Comparing the Ecological Footprints of the U.S. and the E.U.

Jim Bowyer
Dovetail Partners, Inc.
Minneapolis, MN

Comparing Ecological Footprints

- The ecological footprint – what is it?
- The carbon footprint
- Global hectares
- Biocapacity
- Ecological footprints of various nations.
- Footprints of the U.S. and of E.U. nations.
- Understanding the U.S. footprint.
- The non-renewables footprint.
- Implications for wood science.

The Ecological Footprint

A measure of consumption of bioresources in terms of the area of the earth's surface required to support that consumption.

Initially described by the term "Appropriated Carrying Capacity," the name was later changed to "Ecological Footprint."

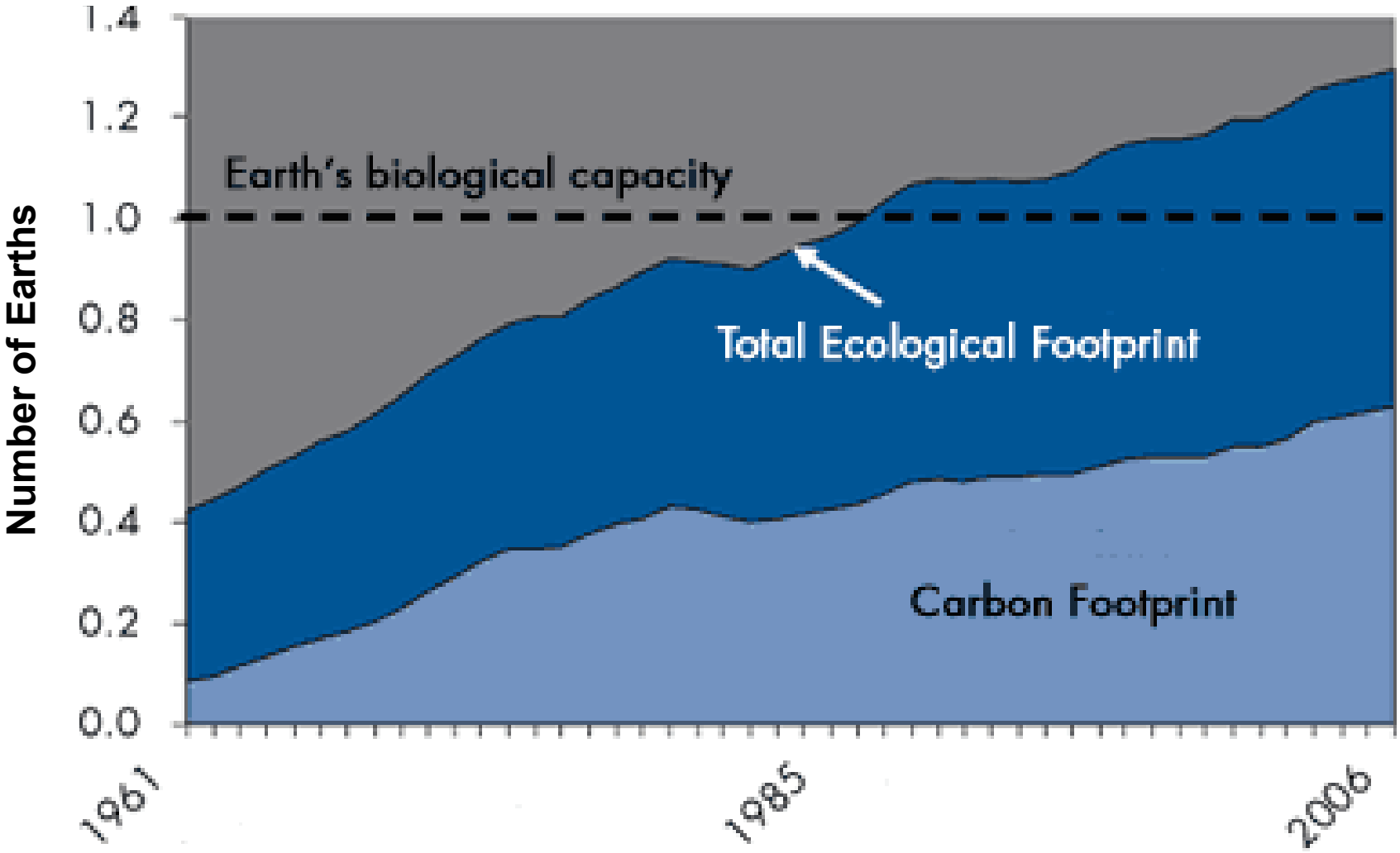
Under the Ecological Footprint concept consumption of the full range of bioresources - from grain, beef cattle, and fish, to peat and timber - is described in terms of the land and water surface area required to support that consumption, as well as disposal of wastes.

