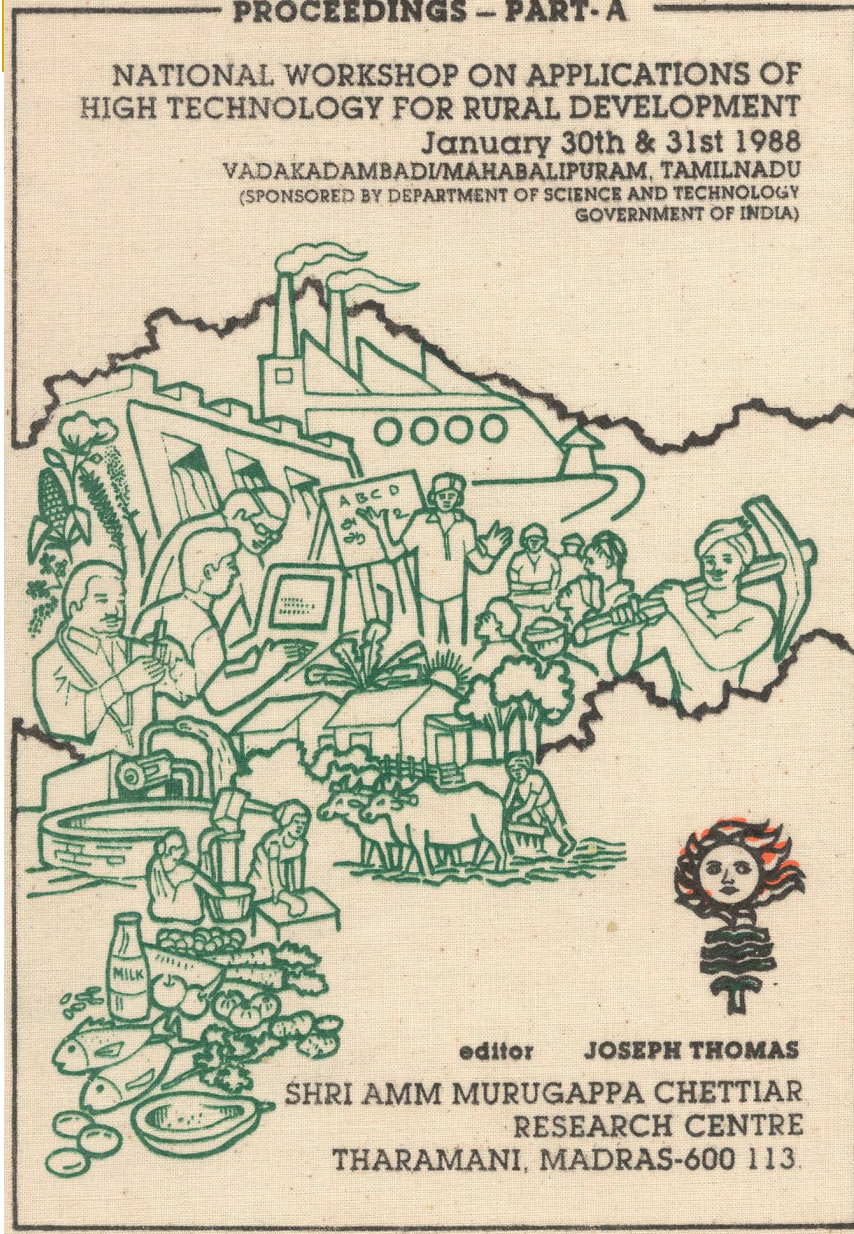
Appropriate Technology Assessment Questions

- Was the participation of individual community members possible and affordable to them?
- Were locally available materials used in the project?
- Was the project labor intensive?
- Was the project sufficiently small scale in order to be affordable to individual families?
- Was sufficient training and technology transfer done to enable and empower the local community to control and maintain the project?
- Can this be re-produced in other villages/small shops?
- Did the community work together to develop and implement the project?
- Was the local community included in the innovation, modification and implementation of the technology?
- Is the technology being implemented adaptable and flexible?
- Can it be adapted to different places and changing circumstances and situations within the community?
- Will the project have an adverse impact on the environment?

