Economics, Environment, and the Lake Champlain Basin

Jon D. Erickson

Gund Institute for Ecological Economics
Rubenstein School of Environment & Natural Resources
University of Vermont

www.uvm.edu/giee

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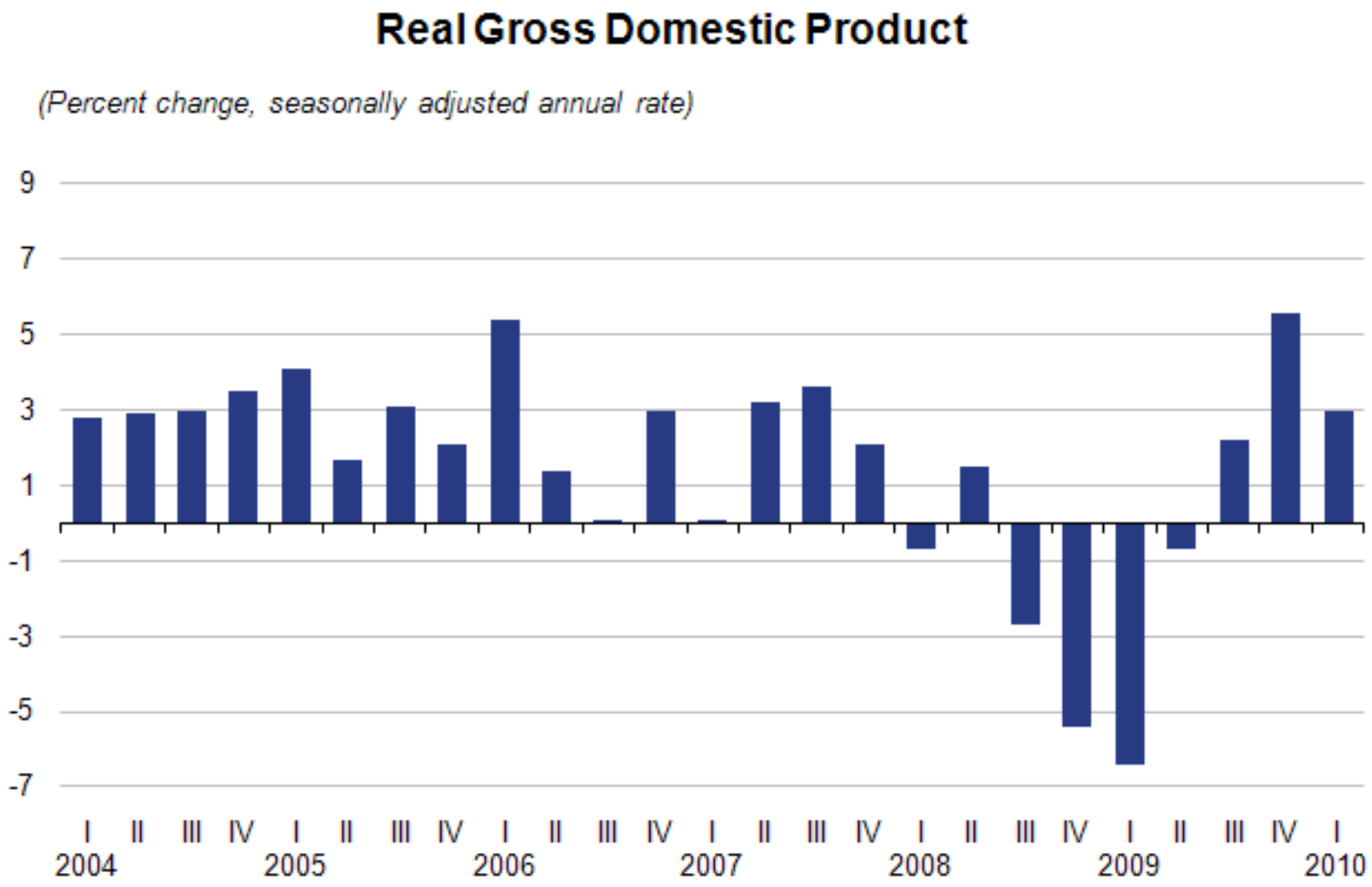
- Economics
  - Economic Growth, Economic Development
- Environment
  - Natural Capital Depreciation, Ecosystem Services
- Lake Champlain Basin
  - Toward a Millennium Ecosystem Assessment



Source: U.S. Bureau of Economic Analysis, http://www.bea.gov/briefrm/gdp.htm

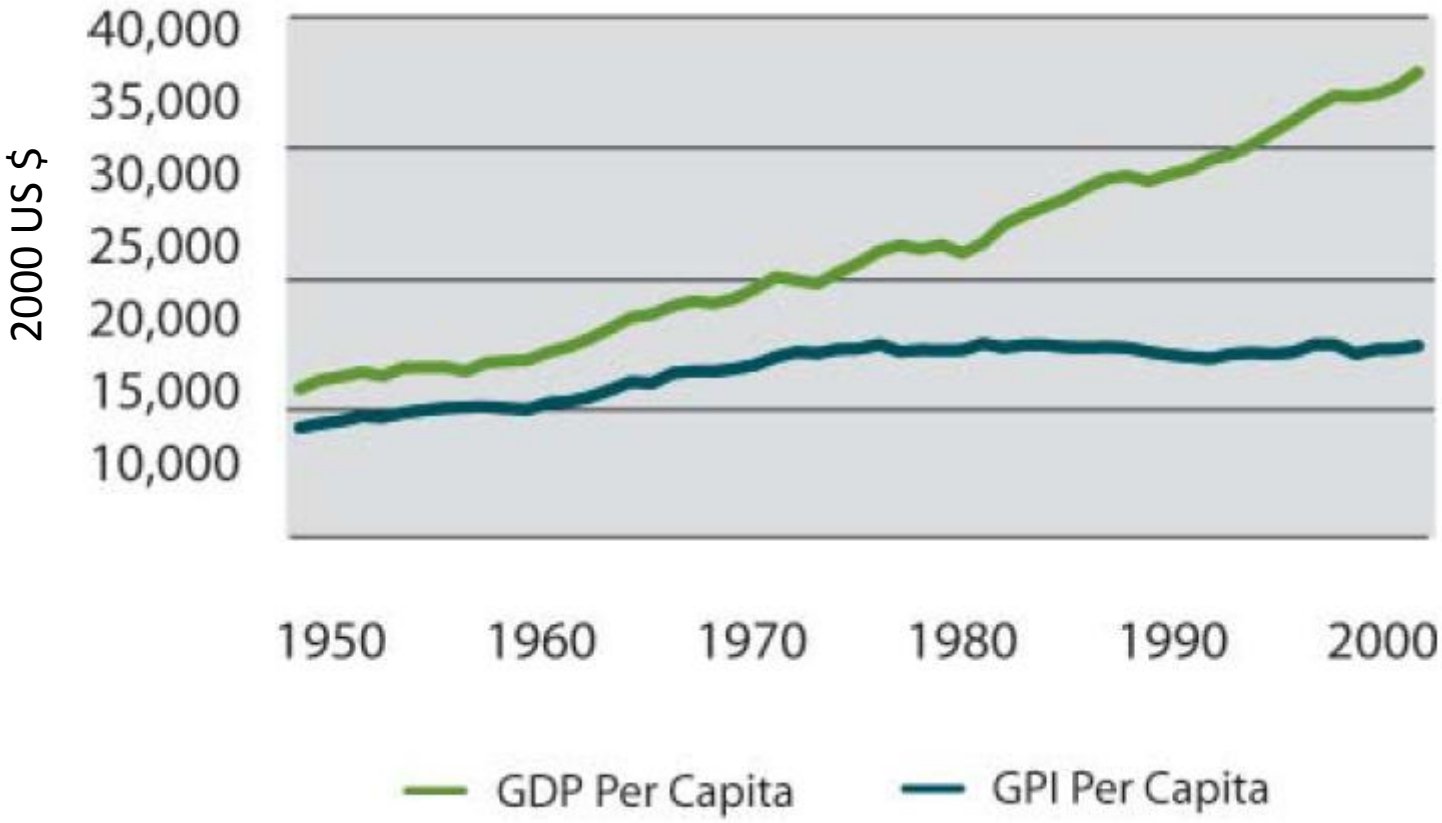
Growth or Development?

"Economically, High-GDP Man is superior to Low-GDP Man, a bigger boon to his country. But is his life any better?"

~ Jon Gertner, "The Rise and Fall of GDP," *New York Times Magazine*, May 16, 2010.

What if the crisis of 2008 represents something much more fundamental than a deep recession? What if it's telling us that the whole growth model we created over the last 50 years is simply unsustainable economically and ecologically and that 2008 was when we hit the wall — when Mother Nature and the market both said: "No more".

~ Thomas Friedman, "The Inflection is Near," *New York Times*, March 7, 2009



Source: Talbreth, J., Cobb, C. and N. Slattery, *The Genuine Progress Indicator 2006*, Redefining Progress, Oakland, CA, 2007.

