Appropriate Technology and/for Sustainable Development: Real or Fantasy?

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Howard University Chapter

Presentation Outline

- **Introduction**
- **The story of Easter Island**
- **Sustainable Development or SD**
- **Sustainability and Development**
- **Appropriate Technology – AT – problems and expectations**
- **Resource Distribution**
- **Do AT, Get SD? Try for Justice.**

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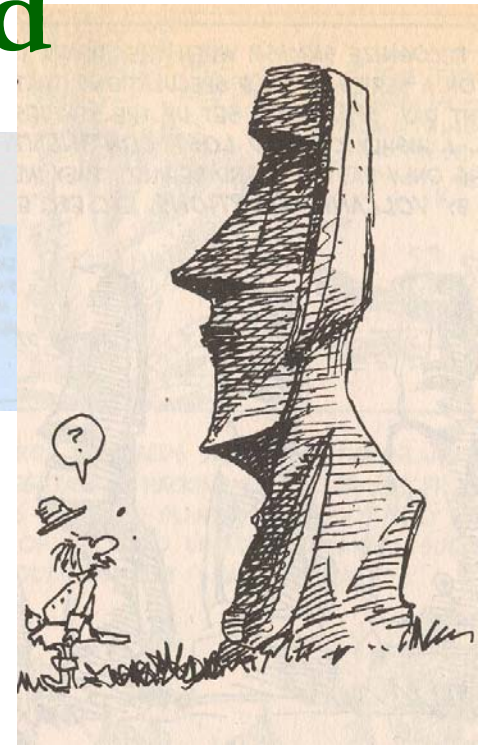
- **64-square mile island in Pacific Ocean**
- **2300 miles from anywhere**
- **"Discovered" in the 18th century**
- **Described as a barren island with about 3000 very poor people eking out a living on bananas, sugar and sweet potatoes.**
- **Rocky soil, no fresh water**
- **Amidst all this, massive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

THEY WALKED HERE.
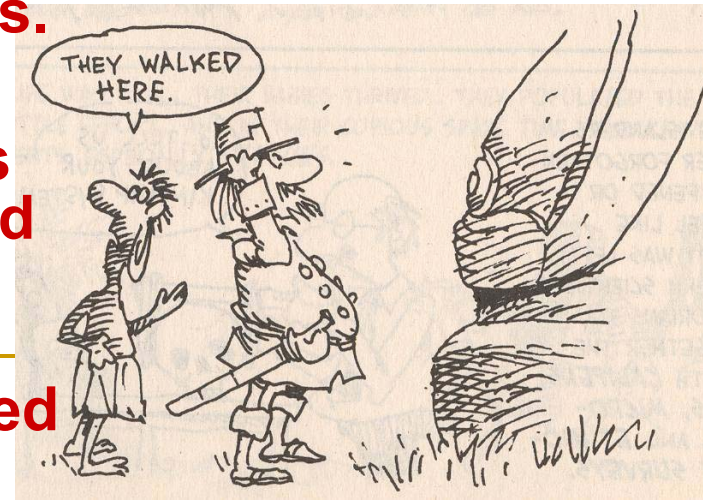
The Story of Easter Island

