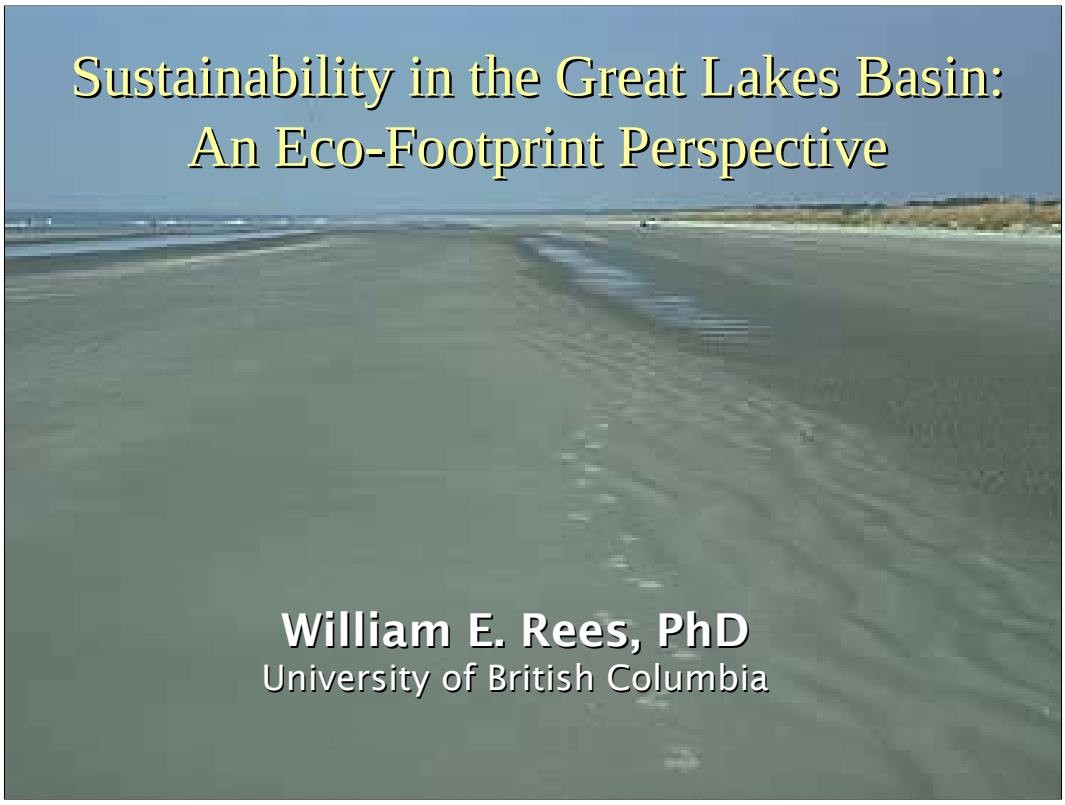
Sustainability in the Great Lakes Basin:
An Eco-Footprint Perspective
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On Sustainability

A sustainable society ***lives within the means of nature***

A sustainable society **lives within the means of nature**.

An ecologically and socially sustainable society

reasonably equitable society

lifestyles and patterns of consumption can be maintained indefinitely without degrading supportive ecosystems or undermining the life support function of the ecosphere. That is:

Shallow ecology: Fooled by encouraging trends

- Initially, 'development' results in worsening pollution
- As incomes rise, societies put more resources into controlling emissions—environmental quality improves
- "...the surest way to improve your environment is to become rich"
- Less energy and material use per unit GDP by rich countries:
  - The economy is "dematerializing" or "decoupling" from nature

Many economists believe in the Kuznets hypothesis:
In its early stages, 'development' results in worsening pollution but, as incomes rise, societies put more resources into controlling emissions—environmental quality improves. It seems that "...the surest way to improve your environment is to become rich" (Beckerman 1992).

Similarly, some economists interpret the fact that rich countries are using less energy and material use per unit GDP to mean that the economy is "dematerializing" or "decoupling" from nature.