The Ecological Footprint of a city, province, or nation is determined by simply multiplying the per capita footprint for residents of that geographic area by population.

There is a carbon component to the Ecological Footprint.

This is a measure of the biological capacity, expressed in terms of global hectares, required to process human emissions of fossil carbon dioxide.

Humanity's Ecological Footprint



Source: Global Footprint Network 2009
(http://www.footprintnetwork.org/en/index.php/GFN/page/carbon_footprint/)

A **global hectare** is "a common unit that encompasses the average productivity of all the biologically productive land and sea area in the world in a given year."

Biologically productive areas include cropland, forest and fishing grounds, but **do not include deserts, glaciers, and the open ocean**.

The Ecological Footprint concept also does not allocate any of the earth's surface area for use by species other than humans.

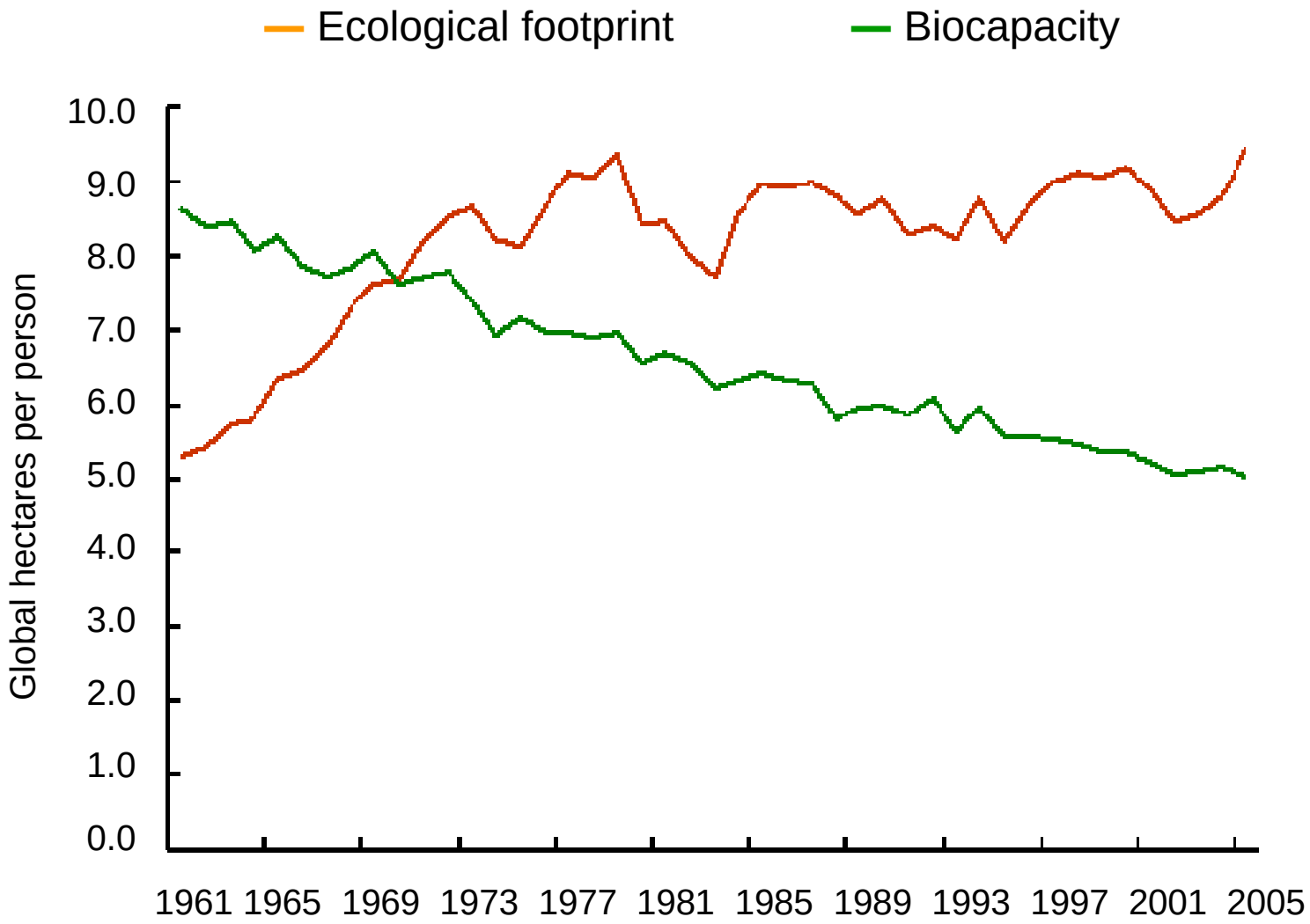
Nations with the highest consumption have the highest ecological footprints.