Appropriate Technology Assessment and Evaluation: Community Questions

- **Does the community feel that local needs were met?**
- **Were local people involved in identifying and working together to address the identified needs?**
- **Did the implementation of the project result in the development of tools that extend human labor and skills?**
- **Was the project comprehensible and controllable in relation to the community's size and needs?**
- **Did the project contribute to establishing a self-sustaining and expanding reservoir of skills within the community?**
- **Did the project reduce economic, social, and political dependency?**

Does Appropriate Technology mean “Low Tech”?



Projects:

- **Energy**
 - Solar Energy
 - Energy Consumption and Development
 - Biomass
- **Technology Application**
- **Land and Water Management**
 - Drinking Water
 - Dryland Farming
 - “New” Agriculture
- **Food Preservation**
- **Information and Communication**
 - Telecommunication
 - Rural wireless net

HOW DO WE GET THERE??

- **Political Change**
 - **Social Change**
 - **Environmental Change**
 - **Cultural Change**
 - **Technology Change**
 - **We need to change!!**
-

Equity

- **Representative Equity – We all can vote**
- **Social Equity – No discrimination on any “group” basis**
- **Environmental Equity – Equitable distribution of the environmental burdens facing humanity**
- **Resource Equity – Equitable access to resources needed for social development**
- **Energy Equity – Equitable access to energy to power and run the “engines” of development**
- **Information Equity – Equitable access to the world wide web of public information to power the innovation that will be needed to transform development**

Justice

- **Civil Justice**
- **Environmental Justice**
- **Energy Justice?**
- **Resource Justice?**
- **Information Justice**
- **Technology Justice?**
- **Science Justice?**

The Development Paradigm....



Modern
Scientific
Knowledge
(International
Knowledge
Systems)

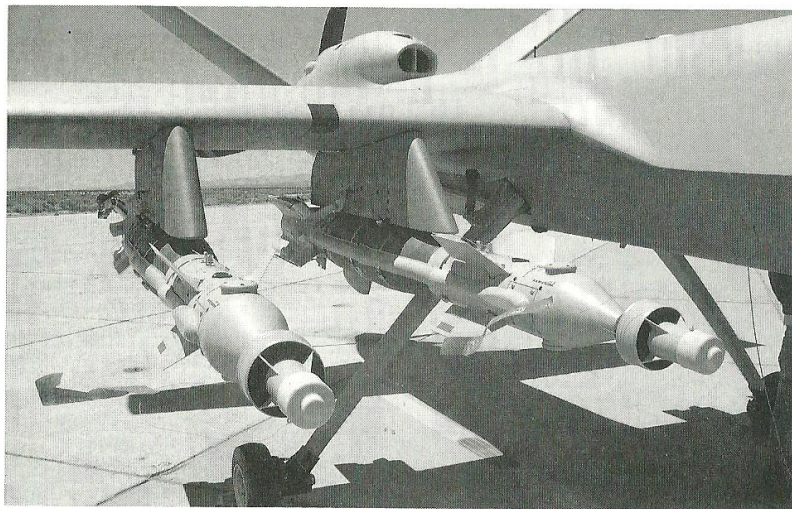
- NOT APPROPRIATE
- MARGINALIZES, DEVALUES and
- DISMISSES INDIGENOUS KNOWLEDGE
- RESULTS IN "UN-DEVELOPMENT"

Indigenous
Knowledge
Systems

...is the Development Divide

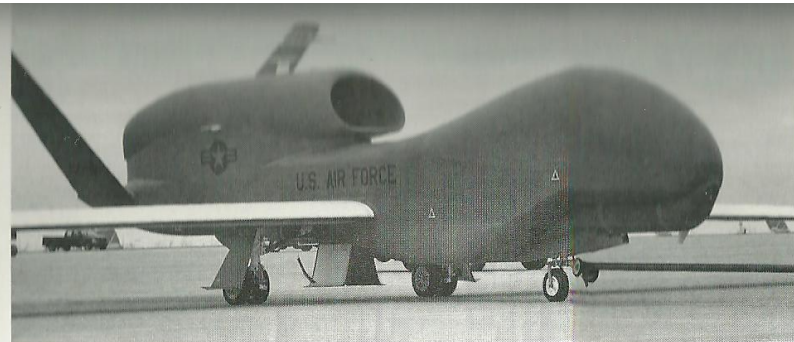
in the air for twenty-four hours, is one of the most widely used and effective weapons in the force. "If you want to pull the trigger and take out bad guys, you fly a Predator," says one report.