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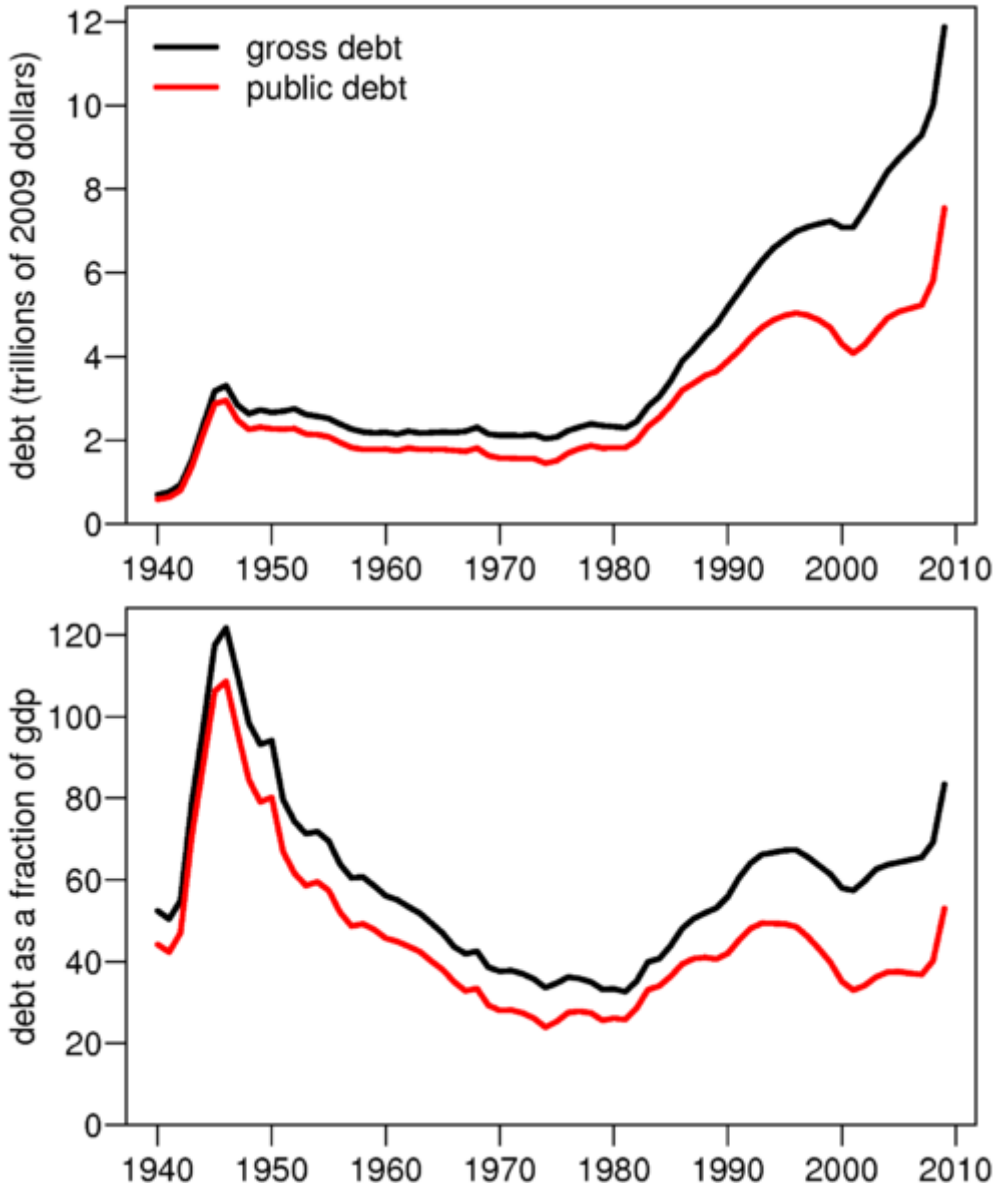


Source: Office of Budget and Management, U.S. Budget, Historic Tables

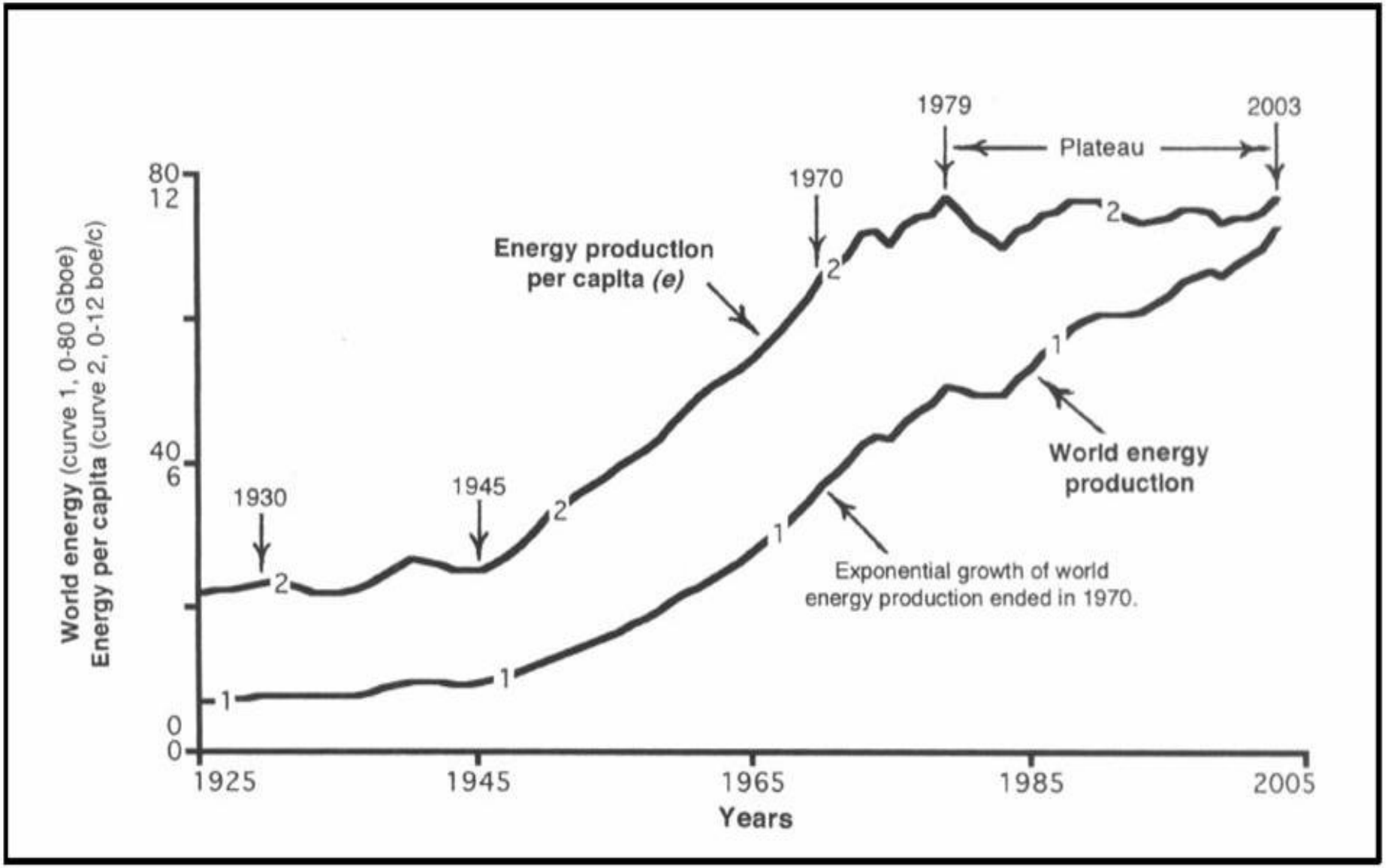
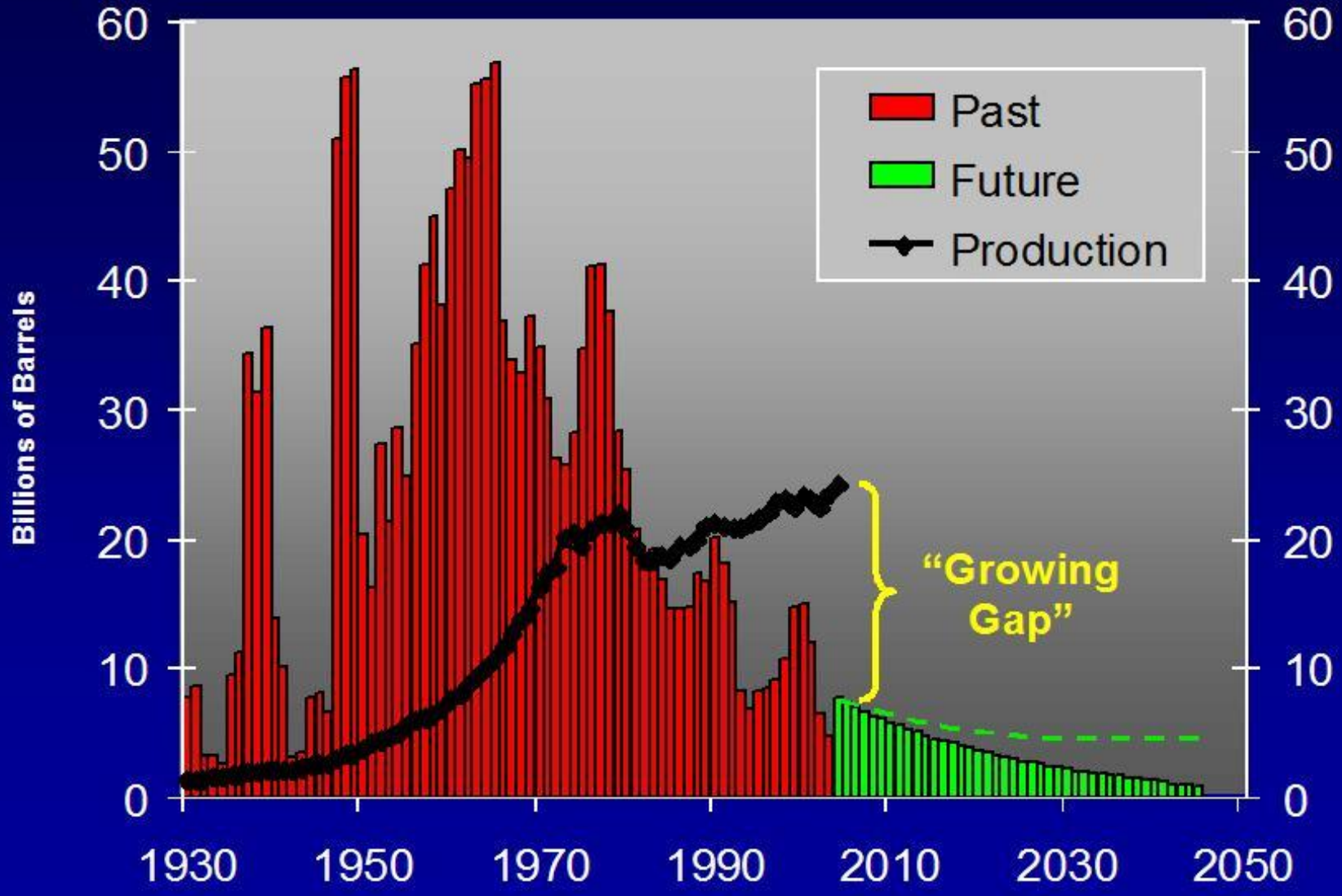


Figure 2. World energy production and energy production per capita. Data sources: 1) for energy – Romer (1985) for 1850-1964 and British Petroleum (2004) for 1965-2003; 2) for population – UN (2004) for 1850-1949 and USCB (2004) for 1950-2003.