The United States leads the world in consumption of almost everything in both per capita and absolute terms.

Biocapacity is a dynamic measure, varying each year with changes in management of agricultural land, forests, water bodies, and other areas.

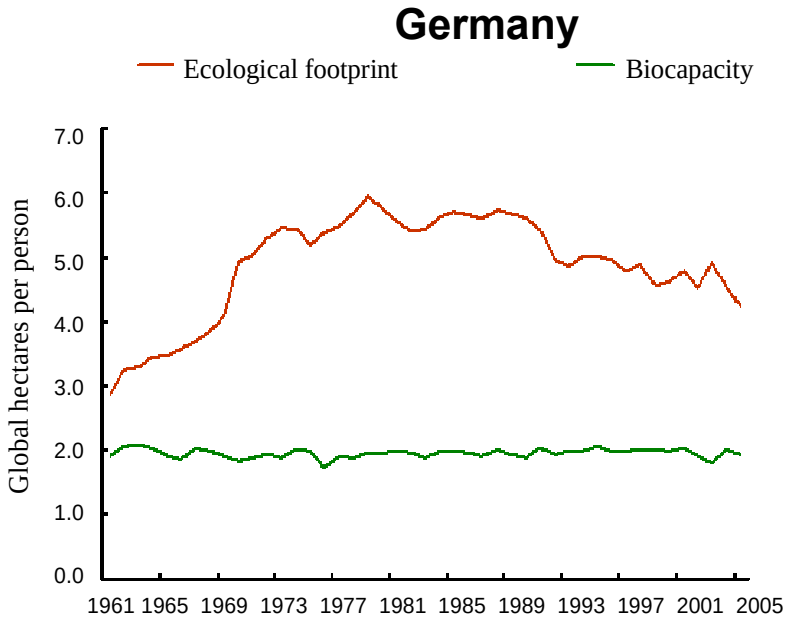
Development of new technologies for resource conversion and use, ecosystem degradation, and weather also affect biocapacity.