It ain't necessarily so! Livability is *not* sustainability

- We may be
  - Exporting dirty industry overseas
- *If regional consumption has remained constant or is growing, local lifestyles may actually be less sustainable*
- Imported goods—dirtier methods of production impact the exporting countries

Improved livability does not equate to greater sustainability.

Improving environmental trends in the GLB are partially related to the off-shore migration of dirty industries and the export of pollutants. If regional consumption has remained constant or is growing, local lifestyles may actually be *less* sustainable.

Imported goods may be being produced using dirtier methods than were used by domestic industries, but now the impacts occur in the exporting countries.

Ecological Footprint analysis (EFA): Challenging the myth of dematerialization

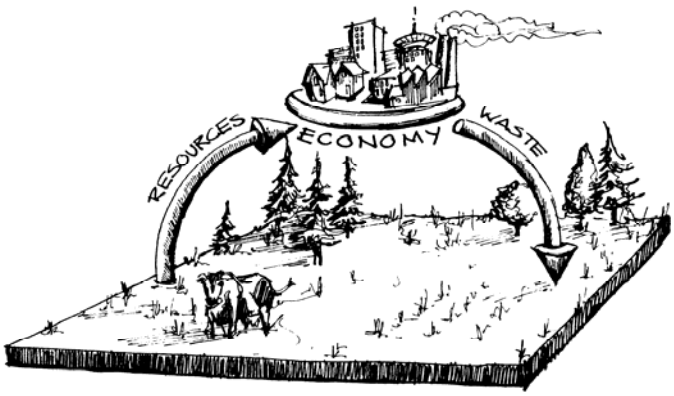
- EFA provides a means to assess the sustainability of any population
- Are our lifestyles *really* becoming less material-intensive?
- Are we living within our ecological means?

Eco-footprint analysis (EFA) provides a means to assess the sustainability of any population. Are our lifestyles *really* becoming less material-intensive. Are we living within our ecological means?

A population's Eco-Footprint (EF) = appropriated ecosystem area

The area of land and water ecosystems required to produce the resources that the population consumes, and to assimilate (some of) the wastes that the population produces,wherever on Earth the relevant land/water may be located

The 'ecological footprint' of a specified population is *the area of land and water ecosystems required to produce the resources that the population consumes, and to assimilate (some of) the wastes that the population produces, wherever on Earth the relevant land/water may be located.*



What is an eco-footprint?

Material premises of EFA

- Biophysical data, not $$$$
- Most human impacts are associated with energy and material production and consumption
- Energy and material flows can be converted to productive or assimilative ecosystem area
- Measurable, finite area of productive land and water ecosystems on Earth

Biophysical data, not $$$$

Most human impacts on ecosystems are associated with energy and material production and consumption

Most measurable energy and material flows can be converted to a corresponding productive or assimilative ecosystem area

Measurable, finite area of productive land and water ecosystems on Earth

Population EFs reflect resource consumption

- Calculations for a specified population are based on final demand for goods and services
- Consumption data are trade-corrected
- Total population EF is obtained by summing the ecosystem areas required for all consumption items

