Environmental Costs versus Human Benefit: Striking a Moral Balance for Sustainability

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World Commission on Environment & Development (1987)

- "Environment is where we live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable...."
- "Humanity has the ability to make development sustainable: to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

Last half century sees big improvements in human well-being

- Life expectancy at birth up: $46 \rightarrow 70 \text{ y}$
- Infant mortality down: $13\% \rightarrow 4\%$
- Access to safe drinking water: $<35\% \rightarrow 65\%$
- Literacy rate up: $<50\% \rightarrow 80\%$
- GDP/capita up: 5+%/yr
- > 3 billion people improve living standards.

















Economic growth without environmental protection...

- Kills the people development is meant to benefit
 - Pollution leads to ~100 million years of life lost each year (number of people * years of life lost per person)
- Limits our ability to produce essential food
 - "Brown clouds" from biomass burning combined with climate change to significantly reduce growth of rice yields in Asia
- Undermines economic growth itself...
 - Pollution and resource degradation cost the median country around 1.5% points of its GNP growth/yr, with more than ¼ of countries losing >5% points of GNP/yr.

What's to be sustained? What's to be developed?

- Nature
 - Earth, biodiversity, ecosystems
- Life support
 - Ecosystem services, resources, environment
- Community
 - Cultures, groups,places

- People
 - Child survival, life expectancy, education, equity, opportunity
- Economy
 - Wealth, productive sectors, consumption
- Society
 - Institutions, social capital, states, regions

What ought to be the human use of the earth?

The IPAT framework...

- Impact (on environment) =
 - Population (e.g. people / area)
 - Affluence (e.g. consumption / person)
 - "Technology" (e.g. junk / unit consumption)
- As growth rates...
 - I = P + A + T
- For the world carbon over last half century
 - \blacksquare P= 1.5%/yr, A= 5%/yr, T= -2.5%/yr
 - I = 1.5 + 5.0 2.5 = 4%/yr...
 - A doubling of Impacts every 20 years...

What ought to be the human my use of the earth?

- I = P + A + T
 - $I = 1.5 + 5.0 2.5 = 4\%/yr \rightarrow I = 0\%/yr$?
- Population?
- Technology?
- Affluence? / Consumption?

Two Harvard Sagas...

- Energy use / Greenhouse gas emissions
 - President's initiative to reduce 30% by 2016...

Supply curve for GHG abatement in 2030

(McKinsey 2007)

Global cost curve for greenhouse gas abatement measures beyond 'business as usual'; greenhouse gases measured in GtCO₂e¹ Approximate abatement required beyond 'business as usual,' 2030 Biodiesel Industrial CCS Waste Carbon capture and storage (CCS); new coal Coal-to-gas shift Medium-cost forestation CCS; coal retrofit Cofiring biomass Higher-cost Industrial abatement Wind; low penetration motor systems 100 Industrial feedstock substitution Avoided CCS, enhanced oil recovery, new coal deforestation Low-cost forestation 50 **Cost of abatement,** ${f e}$ per ${f t}{f 0}_2{f e}^2$ Livestock Further potential3 Nuclear Industrial non-CO2 Standby losses 550 ppm4 450 ppm4 400 ppm4 Sugarcane biofuel -50 ~40 ~50 ~25 Fuel efficiency in vehicles Water heating Marginal cost,⁵ € per tCO₂e² Air-conditioning -100Lighting systems Fuel efficiency in commercial vehicles -1505 10 15 20 25 30 35 Abatement beyond 'business as usual,' GtCO₂e¹ per year in 2030 Building insulation

Two Harvard Sagas...

- Energy use / Greenhouse gas emissions
 - President's initiative to reduce 30% by 2016...
 - What's not included and what we can/ could/ ought to do about it...
- Food consumption
 - Food Literacy Initiative, Organic lawns, Gardens
 - We have met the enemy...
- "Sustainable Consumption"?

"Sustainable Consumption"?







"Sustainable Consumption"?



Common Threads Initiative

- Reduce
- Repair
- Reuse
- Recycle
- Reimagine...

Sustainable Walmart?

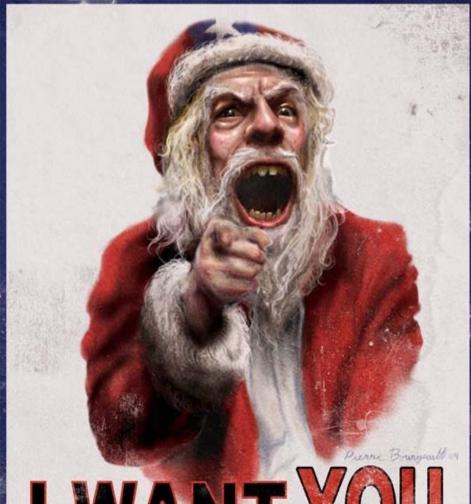
- Worldwide goals to ...
 - Be supplied by 100% renewable energy
 - Create zero waste
 - Sell products that sustain people and the environment
- Huge impacts on supply chain, China, etc.
- A model for sustainable development?
 - Why? Why not?
 - What ... and who.. needs to change?



Franklin Roosevelt:

"The test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little."





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