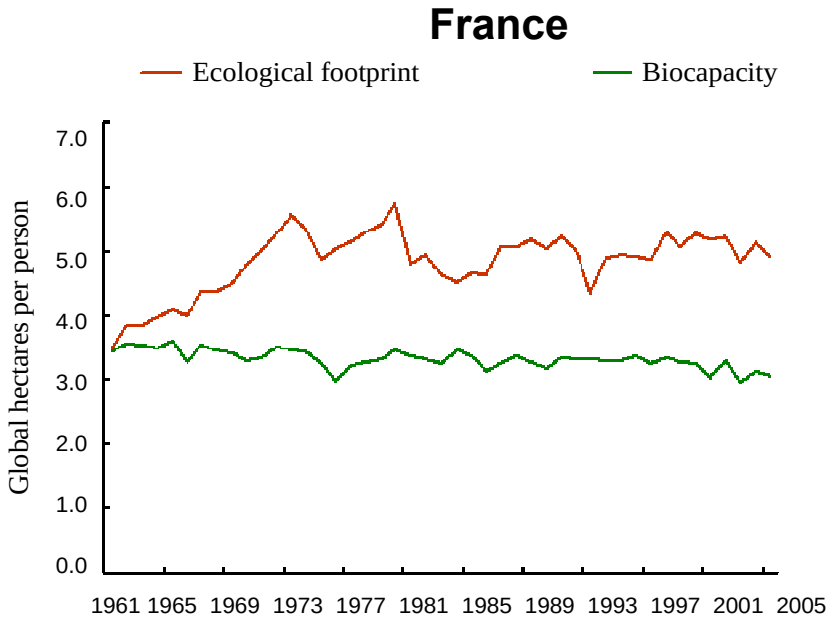
The Ecological Footprint vs. Biocapacity of the United States

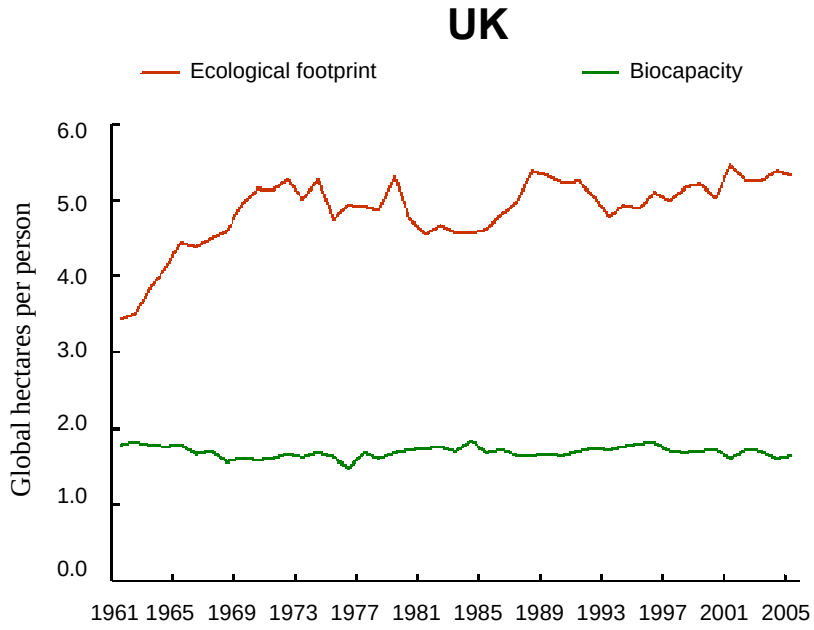


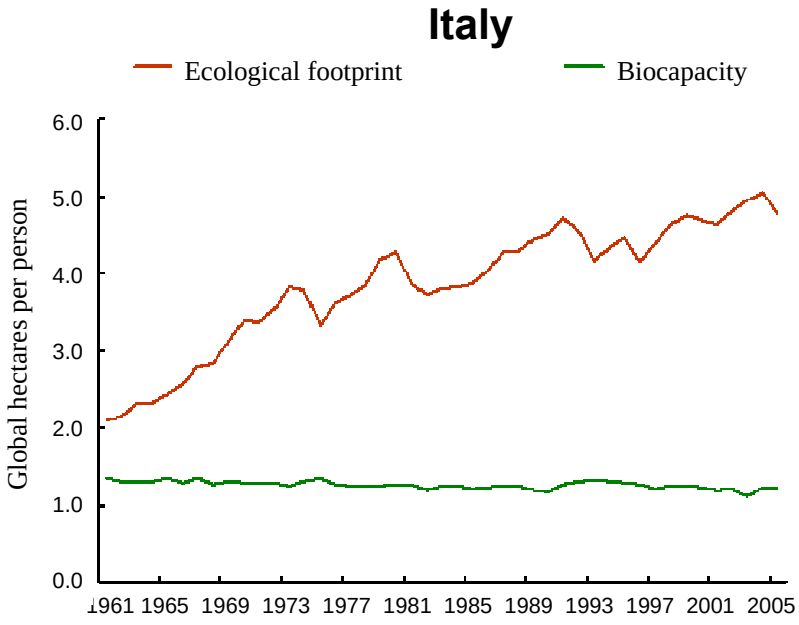
Source: www.footprintnetwork.org/en/index.php/GFN/page/trends/U.S./