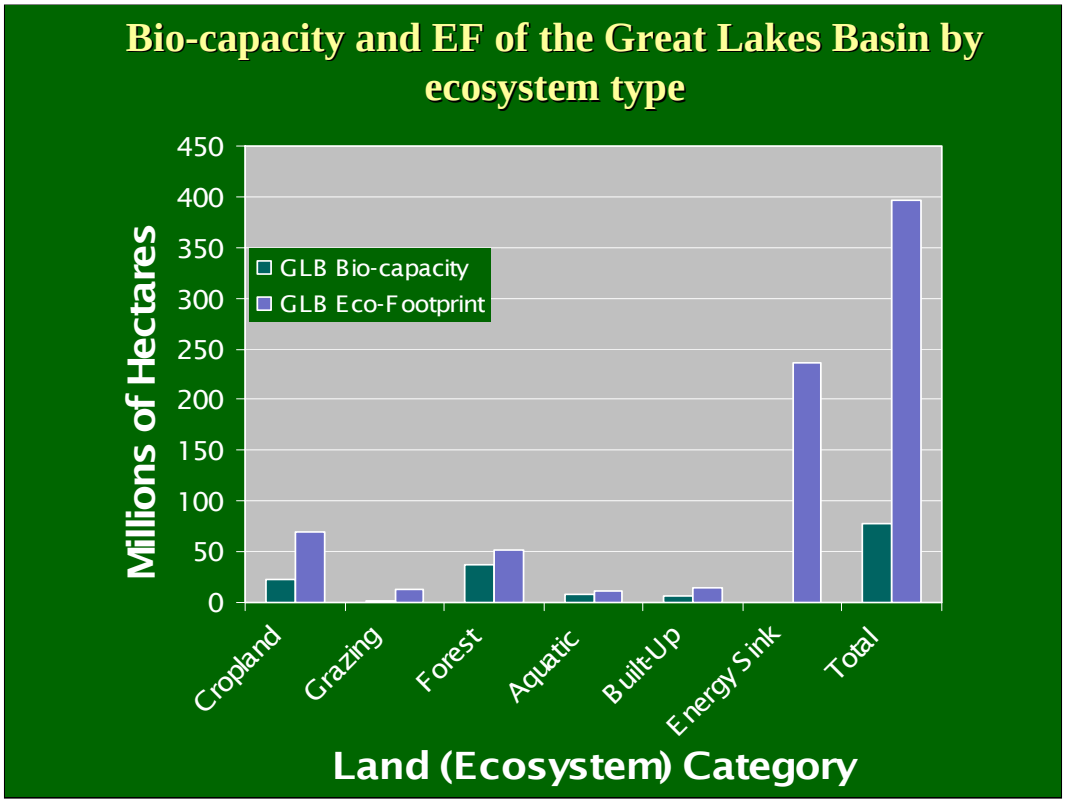
Eco-footprint calculations for a specified population are based on final demand for goods and services.

Consumption data are trade-corrected. Thus, the population's consumption of wheat can be represented as follows:

$$\text{consumption}_{\text{wheat}} = \text{production}_{\text{wheat}} + \text{imports}_{\text{wheat}} - \text{exports}_{\text{wheat}}$$

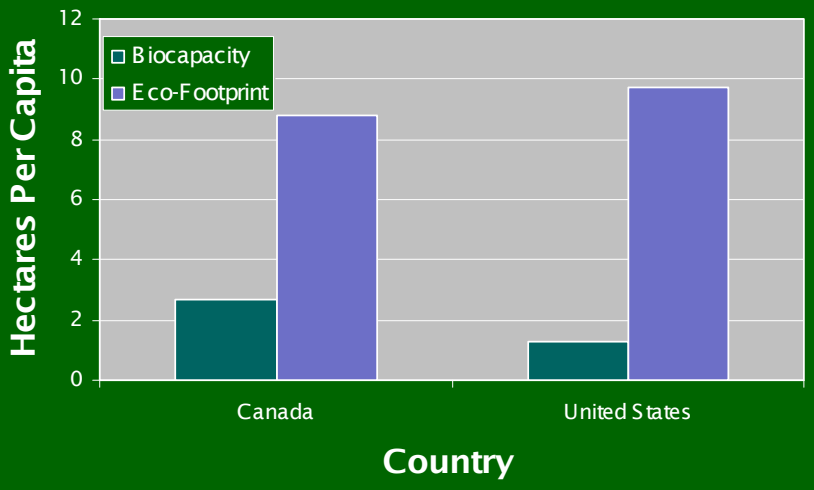
Dividing consumption (kg) by average yield (kg/ha) gives us the ecosystem area 'appropriated' for production.

The total population EF is obtained by summing the ecosystem areas required for all 'n' consumption items.



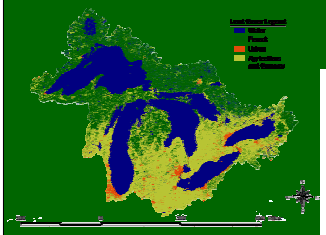
The biological capacity of the Great Lakes Basin is shown in the dark blue on this slide, in millions of hectares, and its footprint is shown in light blue. An obvious problem here as footprint exceeds capacity.