Trends in Discoveries and Production



Source: Assoc. for the Study of Peak Oil and Gas. Past discoveries from ExxonMobil (2002).

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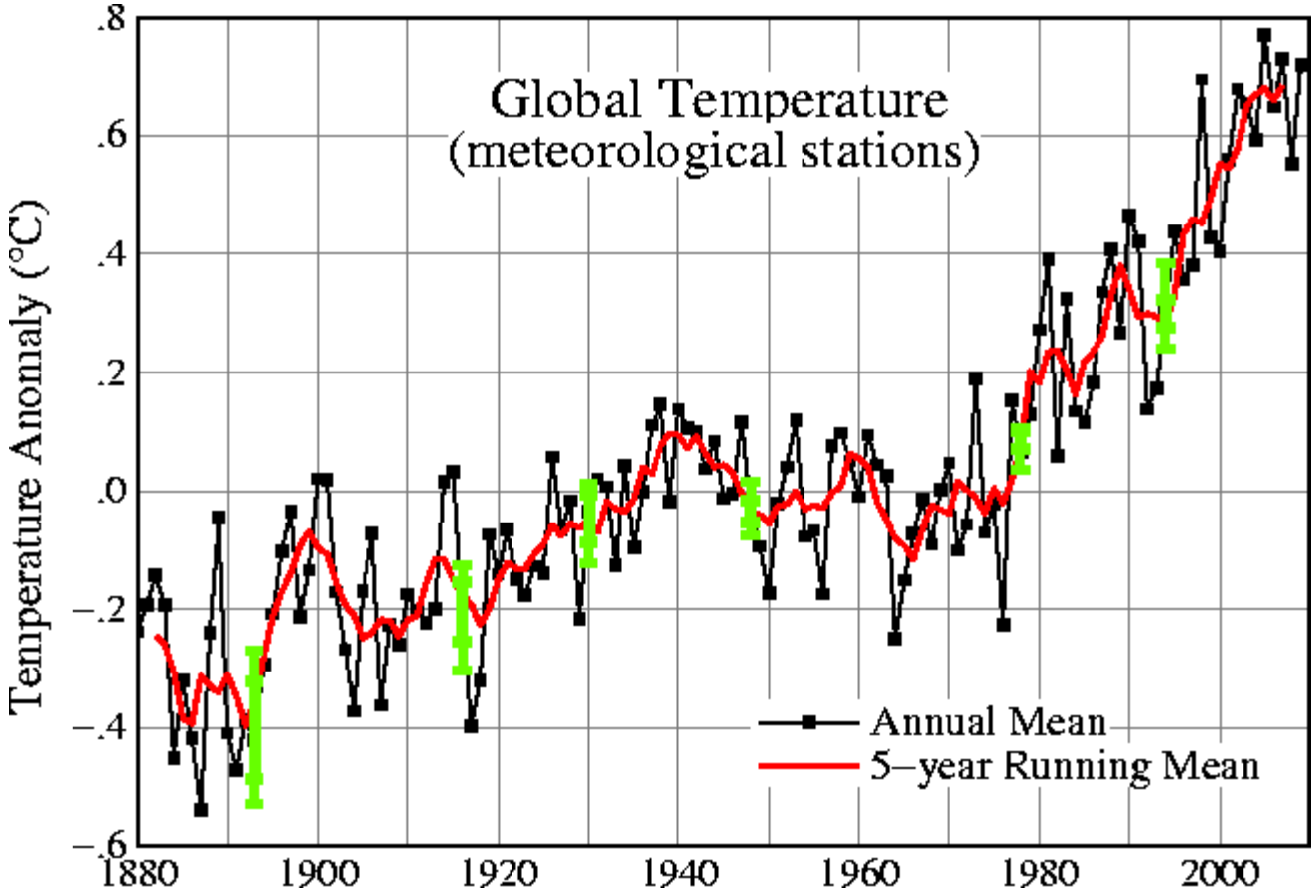
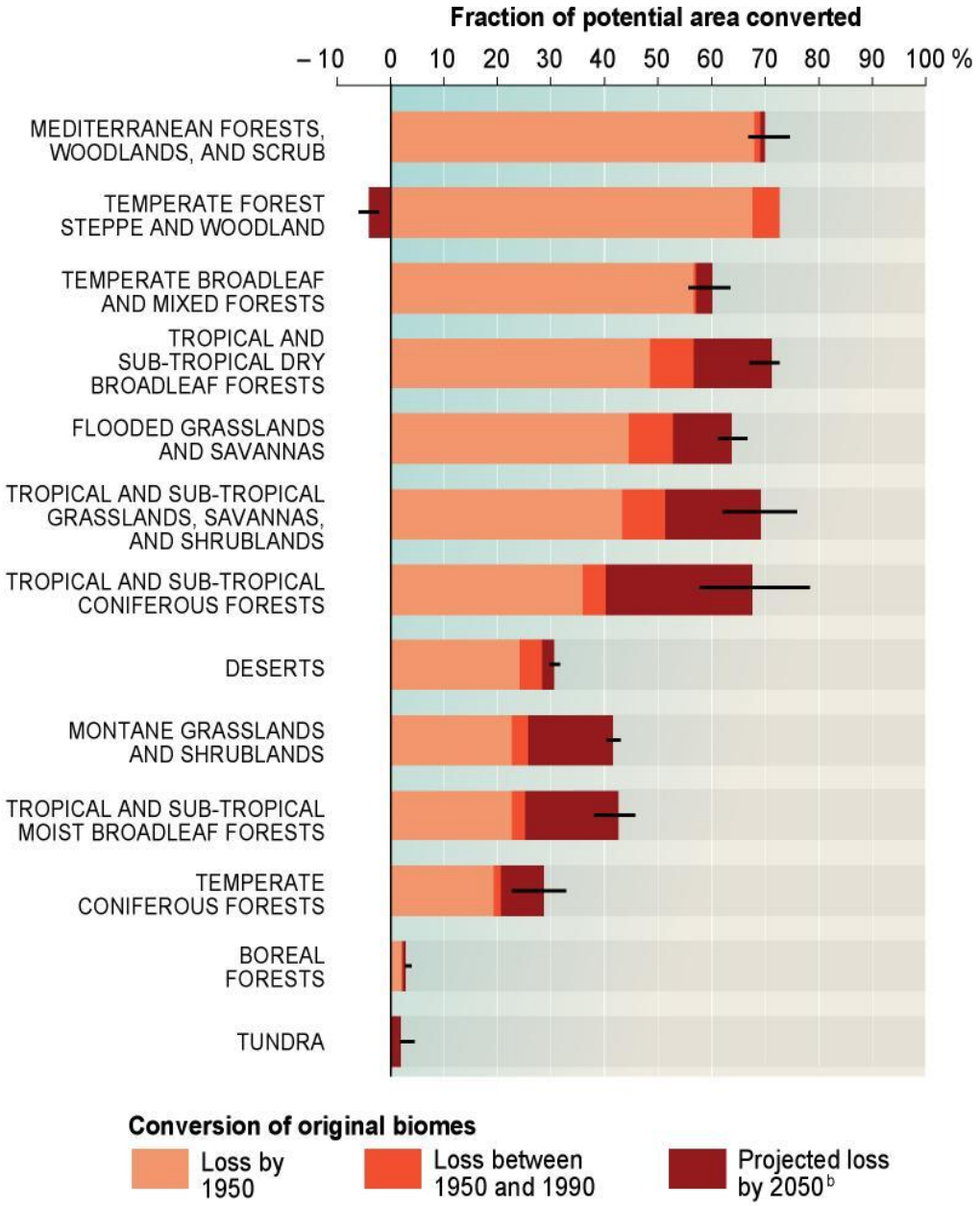
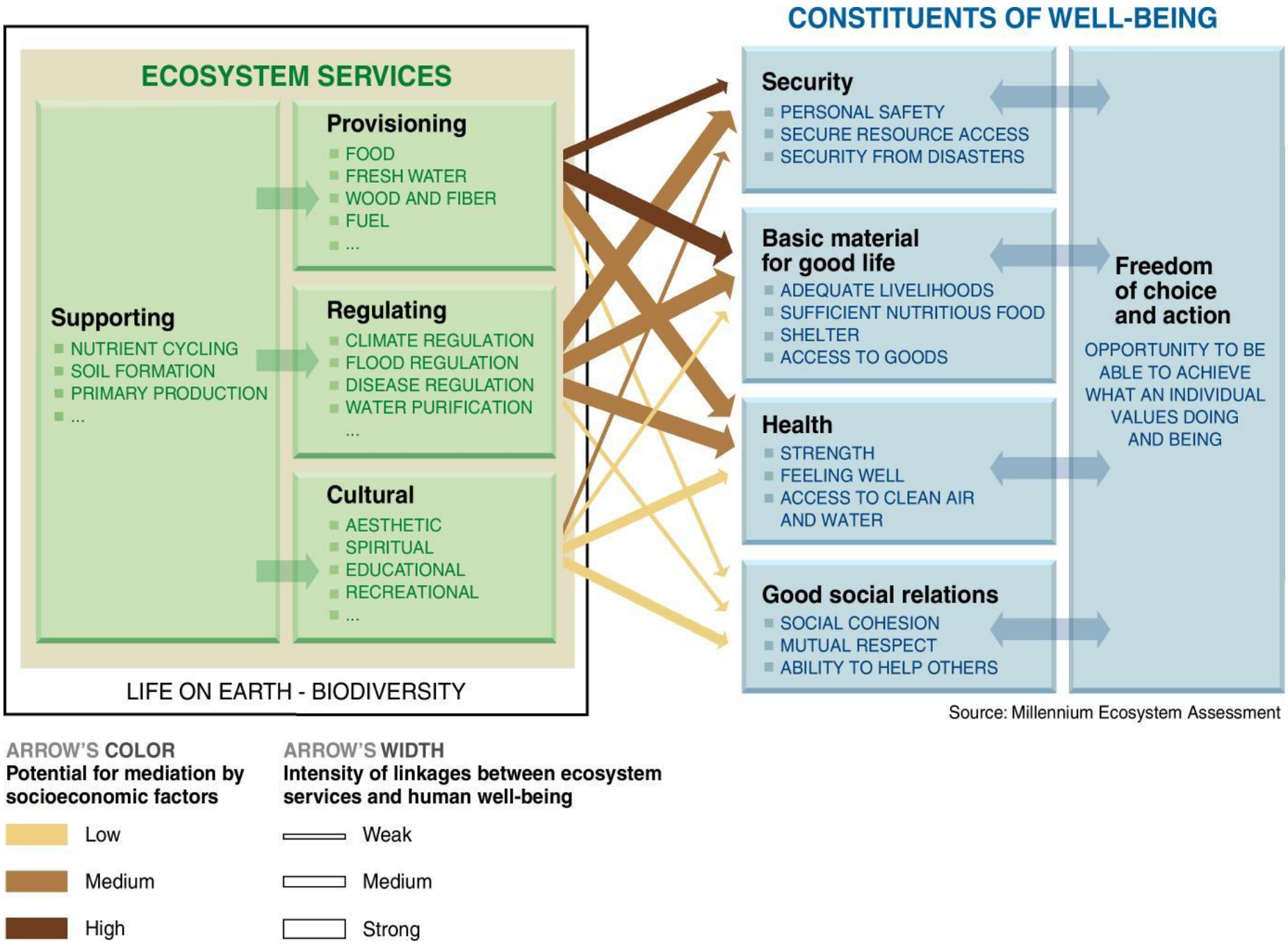