Ecological Footprint vs. Biocapacity of Several European Countries

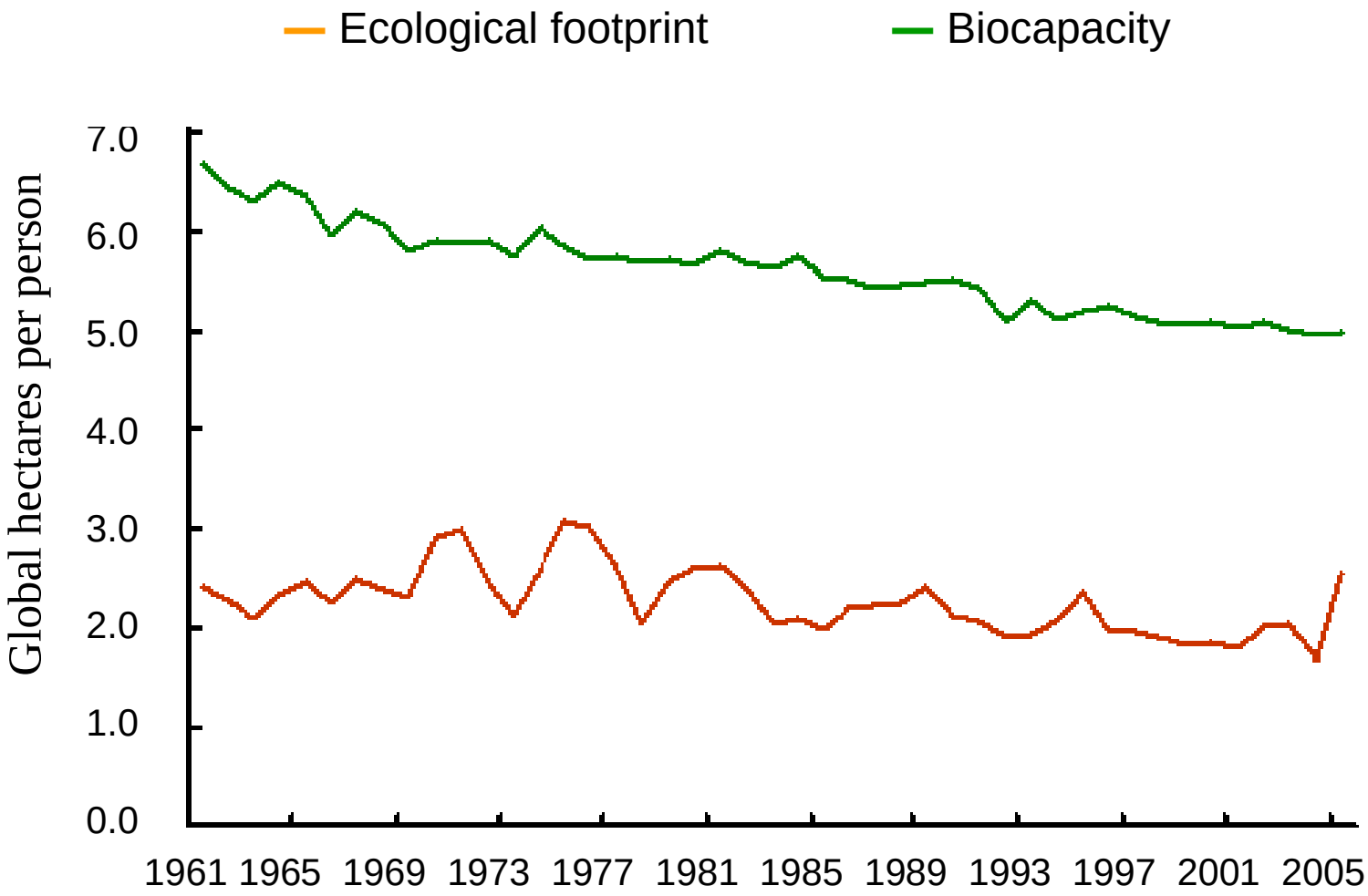








Ecological Footprint vs. Biocapacity of Sweden



Source: www.footprintnetwork.org/en/index.php/GFN/page/trends/U.S./

Ecological Footprints of Selected Countries, 2005