Per capita bio-capacity and EF in the Great Lakes Basin



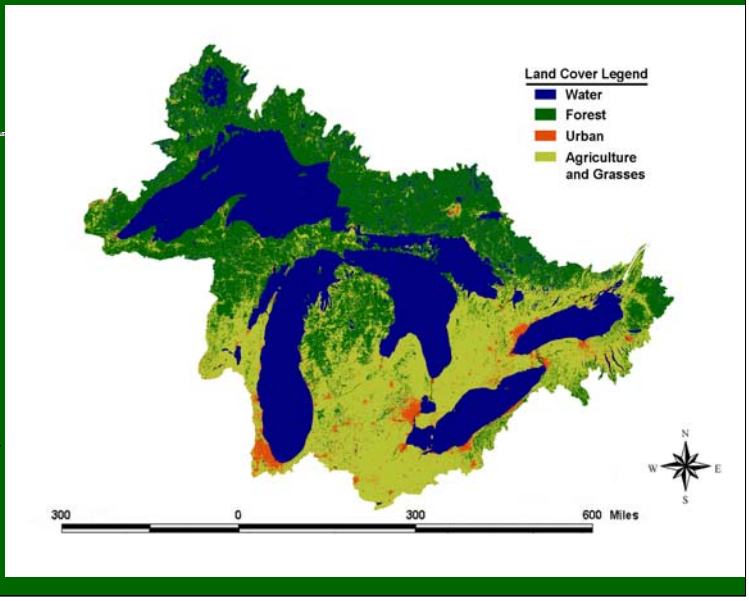
Here is the same information on a per capita basis for each country.

If this small map represents the geographic area of the GLB….

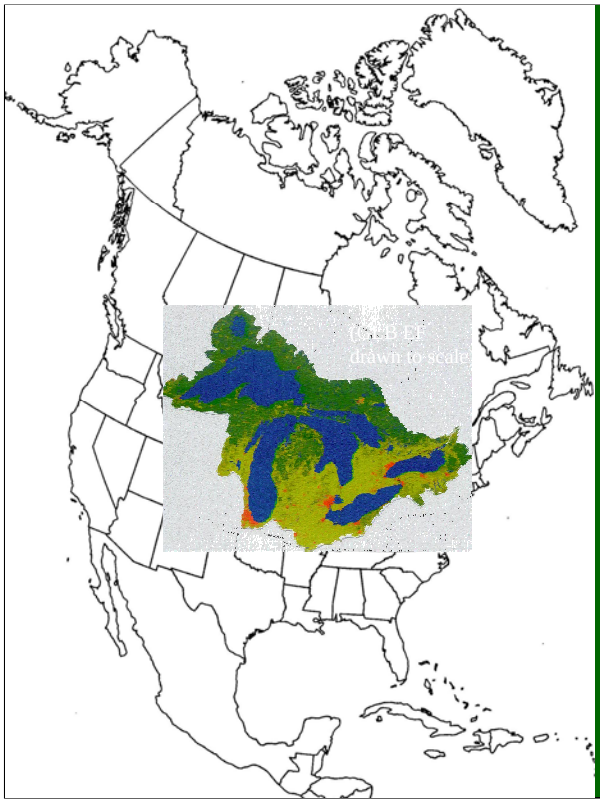


…then this larger graphic represents the **ecological footprint** of the basin at 5.5 times the geographic area of the basin

The Ecological Footprint of the Great Lakes Basin



The Great Lakes Basin's Eco Footprint



The Great Lakes Basin's presence in the world

The eco-footprint of the Great Lakes Basin 'occupies' an area equivalent to **21%** of the area of Canada and the USA, BUT is home to only **13%** of the population of these countries

The ecological footprint of the basin at 5.5 times the geographic area of the basin

At nearly 397 million hectares, the eco-footprint of the Great Lakes Basin eco-functionally 'occupies' an area equivalent to **43%** of the area of North America. However, the basin is home to the equivalent of only 9% of the North American population.

