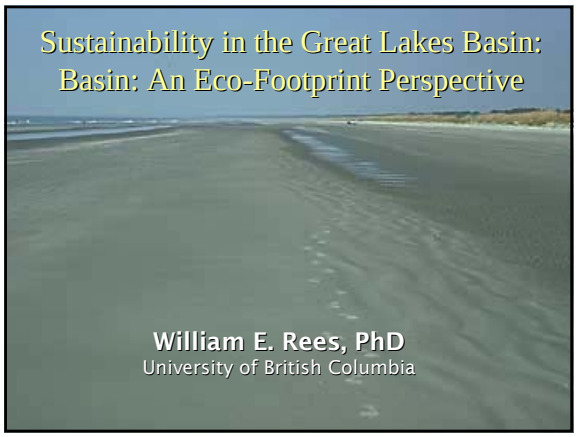


On Sustainability

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

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

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

Ecological Footprint analysis (EFA): (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?

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

What is an eco-footprint?

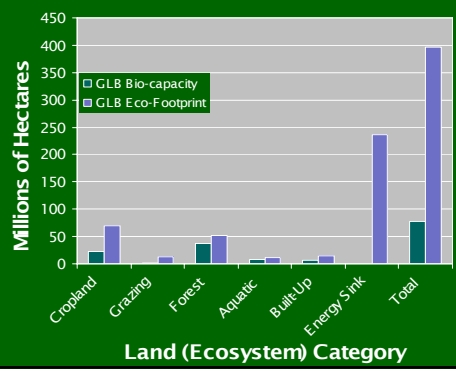
Material premises of EFA

- 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

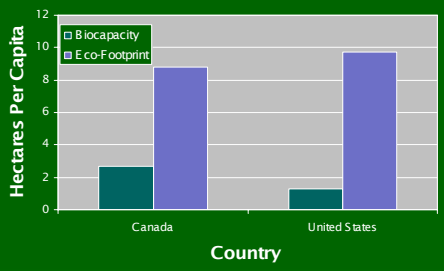
Population EFs reflect resource consumption

- 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

Bio-capacity and EF of the Great Lakes Basin by ecosystem type



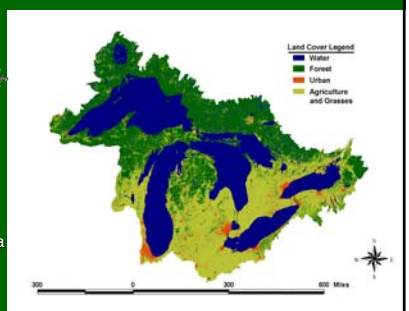
Per capita bio-capacity and EF in the the Great Lakes Basin

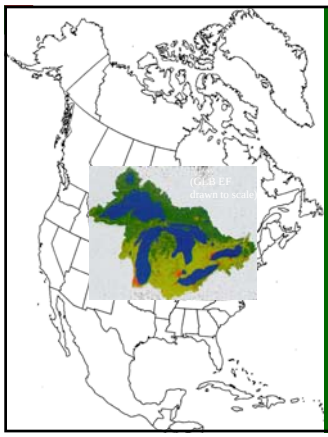


If this small map represents the geographic area of the GLB....

...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 presence in the world

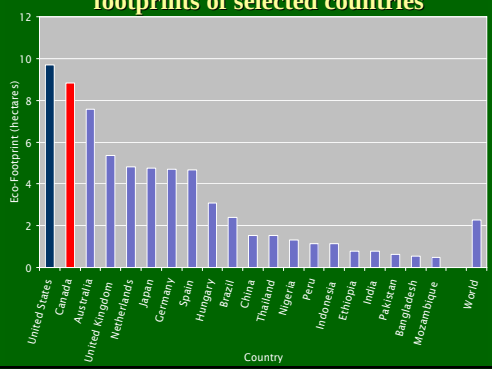
The eco-footprint of the Great Lakes Basin 'occupies' an area equivalent to **21%** of the area of Canada and the USA, BUT is home to only **13%** of the population of these countries

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

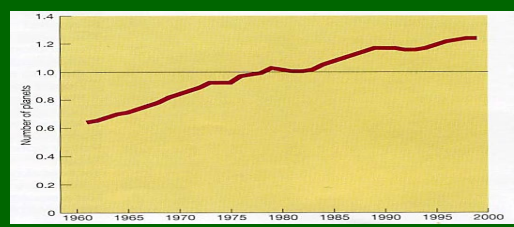
Both are in 'overshoot,' but *the GLB is about four times more ecologically crowded*

	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

Equivalence-adjusted per capita ecological footprints of selected countries



Our growing global Eco-Footprint



Missing: Four phantom planets 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"

Conclusions and some implications 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

Technological challenge

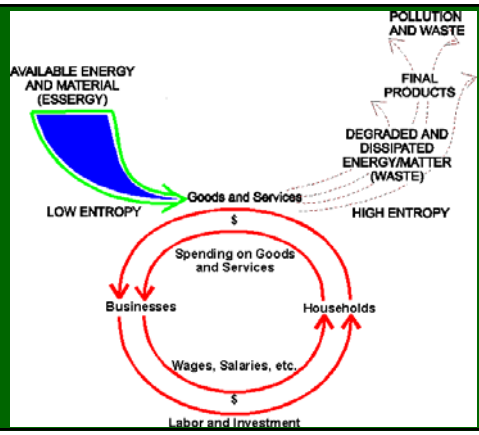
- Industrialized world reductions in material consumption, energy use, and environmental degradation of over 90% will be required by 2040
- Can significant reductions in material intensity be achieved without threatening average lifestyles?

"Factor-four" reductions: Technologically feasible?

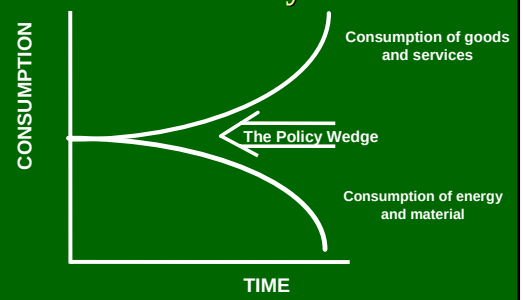
- **"Factor-four"** reduction in the material and energy intensity of production seems to be within current technological capability (e.g., compact florescent bulbs)
- This would bring the GLB close to regional carrying capacity

"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

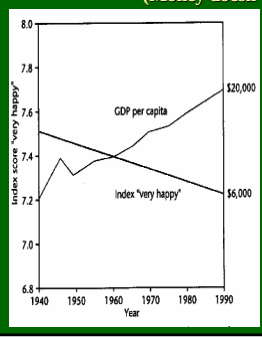


True dematerialization of the economy



Time to reconsider our lifestyles? 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?