Biocapacity is less than Ecological Footprint	Country	Ecological Footprint (hectares/capita)	Biocapacity (hectares/capita)
	United States	9.42	5.02
	Japan	4.89	0.60
	Germany	4.23	1.94
	China	2.11	0.86
	Vietnam	1.26	0.80
	India	0.89	0.41

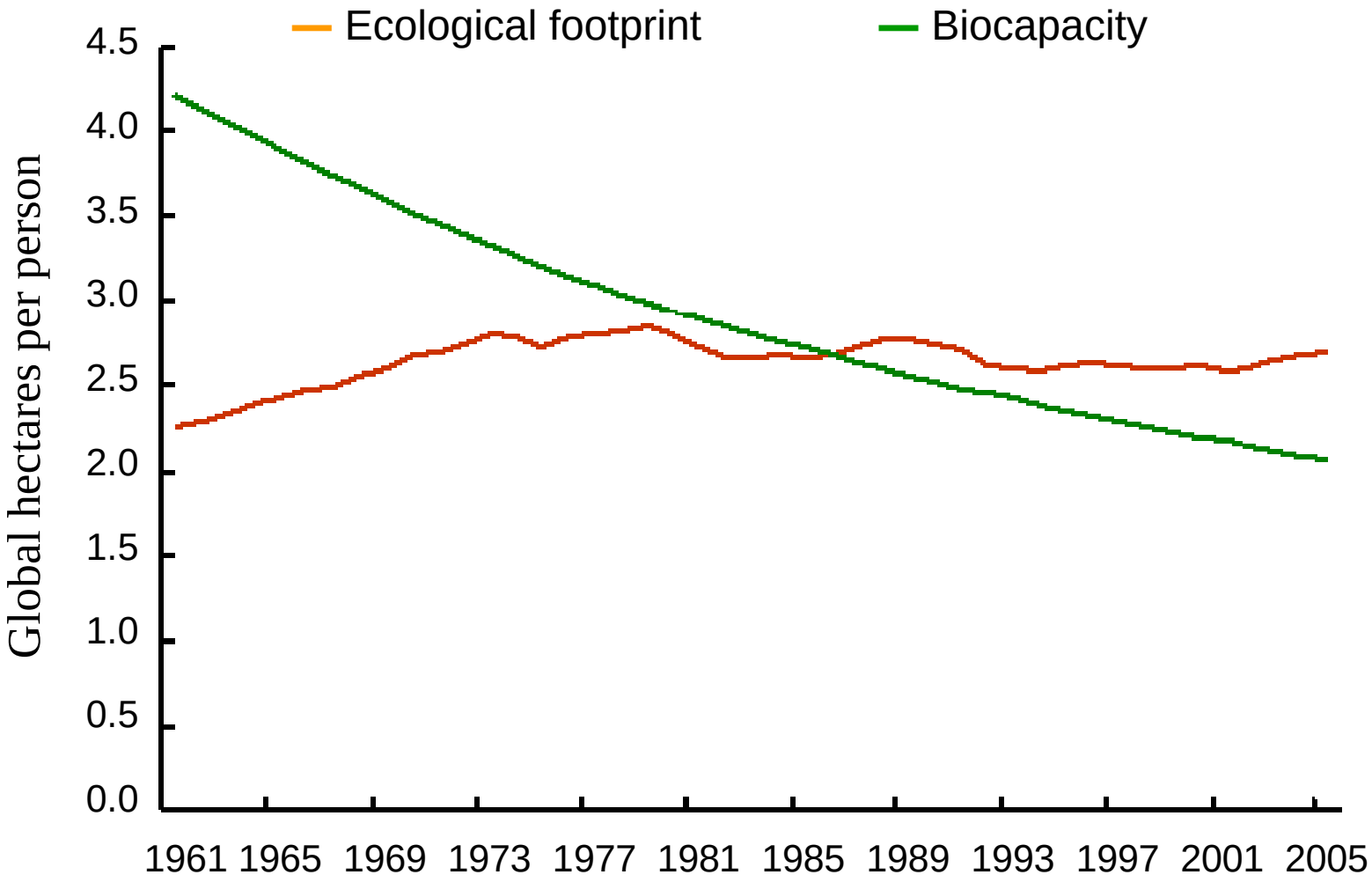
Source: Ewing et al. 2008. The Ecological Footprint Atlas 2008.