The Great Lakes Basin has about the same *per capita* biocapacity as the earth

Both are in 'overshoot,' but *the GLB is about four times more ecologically crowded*

	Population (millions)	*Productive Area (million ha)*	*Bio-Capacity (million global ha)*	Per Capita *Bio-Capacity (global ha)*	Per Capita *Ecological Footprint (global ha)*	*O' shoot Factor (Reflects Eco-Deficit)*
World	6,000	11,400	11,400	**1.9**	**2.3**	1.3
Great Lakes Basin	42	71	77	**1.8**	**9.6**	5.2

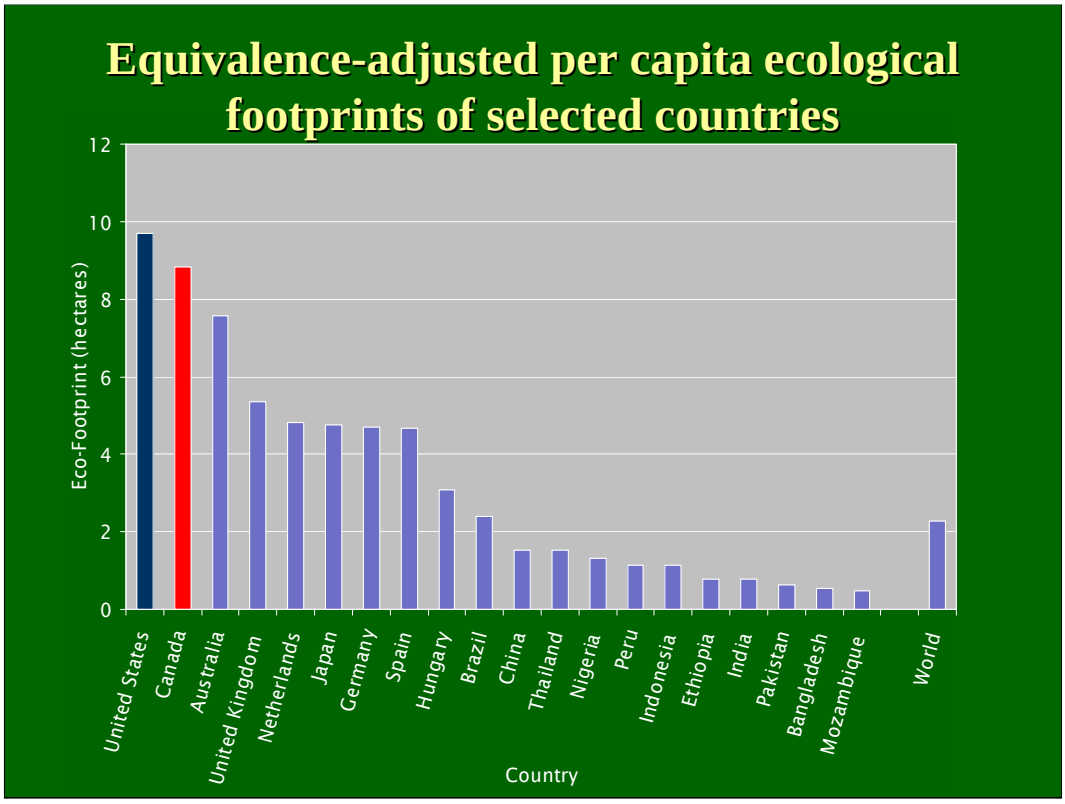
The Great Lakes Basin has about the same per capita biocapacity as the earth.

Both are in 'overshoot' but the GLB is about four times more ecologically crowded.

High-income eco-footprints typically vary from five to 10 hectares compared to as little as half a hectare per capita in poor countries.