- 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.
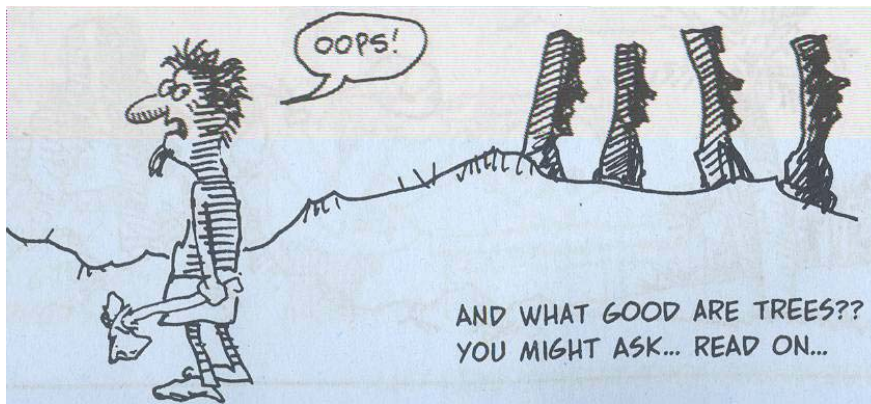
THE CARTOON GUIDE TO THE
ENVIRONMENT
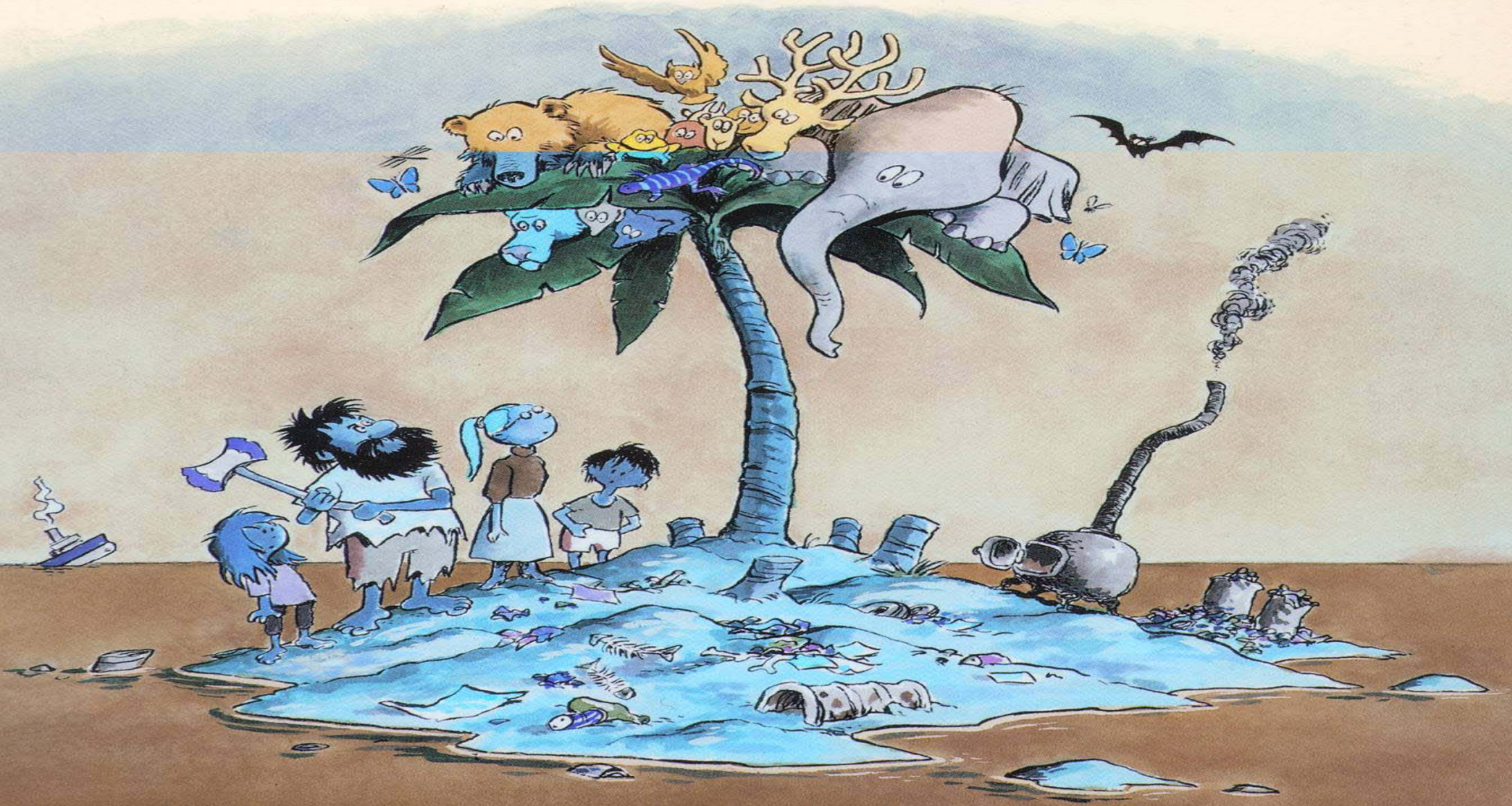
LARRY GONICK & ALICE OUTWATER
Author of *The Cartoon History of the Universe*

Lessons Learned?