Ecological Footprints of Selected Countries, 2005

Biocapacity is greater than Ecological Footprint (resource supply nations)	Australia	7.81	15.42
	N. Zealand	7.70	56.64
	Canada	7.07	20.05
	Sweden	5.10	9.97
	Russian Federation	3.75	8.11
	Chile	3.00	4.14
	Venezuela	2.81	3.15
	Brazil	2.36	7.26
	South Africa	2.08	2.21
	Peru	1.57	4.02
	Gabon	1.30	24.97
	Indonesia	0.95	1.39
	Dem. Rep. of Congo	0.61	4.17

Source: Ewing et al. 2008. The Ecological Footprint Atlas 2008.

Global Ecological Footprint vs. Biocapacity



Ecological Footprints of the U.S. and E.U. Countries

Country		Ecological Footprint (ha/capita)	
United States	9.42	Italy	4.76
Denmark	8.04	Slovenia	4.46
Estonia	6.39	Portugal	4.44
Ireland	6.26	Netherlands	4.39
Greece	5.86	Germany	4.23
Spain	5.74	Poland	3.96
Czech Republic	5.36	Hungary	3.55
UK	5.33	Latvia	3.49
Finland	5.25	Slovakia	3.29
Belgium	5.13	Lithuania	3.20
Sweden	5.10	Romania	2.87
Austria	4.98	Bulgaria	2.71
France	4.93	Weighted E.U. Average	4.70

* Values are not provided for Cypress, Malta, or Luxembourg as these countries are not included within the Ecological Footprint Atlas.

**Countries highlighted in yellow are those often listed as offering a higher or comparable quality of life as the United States.

Source: Ewing et al. 2008. The Ecological Footprint Atlas 2008.

Reader's Digest recently (2008) published a green and livable index using the United Nations 2006 Human Development Indicators (HDI) data and the 2005 Environmental Sustainability Index (ESI). In this ranking the United States was 23rd, with 13 of the E.U. nations ranked higher.

In the most recent list of UNDP Human Development Indicators the U.S. is ranked 15th, with 10 European nations higher on the list.

It is interesting that the Ecological Footprint of the U.S. is substantially higher than all 27 countries of the E.U., and all E.U. countries often listed as offering a higher or comparable quality of life than the U.S.

The primary explanation for the very large Ecological Footprint of the United States relative to Europe is higher energy and fossil fuel consumption, and the related function of biological resources in carbon cycling.

Per Capita Energy Consumption in the U.S. and the E.U. Countries

Country		Per Capita Energy Consumption (kg of oil equivalent per person)	
United States	7885.9	Slovakia	3502.8
Finland	6555.0	Cypress	3367.0
Belgium	5891.7	Spain	3339.6
Sweden	5780.3	Italy	3169.1
Netherlands	5048.8	Greece	2794.0
Czech Republic	4418.6	Hungary	2757.4
France	4396.8	Bulgaria	2592.0
Germany	4187.0	Portugal	2574.1
Austria	4134.7	Lithuania	2515.0
UK	3894.6	Poland	2429.0
Estonia	3786.0	Malta	2349.0
Ireland	3656.0	Latvia	2050.0
Slovenia	3655.0	Romania	1772.0
Denmark	3634.3	Weighted E.U. Average	3773.4

Source: Ewing et al. 2008. The Ecological Footprint Atlas 2008.