Source: Surface Temperature Analysis, Goddard Institute for Space Studies, New York , NY

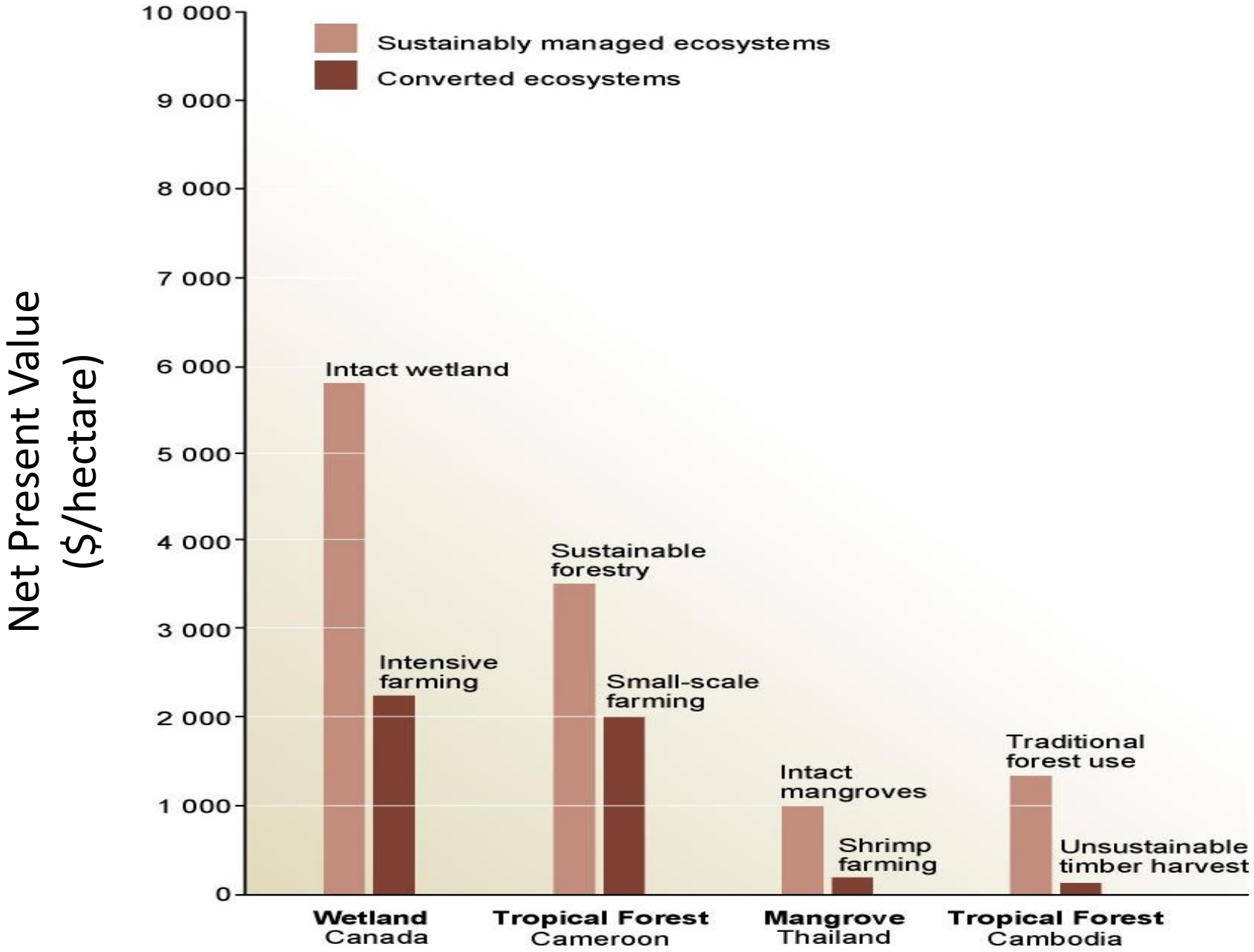
Millennium Ecosystem Assessment

- 5-10% of the area of five biomes was converted between 1950 and 1990
- More than two thirds of the area of two biomes and more than half of the area of four others had been converted by 1990





Source: Millennium Ecosystem Assessment



Source: Millennium Ecosystem Assessment

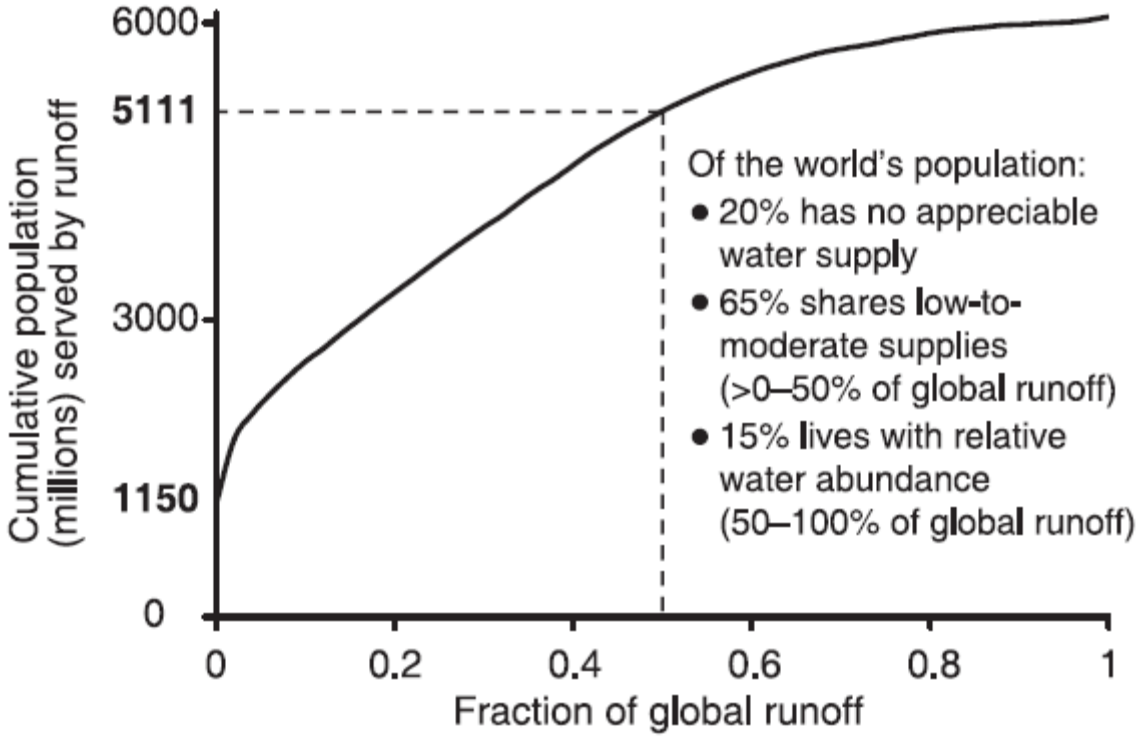


Figure 7.2. Cumulative Distribution of Population with Respect to Freshwater Services, 1995–2000. Fraction of runoff is ranked from low to high based on mean annual conditions. This distribution is also affected by seasonal variations in available runoff.