- **Resources are finite**
- **Human capacity to exploit the environment is "infinite"**
 - **Until it is not.**

Sustainable Development

- **Preserving the ability of future generations to flourish while raising the quality of life and standard of living of currently underdeveloped, underserved and previously (and currently) exploited communities and environments**

"**The term was used by the Brundtland Commission and the most often-quoted definition of sustainable development is:** "**development that meets the needs of the present without compromising the ability of future generations to meet their own needs.**"

Is there a Sustainability Factor?

- **The Triple Bottom Line**
    - **Environment**
    - **Society**
    - **Economy**
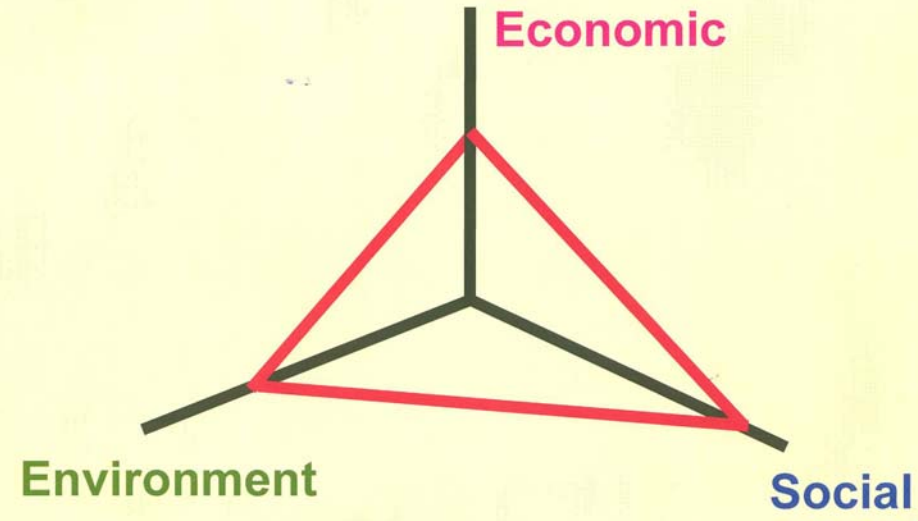
- **How do we measure "Sustainability"**
    - **The size of the triangle?**
    - **Can the triple bottom line be independently addressed?**
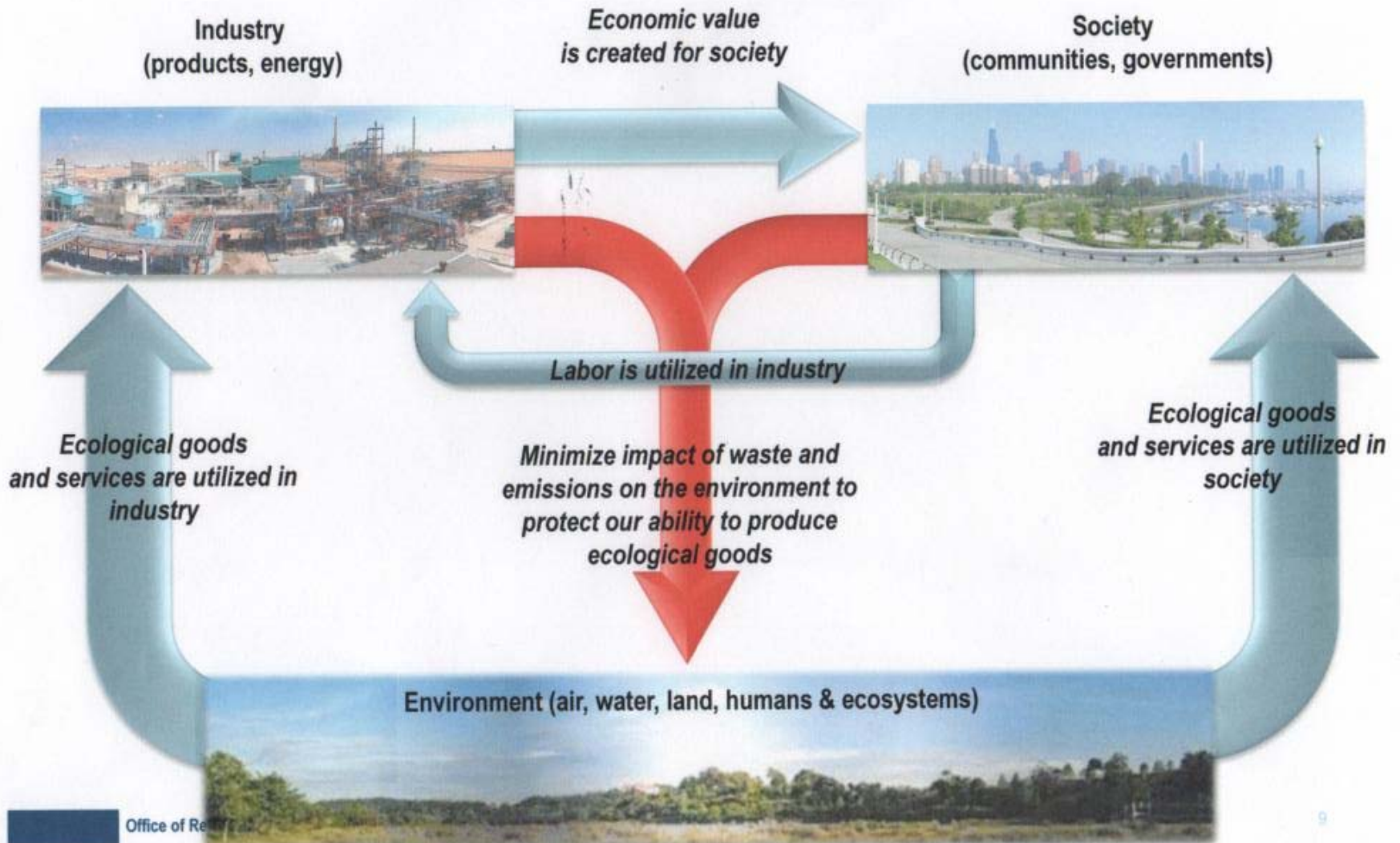   - **Where are we right now?**