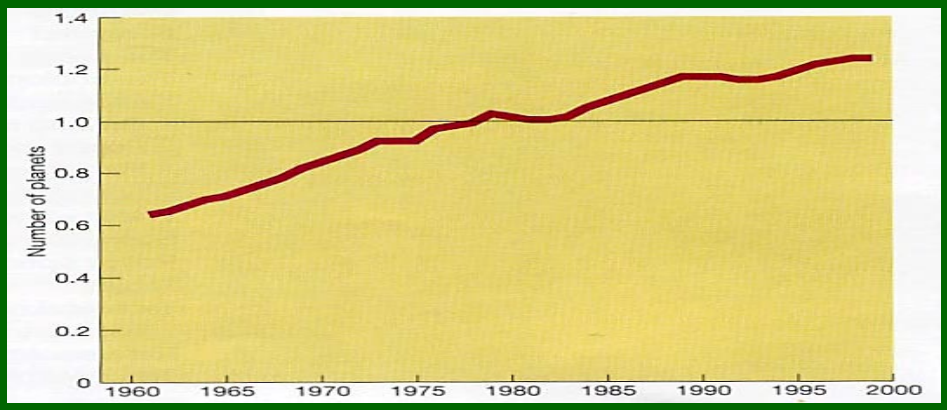
There are fewer than two hectares of productive land per capita on Earth.

That is, wealthy regions like the GLB use up to five times their equitable "earth-share" and run large 'ecological deficits' with the rest of the world.



Here is how Canada and the USA stack up against some other countries.

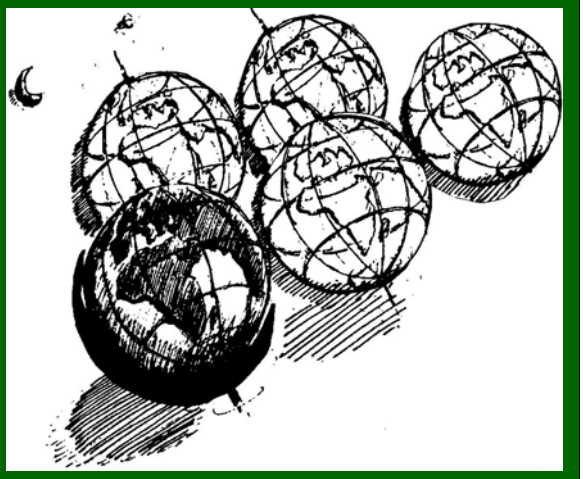
Our growing global Eco-Footprint



Humanity's demand for natural resources increased by 80 percent between 1961and 1999. The world eco-footprint is now at least 20% in excess of global biocapacity (WWF 2000) as reflected in such familiar phenomena as fisheries collapses, deforestation, resource depletion, climate change, etc.).

Missing: Four phantom planets

If the entire world population today enjoyed the same consumer lifestyles as residents of the Great Lakes Basin, it would take four additional Earth-like planets to accommodate everyone sustainably!



Problem: “Good planets are hard to find”

If the entire world population today enjoyed the same consumer lifestyles as residents of the Great Lakes Basin, it would take four additional Earth-like planets to accommodate everyone sustainably!
Problem: “Good planets are hard to find.”

Conclusions and some implications for the Great Lakes Basin

- We are not living within our ecological means
- We are highly dependent on other countries as a source for resources and sink for wastes
- There is no excess capacity in the rest of the world
- Sustainability may require becoming more regionally self-reliant

With an eco-deficit about four times the area of the region, we are not living within our ecological means in the GLB.

The GLB population is highly dependent on other regions, countries and the global commons as a source for resources and sink for wastes. However:

There is no excess capacity in the rest of the world.

In an era of growing population, exploding consumption, global climate change and increasing geo-political instability, sustainability may require becoming more regionally self-reliant.

Technological challenge

- Industrialized world reductions in material consumption, energy use, and environmental degradation of over 90% will be required by 2040
- Can significant reductions in material intensity be achieved without threatening average lifestyles?

“Industrialized world reductions in material consumption, energy use, and environmental degradation of over 90% will be required by 2040 to meet the needs of a growing world population fairly within the planet’s ecological means”

Can significant reductions in material intensity be achieved without threatening average lifestyles?

“Factor-four” reductions: Technologically feasible?

- **“Factor-four”** reduction in the material and energy intensity of production seems to be within current technological capability (e.g., compact florescent bulbs)
- This would bring the GLB close to regional carrying capacity

A ‘factor-four’ reduction in the material and energy intensity of production (i.e., current output with a quarter the input) seems within current technological capability (e.g., compact florescent bulbs).

This would bring the GLB close to regional carrying capacity.