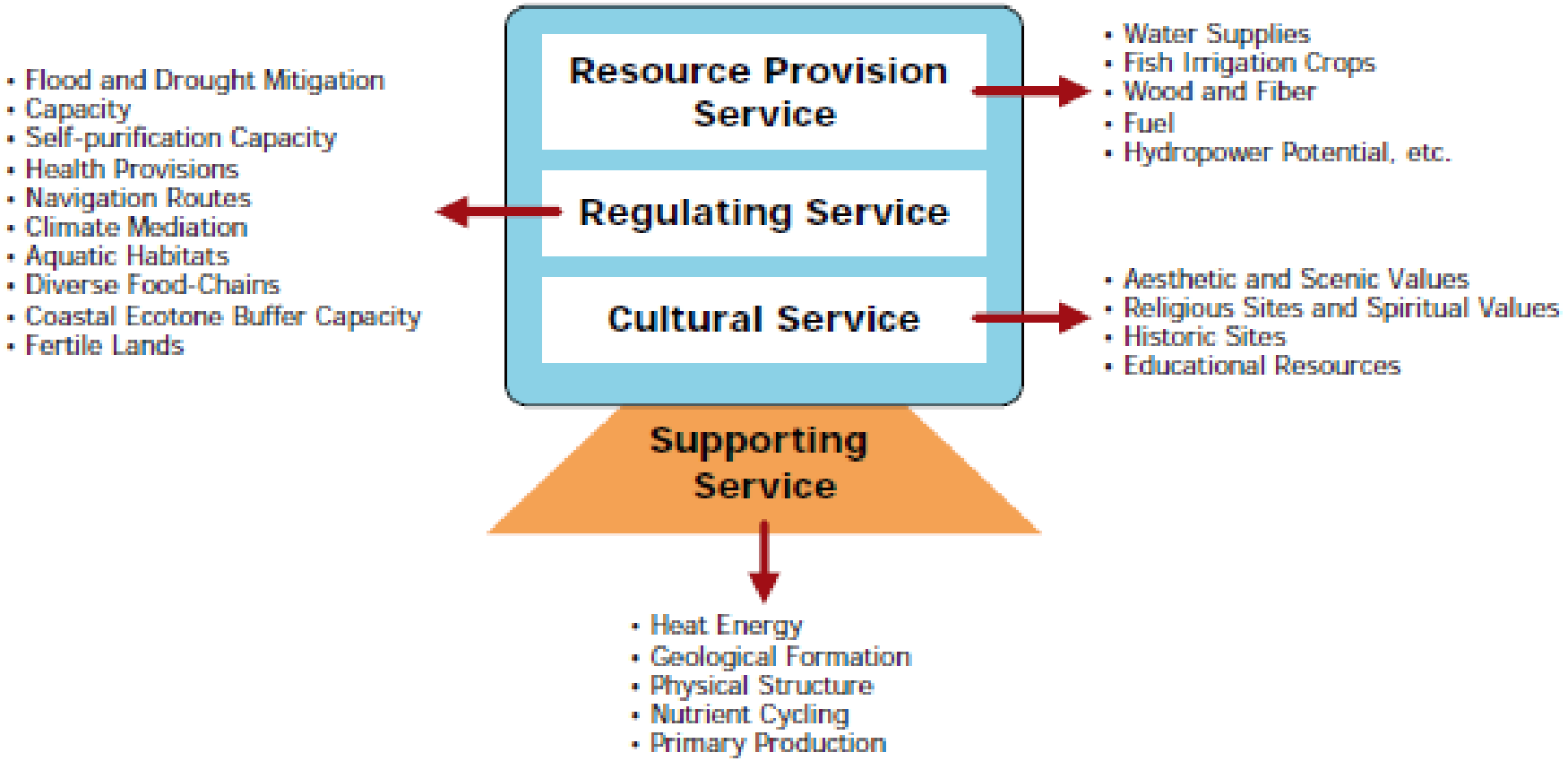
Source: Millennium Ecosystem Assessment, Chapter 7: Freshwater
http://www.millenniumassessment.org/documents/document.276.aspx.pdf

Table 7.7. Continental-scale Assessment of Major Water Quality Issues. The purpose of this table is to present a general overview. It does not capture fully large sub-regional differences that are known to occur. (Updated from Meybeck et al. 1991)

Continental Domain	Summary of Key Findings
Americas	In the United States and Canada, the major pollution problem is eutrophication from agricultural runoff and acidification from atmospheric deposition. Major problems also include persistent toxic water pollution from point and non-point sources. In South and Central America the major contaminant problems, except in the Amazon and Orinoco basins, where ecosystems are more intact and high flows foster dilution, are pathogens and organic matter, as well as industrial and mining discharges of heavy metals and pesticide and nutrient runoff.

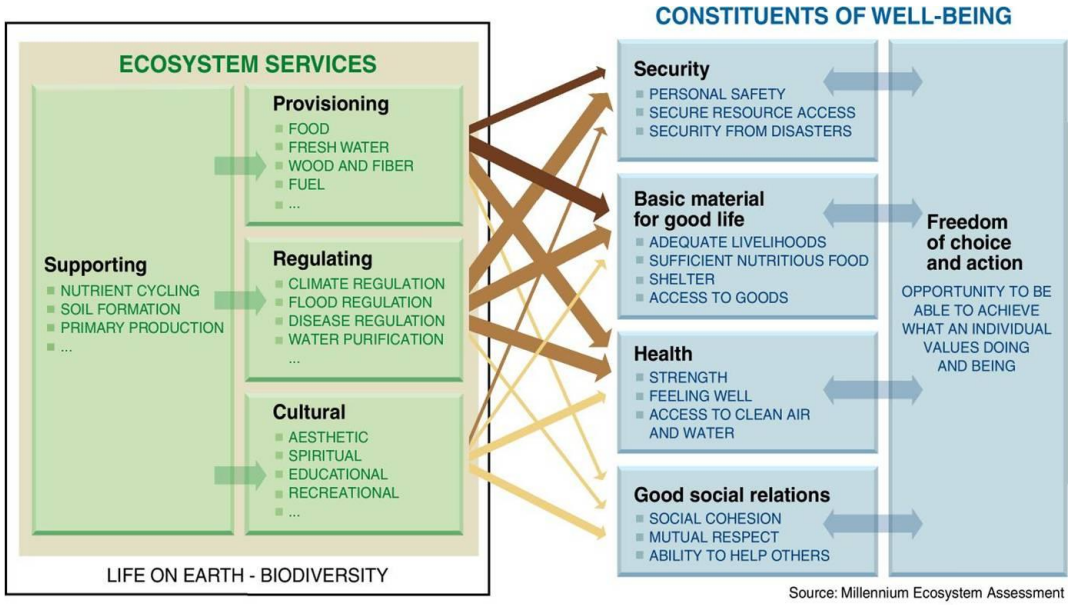
Source: Millennium Ecosystem Assessment, Chapter 7: Freshwater
http://www.millenniumassessment.org/documents/document.276.aspx.pdf

Ecosystem Services Provided by Lakes and Reservoirs

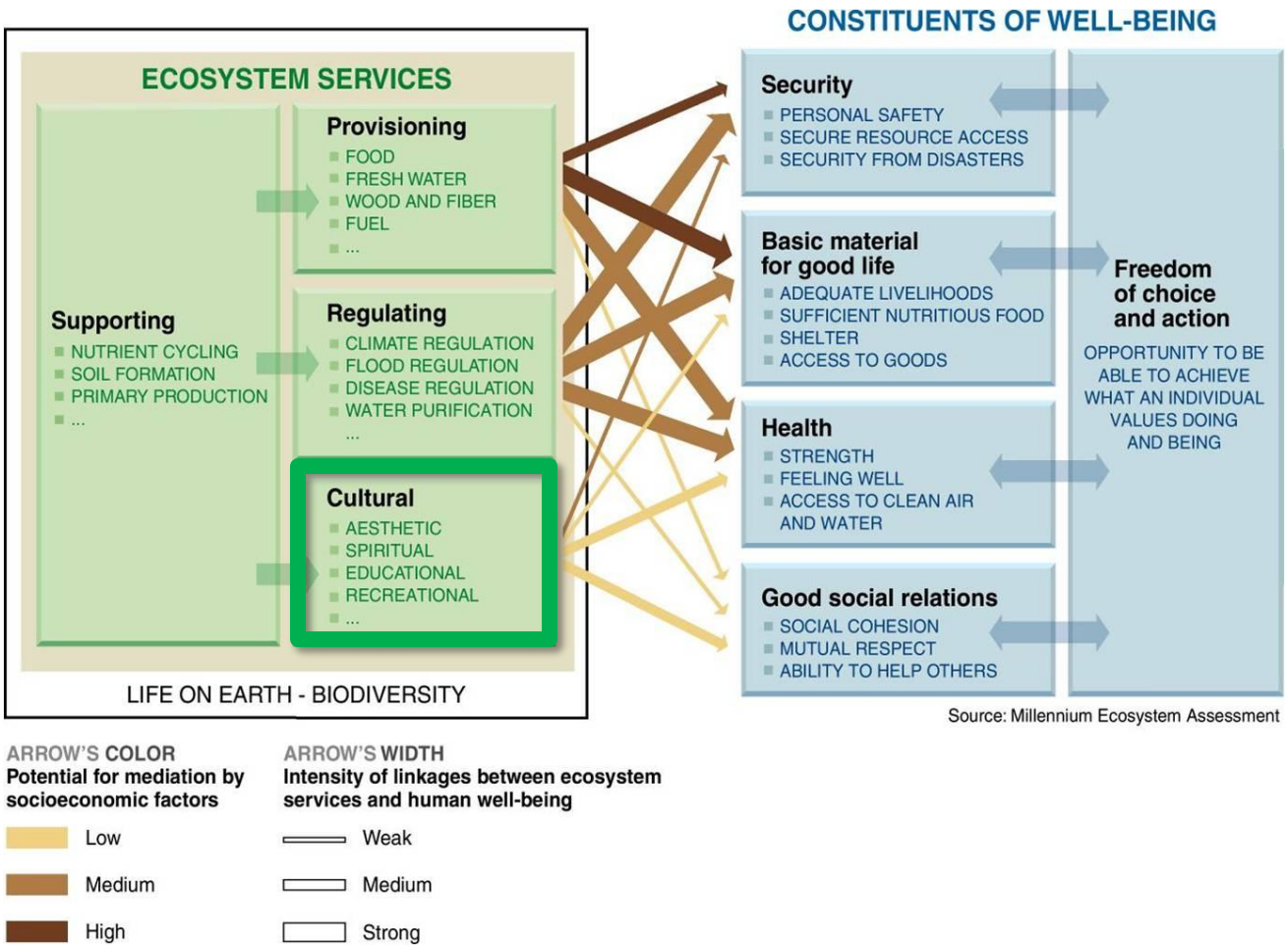


Source: ILEC. 2007. Integrated Lake Basin Management: An Introduction. International Lake Environment Committee Foundation: Kusatsu, Japan.