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE



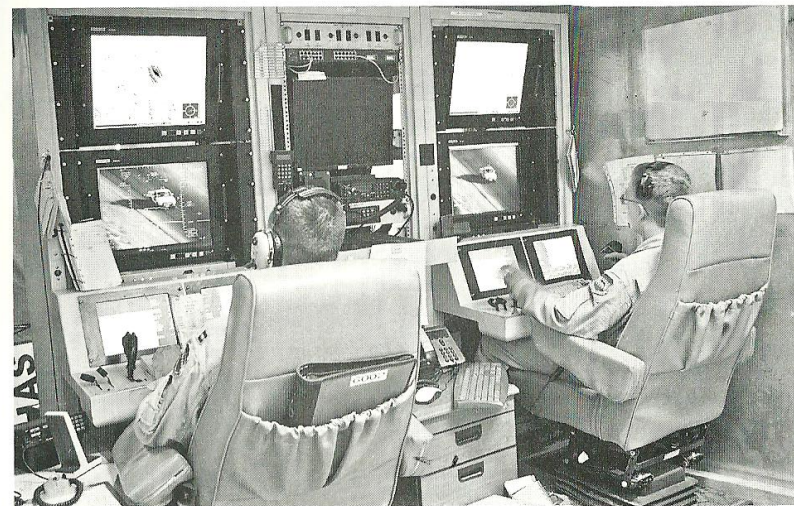
A special task force using drones armed with weapons such as these found and killed more than 2,400 Iraqi insurgents, in just one year.

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE



The Global Hawk spy drone can take off by itself, fly 3,000 miles, spend a day spying on an area the size of Maine, fly back 3,000 miles, and then land itself. Some uncharitably say it looks like "a flying albino whale."

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE

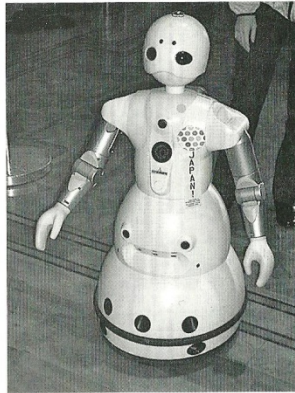


In reachback operations, the drones over Iraq and Afghanistan are actually flown by pilots sitting in Nevada. As one described fighting from a cubicle, "It's antiseptic. It's not as potent an emotion as being on the battlefield." Says another, "It's like a video game. It can get a little bloodthirsty. But it's fucking cool."

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE

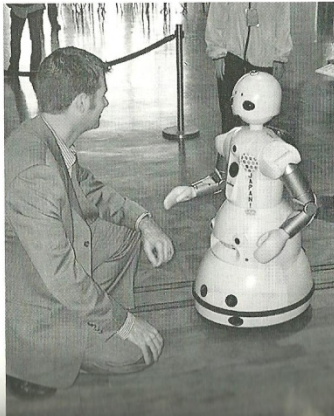
Wakamura is a cross between a house sitter and nanny robot. It is able to patrol the house, call the police or doctors in an emergency, and wake the family in the mornings and tell them about the weather and the news. In Japan, the little robot has also become a "companion" for elderly shut-ins.

PHOTOGRAPH COURTESY THE AUTHOR



As part of its design, Wakamura can recognize faces, make eye contact, and start conversations. But robots are notoriously tight-lipped during interviews.

PHOTOGRAPH COURTESY THE AUTHOR



One concept being explored for twenty-first-century war at sea is the mothership, where a warship would serve as the hub for a tiny fleet of unmanned drones and submarines.

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE



Described as looking like "a set piece from the television program *Battlestar Galactica*," the X-45 UCAV is designed to take on the most dangerous roles in the air and, perhaps, even replace manned bomber and fighter planes one day.

PHOTOGRAPH COURTESY U.S. DEPARTMENT OF DEFENSE

QUESTIONS/DISCUSSION??