In addition, wood is more commonly used in home construction in the U.S, and per capita living space is far higher than in even other affluent countries, resulting in not only greater quantities of raw materials used in construction, but also for furnishings, cleaning, maintenance, and heating/cooling.

Moreover, U.S. per capita consumption of paper and paperboard is more than double that of the E.U. overall, and higher than any individual E.U. country except Finland.

An added contributor to the large U.S. Ecological Footprint is high meat and grain consumption relative to Europe.

In 2007, per capita consumption of meat (beef, pork, poultry, and mutton/goat meat) was more than 17 percent higher in the U.S. than in the E.U., and 11 percent higher than in the 15 nations of western Europe; per capita consumption of beef was 70 percent higher in the U.S.

Largely attributable to high beef consumption, U.S. per capita consumption of grains was about double that of the E.U. in 2007.

European diets, in contrast to the U.S., are more heavily oriented toward pork rather than beef, and toward fish. E.U. per capita consumption of fish was nearly four times that of the U.S. in 2007.

An interesting question is *why* U.S. energy consumption is so high relative to other countries. To understand high energy consumption is to understand why the U.S. Ecological Footprint is so large, and perhaps how it might be reduced.

Why are U.S. homes in comparison to those of the E.U.:

- so much larger?
- so seldom designed so that zone heating could be effectively employed?
- so much more dispersed?
- so much less likely to be served by rapid transit?

Why are U.S. automobiles:

- so large and so fuel inefficient in comparison on average to those in the EU.?

Why do U.S. residents travel, on average, 2.5 times the number of auto miles annually per capita and 3 times the number of air miles, but only one-half the distance per capita by rail and bus transit systems?

In a word, the answer to all of these questions is energy, and more specifically cheap energy.

A clear result of the long history of seldom considering energy implications of purchasing decisions is our large Ecological Footprint.

Another is our extremely high energy consumption even in comparison to other affluent nations.

“And I will tell you now, if you want to keep your guns, your property, your children and your God . . . if you love liberty . . . Then Sustainable Development is your enemy!"

Tom DeWeese, President
American Policy Center
August 6, 2004

The Non-Renewables Footprint

Per Capita Consumption of Key Raw Materials - U.S. and the E.U. vs. World, 2007

	Average Per Capita Consumption (kg)			Consumption Compared to World Average	
Raw Material	**U.S.**	**E.U.-27**	**World**	**U.S.**	**E.U.-27**
Wood*	2.01	1.07	0.54	3.72x	1.98x
Steel	378	395	202	1.87x	1.96x
Aluminum	19.1	15.1	5.8	3.29x	2.60x
Cement	387	624	418	0.93x	1.49x
Plastics	175	106	39	4.49x	2.72x

Source: Data for wood (US) from Howard, USFS (2007) and wood (EU) from Ekström (2008); for cement, steel, and aluminum from the U.S. Geological Survey (2009) and the World Bureau of Metal Statistics (2008); and for plastics from the American Chemistry Council Plastics Industry Producers Group (2009), and from the Association of Plastics Manufacturers in Europe (2009).

* Wood quantities in m^3. Wood consumption data for U.S. 2005, for EU 2007.

Implications for Wood Science

Implications for Wood Science

- **There is a continuing need to find ways to produce more from less, to increase product durability, to increase recycling/ reuse options at the end of product life.**

Implications for Wood Science

- **Active attention to the Ecological Footprint as well as ongoing research are needed to ensure appropriate policy relative to wood use to prepare for the possibility that the Ecological Footprint concept emerge as a significant environmental policy tool.**

Questions?

For additional information on this and related topics visit www.dovetailinc.org