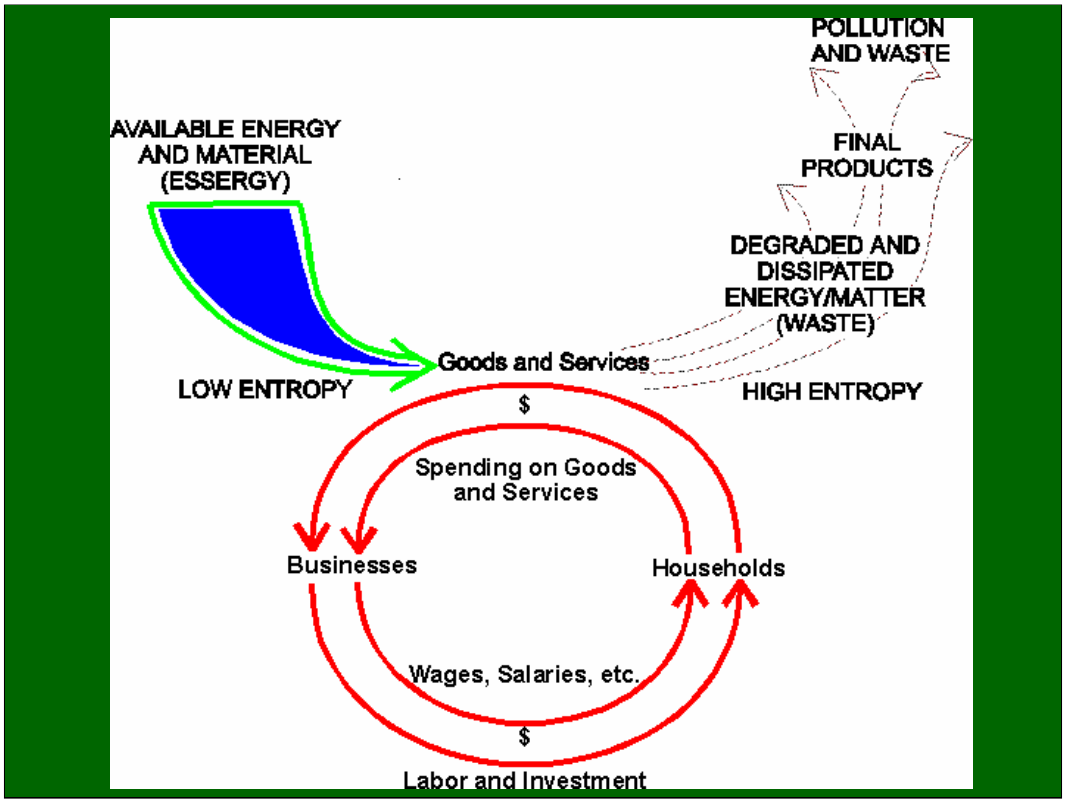
‘Factor-ten’ gains will require much greater effort.