Lake Champlain Ecosystem Assessment

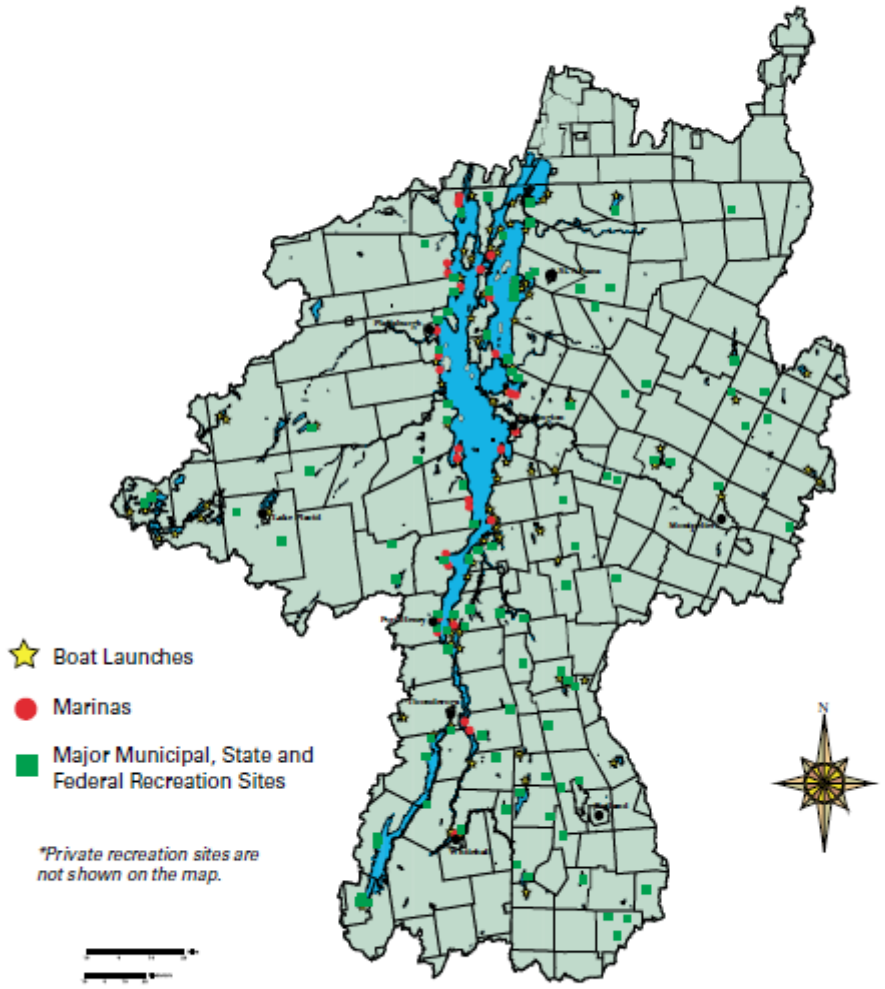


Cultural Services



Source: Millennium Ecosystem Assessment

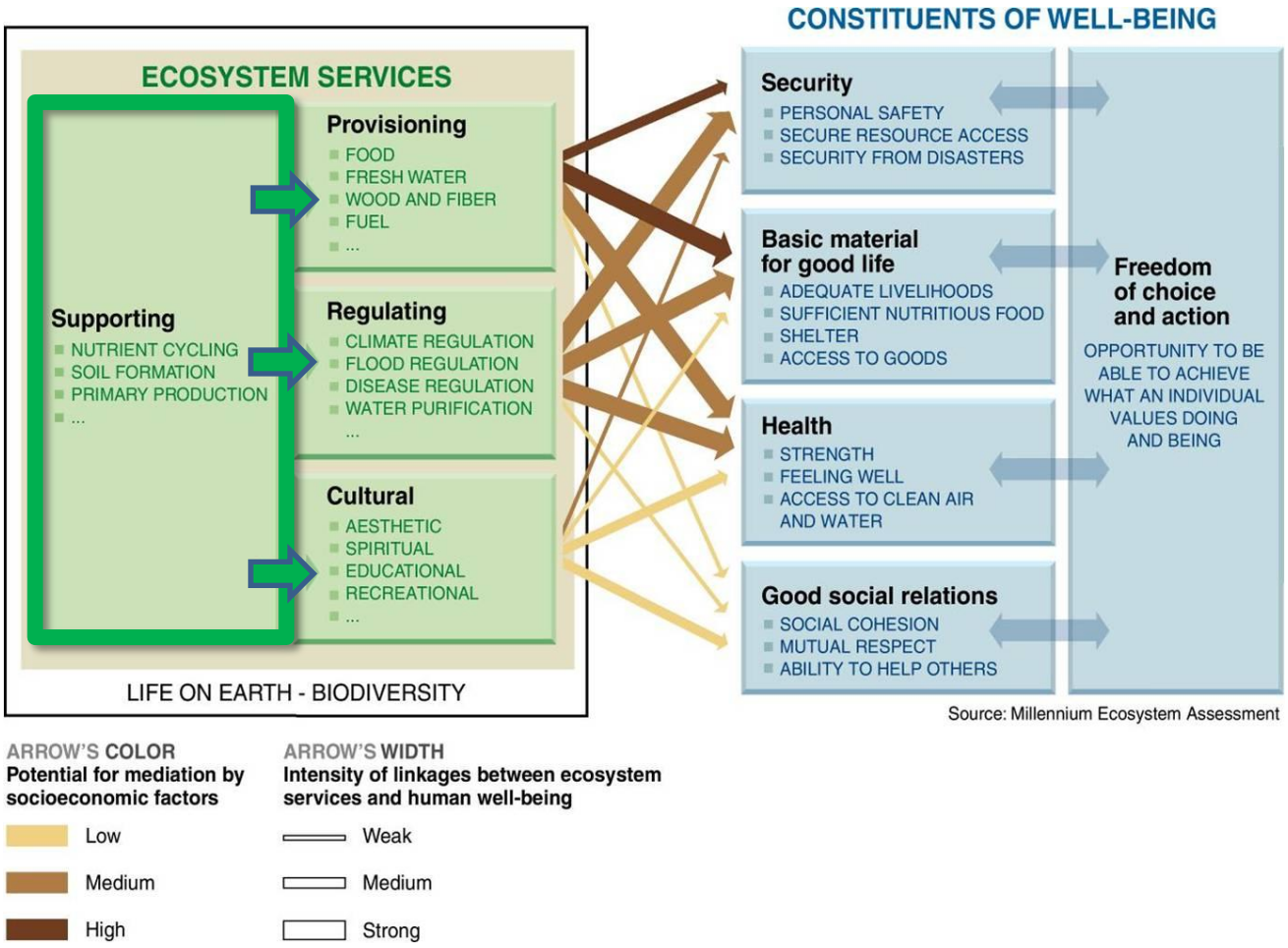
Recreation Sites and Lake Champlain Access



Data for near shore sites from:
Lake Champlain Outdoor Recreation Facilities Inventory, 1995.