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.
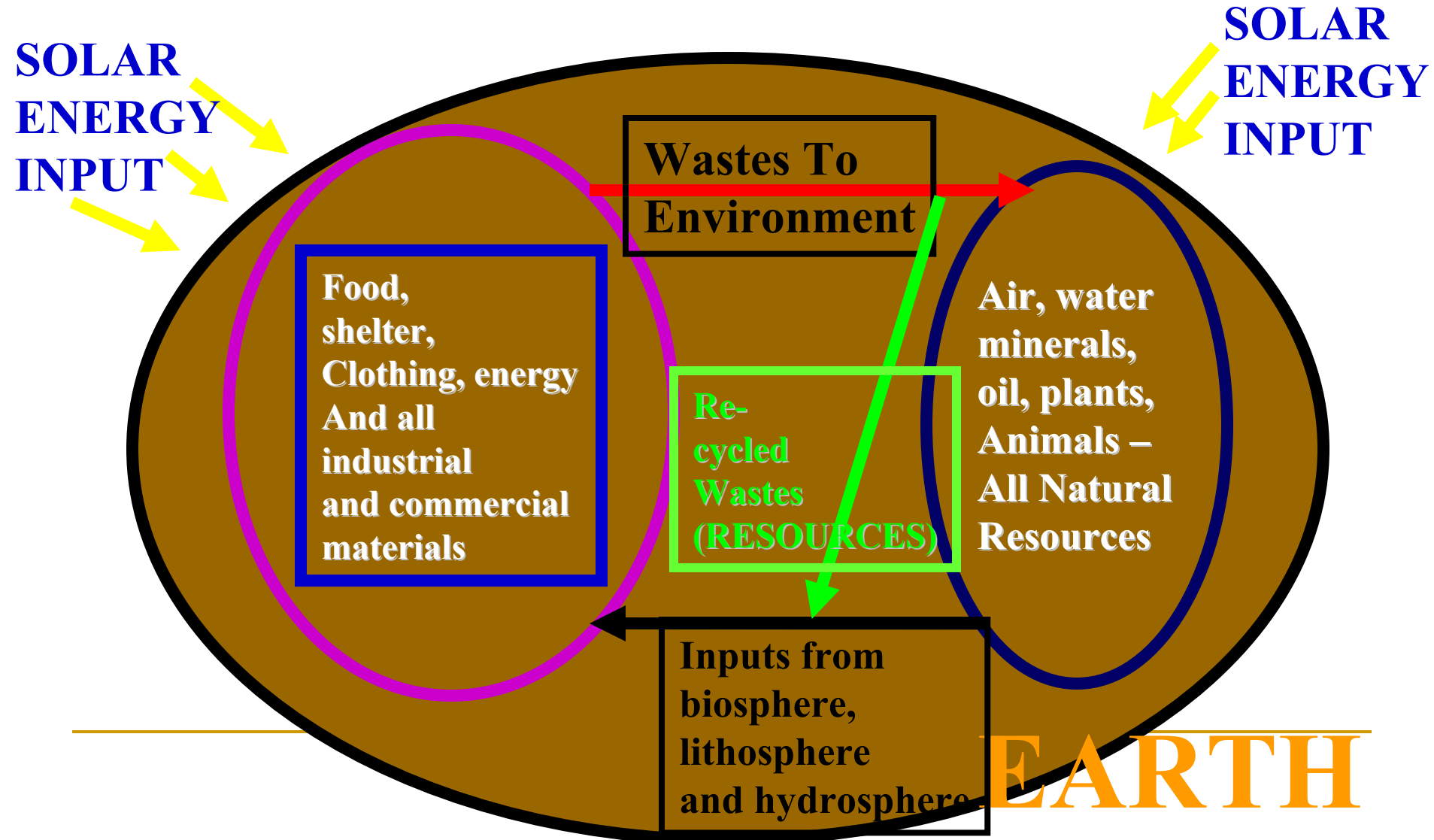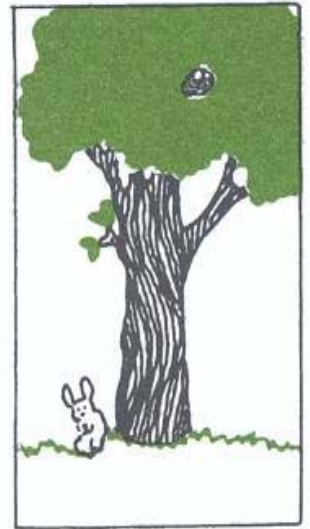
Appropriate Technology