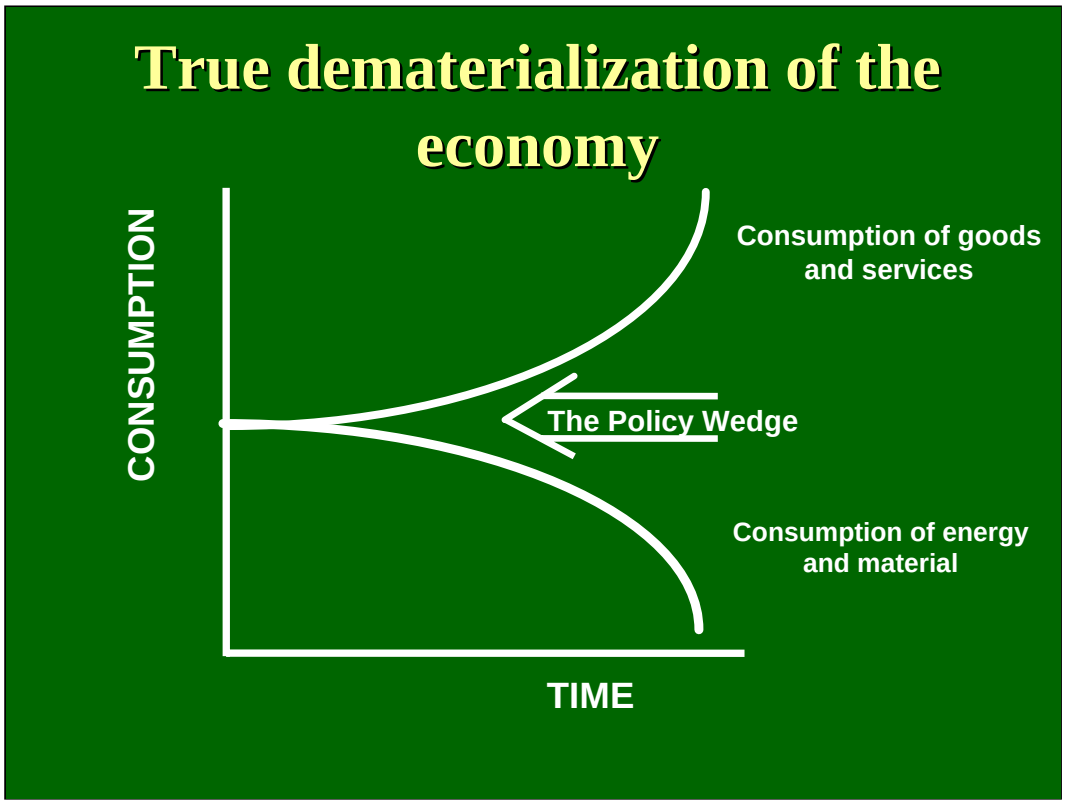
The market alone will not stimulate the efficiency gains required for sustainability.

Government intervention in the form of ‘ecological fiscal form’ is required.

"Factor-ten" reductions: Technologically feasible?

- **"Factor-ten"** gains will require much greater effort
- The market alone will not stimulate the efficiency gains required for sustainability
- Government intervention in the form of "ecological fiscal reform" is required

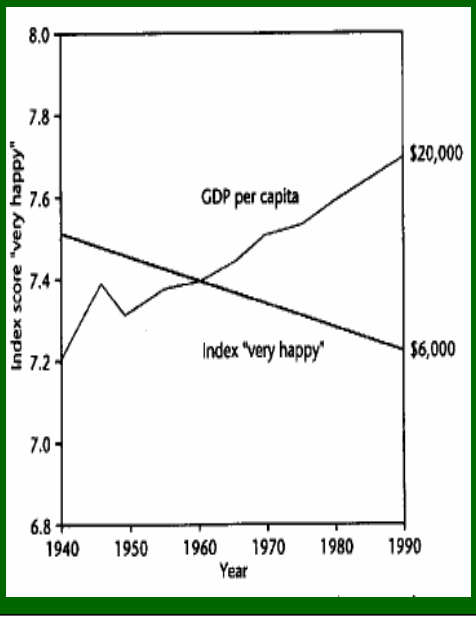

POLLUTION AND WASTE
AVAILABLE ENERGY AND MATERIAL (ESSERGY)
FINAL PRODUCTS
DEGRADED AND DISSIPATED ENERGY/MATTER (WASTE)
Goods and Services
LOW ENTROPY
HIGH ENTROPY
$
Spending on Goods and Services
Businesses
Households
Wages, Salaries, etc.
$
Labor and Investment



At the limits to material throughput, sustainability requires that growth in the consumption of goods and services be accompanied by a proportional decline in the energy and material intensity of that consumption.

Time to reconsider our lifestyles?

(Money doesn't buy happiness)



- Are we a science-based culture?
- In the US we see "…the strange, seemingly contradictory pattern … of rising real income and a falling index of subjective well-being"
- What intelligent species would risk destroying its only habitat for more stuff?

Are we a science-based culture? Consider this: In many rich countries today well-being is no longer associated with rising GDP/incomes *per capita.*

In the US we see "…the strange, seemingly contradictory pattern … of rising real income and a falling index of subjective well-being" (Lane 2000).

What intelligent species would risk destroying its only habitat for more 'stuff' in the face of data showing that the getting of it is actually reducing its overall welfare?