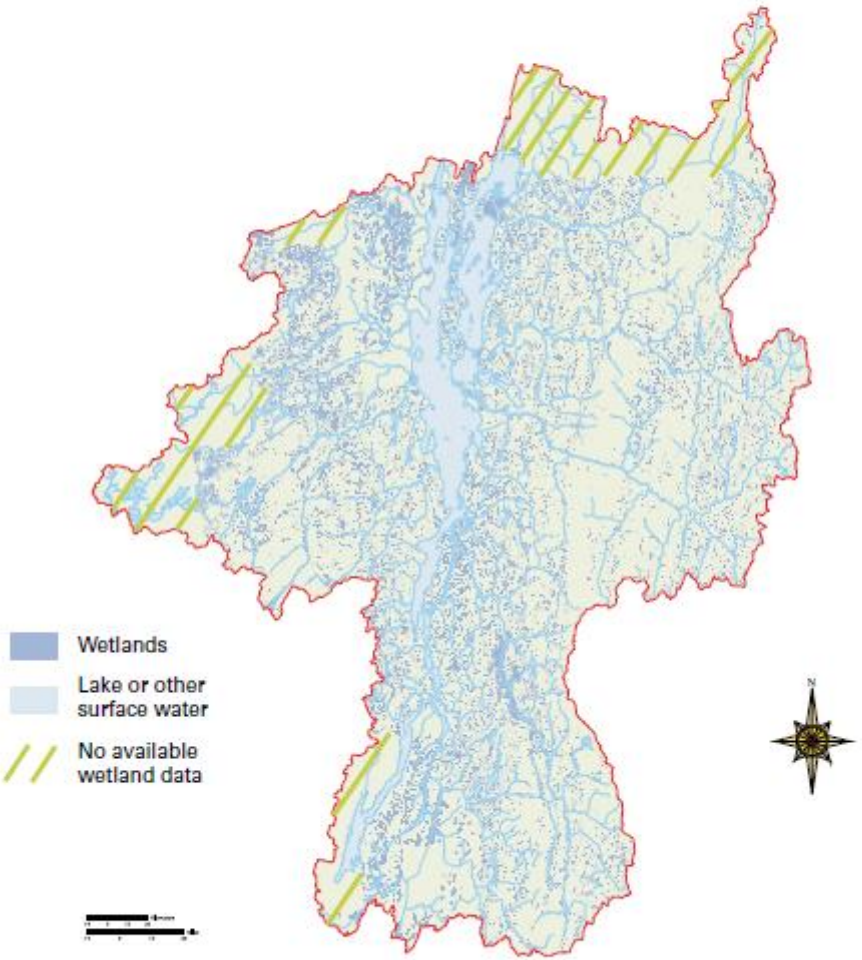
Map by Northern Cartographic

Supporting Services



Source: Millennium Ecosystem Assessment

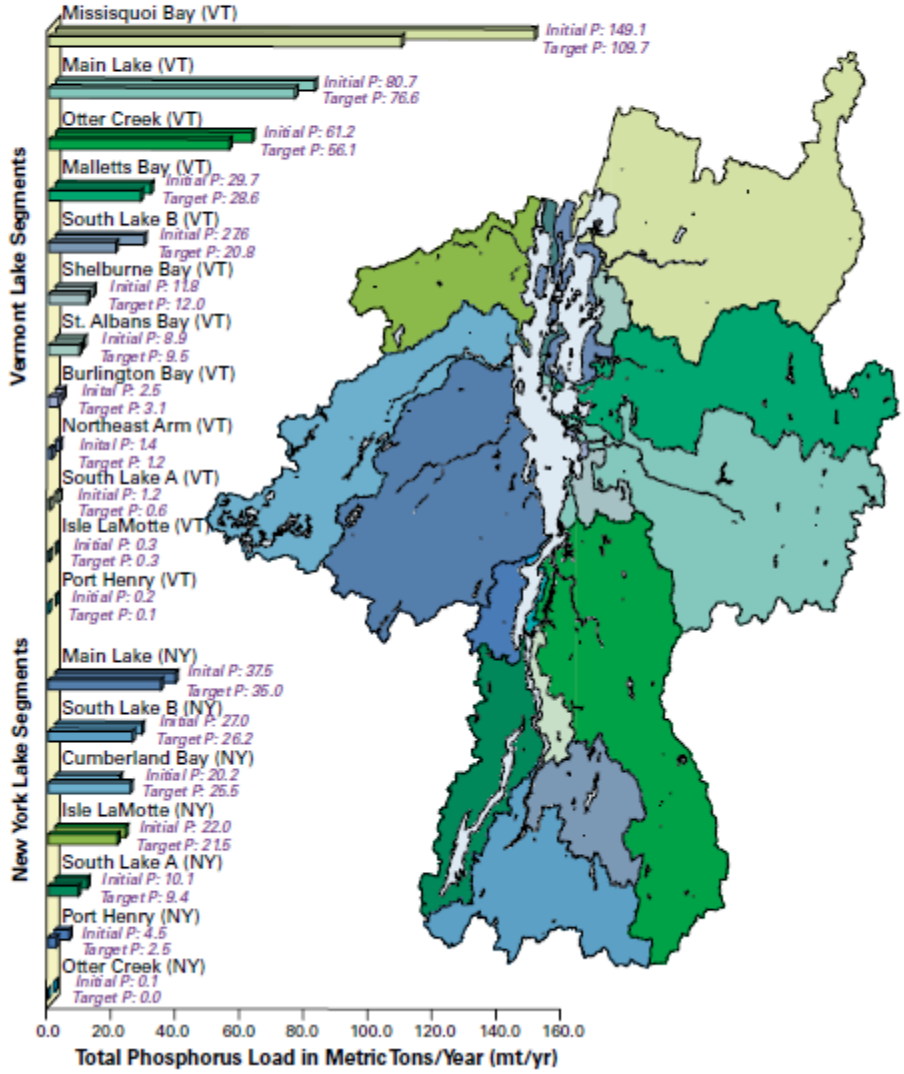
Wetlands in the Basin



Map by Northern Cartographic

Phosphorus Loads

Initial (1995) and Target Phosphorus Loads by Lake Segment Showing Adjacent Watersheds in Metric Tons/Year (mt/yr)



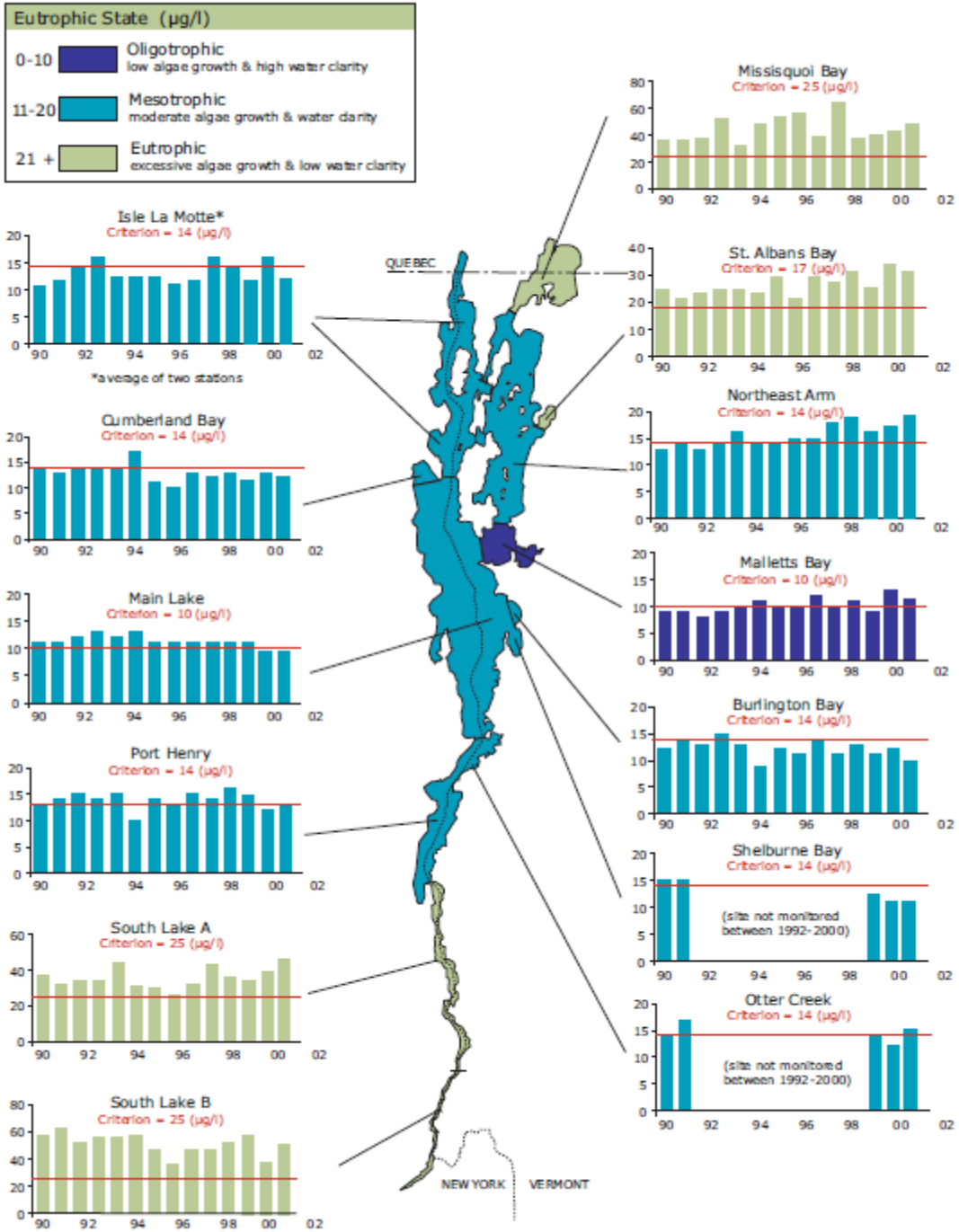
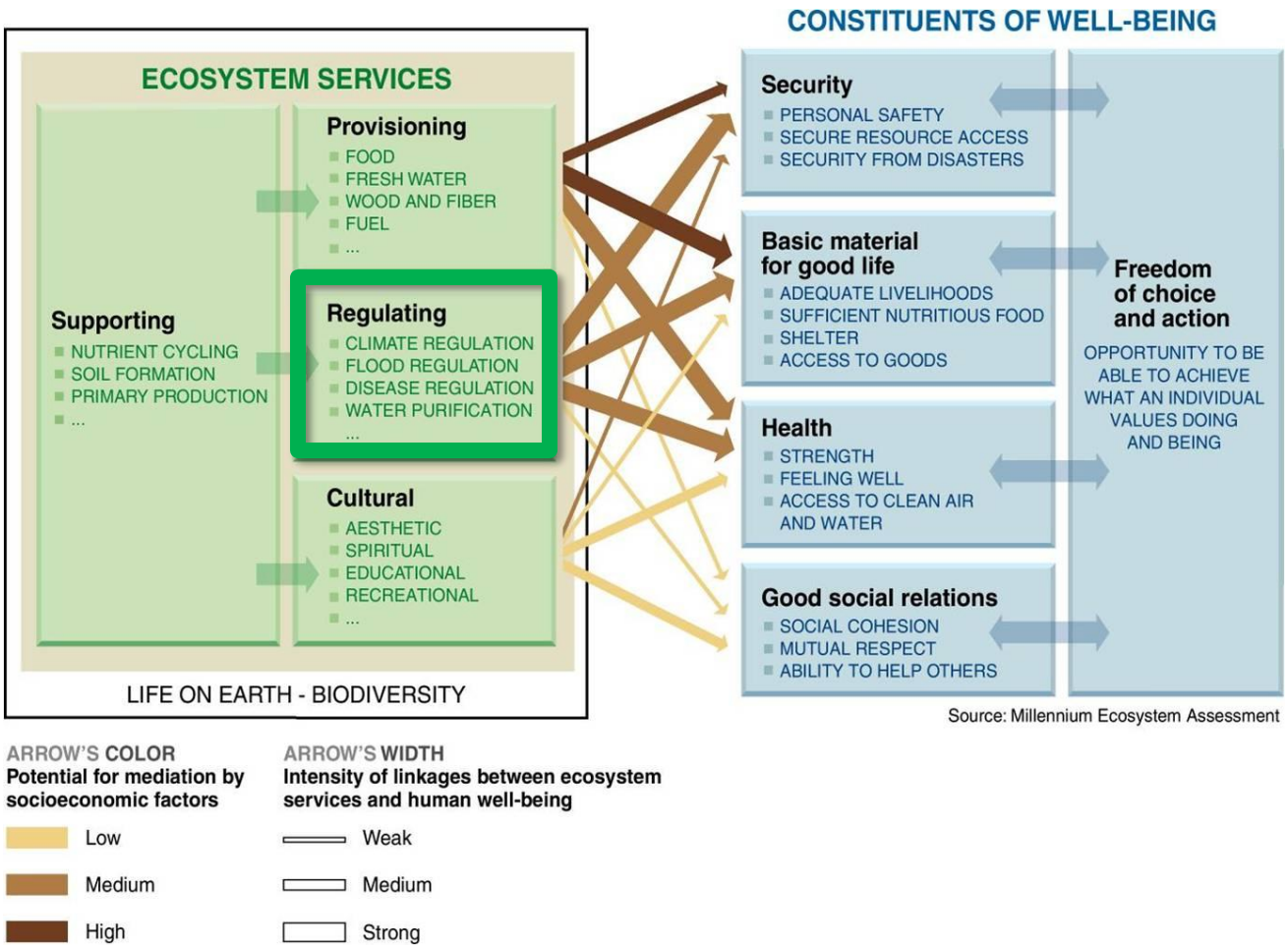
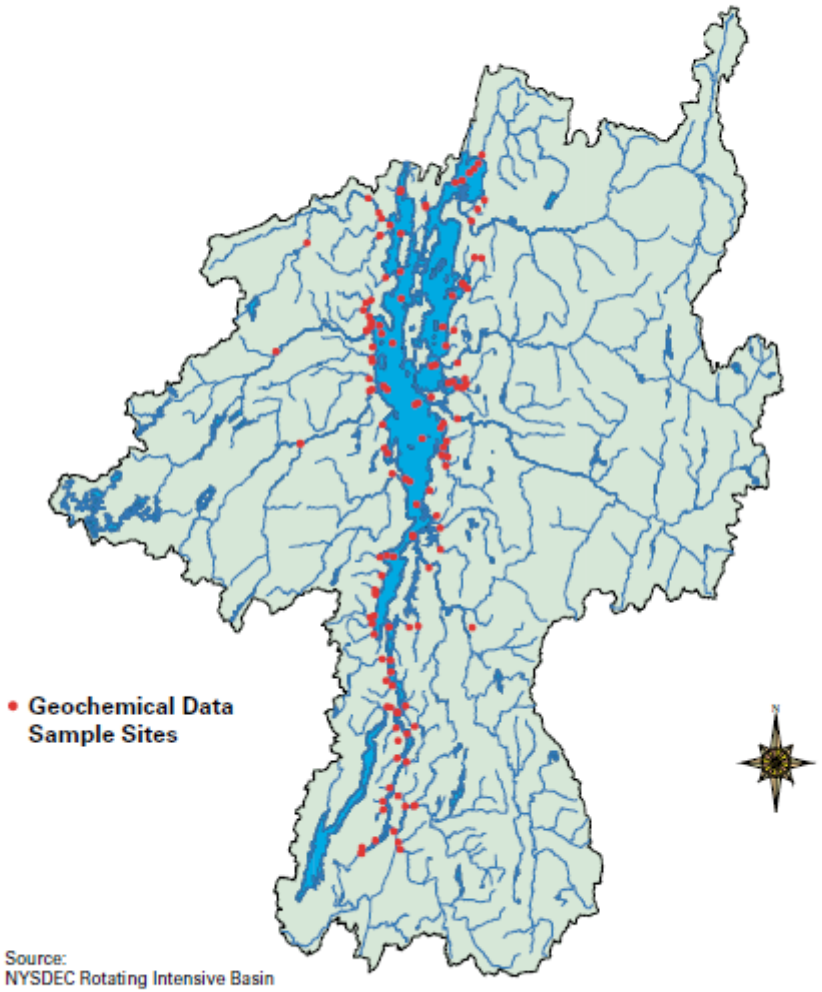