- **Technology to Empower People**
- **Appropriate – Suitable, sustainable**
- **Empowerment:**
  - **Air and Water**
  - **Food**
  - **Shelter**
  - **Energy and Environment**
  - **Health**
  - **Information**

How we develop: Through mostly unsustainable Resource Use

Adapted from: J. Fiksel, A Framework for Sustainable Materials Management, *Journal of Materials*, August 2006.

GLOBAL RESOURCE USE (MATERIALS AND ENERGY USE)

SOLAR ENERGY INPUT

SOLAR ENERGY INPUT

Wastes To Environment

Food, shelter, Clothing, energy And all industrial and commercial materials

Re-cycled Wastes (RESOURCES)

Air, water minerals, oil, plants, Animals – All Natural Resources

Inputs from biosphere, lithosphere and hydrosphere.

EARTH
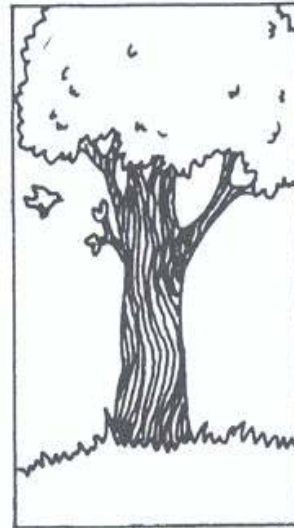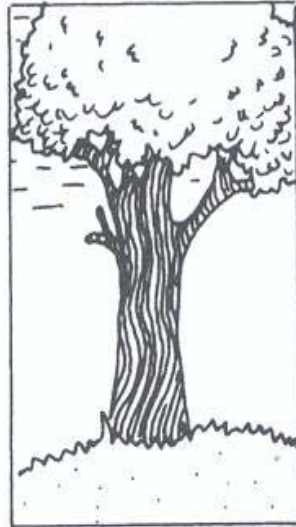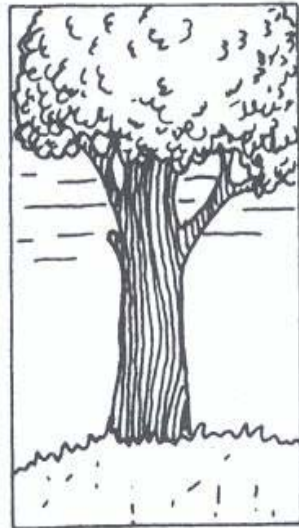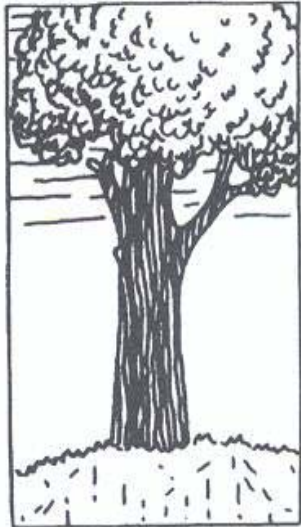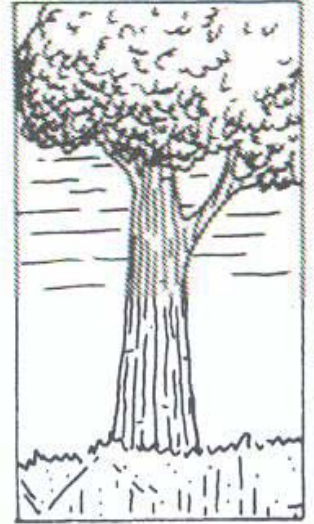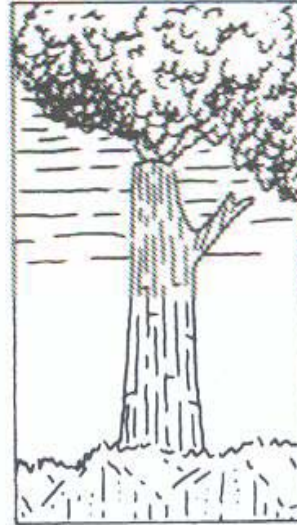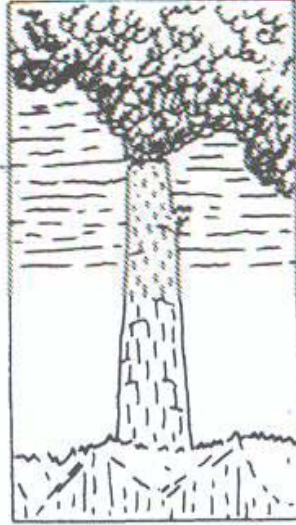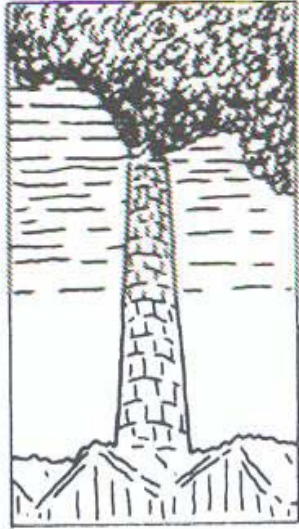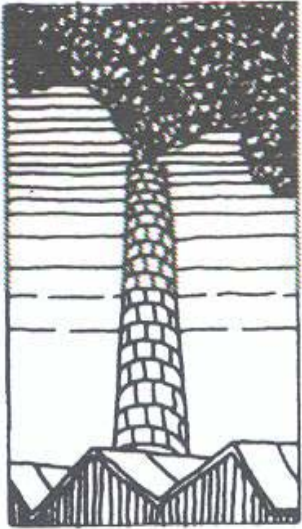
21st Century Pollution and Waste Management Imperatives

- **Late 20th Century**
  - 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