Figure 5. Phosphorus Levels in Segments of Lake Champlain, 1990-2003 (Source: Adapted from figure available at http://www.lcbp.org).

Regulating Services



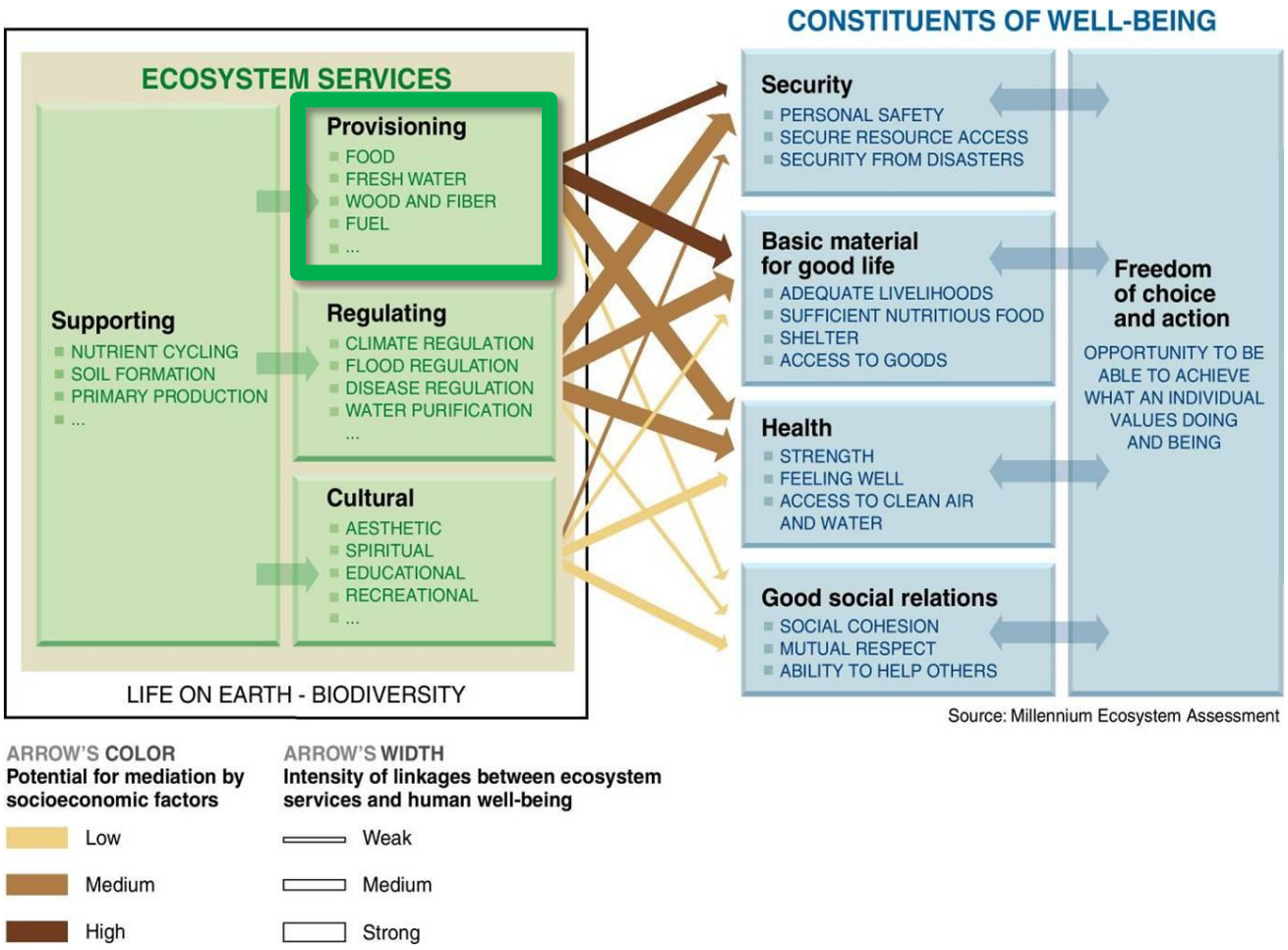
Geochemical Sediment Sampling Sites

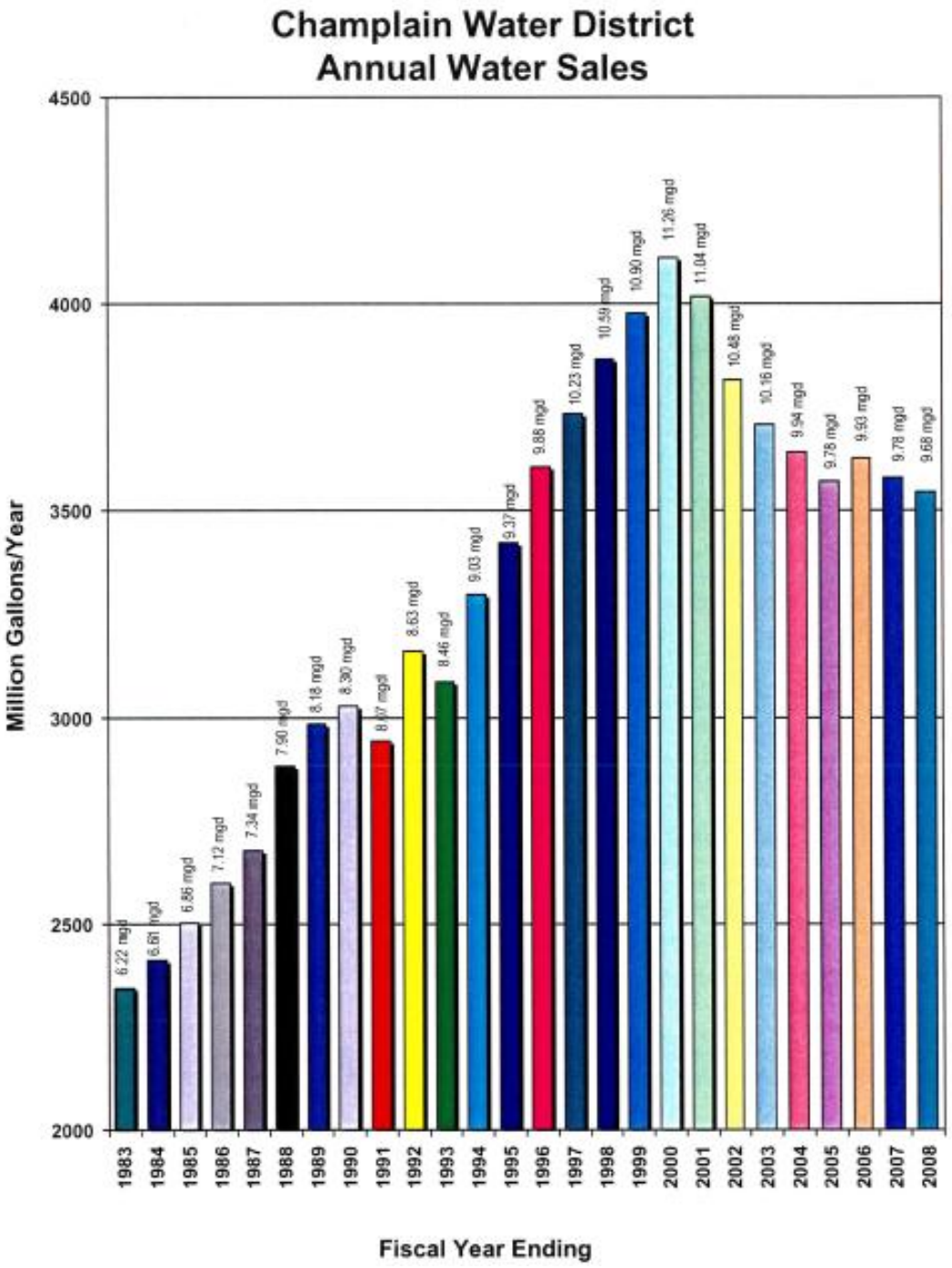


Source:
NYSDEC Rotating Intensive Basin
Survey Sediment Toxics Assessment
Program USGS Open File Report 94-472

Map by Northern Cartographic

Provisioning Services




Champlain Water District
Annual Water Sales
Million Gallons/Year
4500
4000
3500
3000
2500
2000
6.22 mgd
6.61 mgd
6.86 mgd
7.12 mgd
7.34 mgd
7.90 mgd
8.18 mgd
8.30 mgd
8.07 mgd
8.63 mgd
8.46 mgd
9.03 mgd
9.37 mgd
9.88 mgd
10.23 mgd
10.59 mgd
10.90 mgd
11.26 mgd
11.04 mgd
10.48 mgd
10.16 mgd
9.94 mgd
9.78 mgd
9.93 mgd
9.78 mgd
9.68 mgd
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Fiscal Year Ending