- **21st Century**
  - 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

How do we make Communities Sustainable?
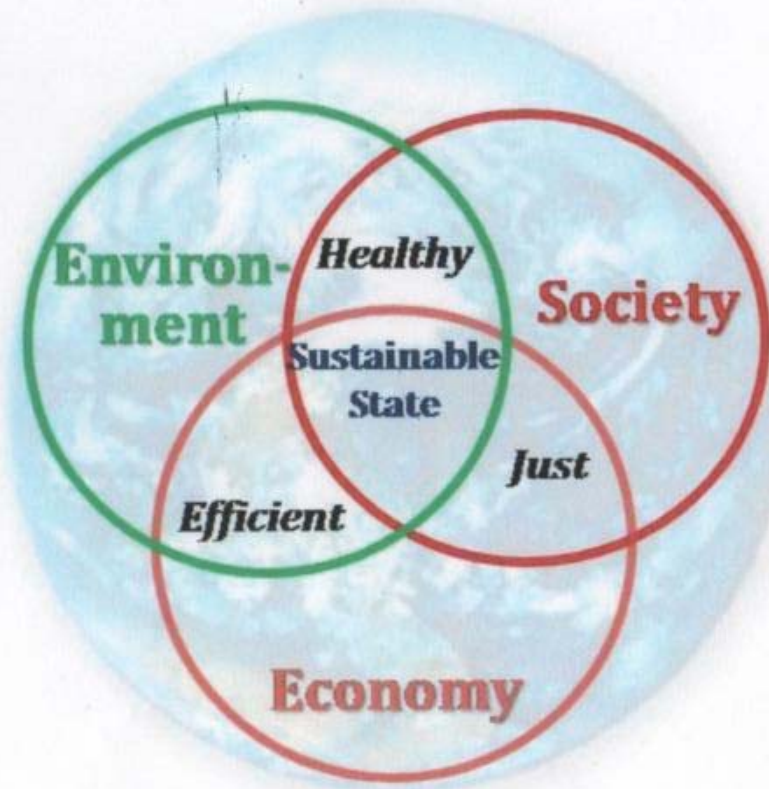
Social Justice – Is this – should it be - the goal of Development?

- **Application of justice principles on a broad social scale**

- **Equitable distribution of the earth's resources**

- **Eradication of poverty**

- **Bringing the Global South to parity with the Global North?**

HOW DO WE GET THERE??

- **Political Change**

- **Social Change**

- **Environmental Change**

- **Cultural Change**

- **Technology Change**

- **We need to change!!**

Divisions of the World's Energy Resources

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 inequity**
- **Military expenditures per capita (dollars)**

Energy and Equity – Percentage Basis

Country	Pop.	Pop. %	PPP ($)	PPP %	1997 KgOE	Energy %	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%

The Relevance of Appropriate Technology?

- **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**
- **Nevertheless, of the 6.5 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 web**
- **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**

The Development Paradigm….

Modern Scientific Knowledge (International Knowledge Systems)

Indigenous Knowledge Systems

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

…is the Development Divide

Thanks to Mukund Talwalker for Original Cartoon, © 1987

Equity

- **Representative Equity – We all can vote**

- **Social Equity – No discrimination on any "group" basis**

- **Environmental Equity – Equitable distribution of the environmental burdens facing**

- **Resource Equity – Equitable access to resources needed for social development**

- **Energy Equity – Equitable access to energy to power and run the "engines" of development**

Justice

- **Civil Justice**

- **Environmental Justice**

- **Energy Justice?**

- **Resource Justice?**

- **Technology Justice?**

Howard University Project on Appropriate Technology – Study Tour
Havana, Cuba, March 15 – 26, 2003

Institut Superior Polytechnica Y Arcitectura, Engineering Havana, Cuba

- **Entrance Examination**
- **Departments**
  - **Architecture and Civil, Electrical, Industrial, Chemical and Mechanical Engineering**
- **Students**
  - **4500 Undergrads**
  - **23,000 Graduates**
  - **3,000 M.S./PhD**
  - **379 Foreign Students: 45 countries, all scholarships**
- **Curricular highlights**
  - **Voluntary projects**
  - **Taking the University outside the University's walls**
  - **Work practice focuses on real problems**
  - **Final Design Project Community Based**
  - **CUJAE Intranet: Curriculum and syllabi are all completely on-line.**

Service Learning

- **Learning Acquired Through Service**
  - ❑ **Curricular Activity, course based**
  - ❑ **Credit Bearing**
- **Two Major Components**
  - ❑ **Engagement of Students in a self-selected, planned and driven, but professionally supervised and advised/mentored service activity**
  - ❑ **Opportunity and Requirement for students to engage in reflection and writing on the service activity**

TRANSFORMING DEVELOPMENT

- **Harnessing the power of education**
- **Leveraging existing educational programs**
- **Integrating service learning into curricula**
- **Community based**
- **Using students and leveraging their expectations and desires**