Earth, Inc.

Shareholders Report

Beyond the Confrontational Debate about the Environment

Gund Institute
for Ecological Economics

"Human alteration of Earth is substantial and growing. Between one-third and one-half of the land surface has been transformed by human action; the carbon dioxide concentration in the atmosphere has increased by nearly 30 percent since the beginning of the Industrial Revolution; more atmospheric nitrogen is fixed by humanity than by all natural terrestrial sources combined; more than half of all accessible surface fresh water is put to use by humanity; and about one-quarter of the bird species on Earth have been driven to extinction. By these and other standards, it is clear that we live on a human dominated planet…

Humanity's dominance of Earth means that we cannot escape responsibility for managing the planet. Our activities are causing rapid, novel, and substantial changes to Earth's ecosystems…In a very real sense, the world is in our hands-and how we handle it will determine its composition and dynamics, and our fate."

-Vitousek, et al, *Science* 25 July,1997

Image/NASA

Dear Shareholders:

Human activities on planet Earth are like a ship at sea with no one at the helm, or a corporation with no management. There is no coordinated international body empowered to manage human activity on Earth, despite the fact that our activities will determine the fate of the planet and of humanity. Perhaps there never will be such a body. In the meantime, we take it as our responsibility to inform you, the shareholders of "Earth, Inc." of the current status of human and planetary assets and liabilities, so you can hold your leaders accountable, and take action needed to secure your future wellbeing.

Why a Shareholder Report?

In the past, global economic information has been reported primarily using The United Nations (UN) system of national accounts which report "Gross Domestic Product" (GDP) for each country, or Gross World Product (GWP) for the whole world. The (UN) system of national accounts as well as corporate balance sheets, focus exclusively on goods and services purchased in the marketplace to assess the wealth, health, and viability of society. By measuring GDP, or corporate profit and loss respectively, these financial accounts place no value on non-market human, social, or natural resources. For example, the unpaid work of parents caring for children, though crucially important, isn't counted in GDP or corporate accounts. The value of social networks and democracy, although of proven importance to wellbeing, aren't counted. Finally, crucial services of nature such as providing oxygen to breathe aren't counted either. By excluding these important assets, a dangerously incomplete view of human welfare is perpetuated.

Is Growth always good?

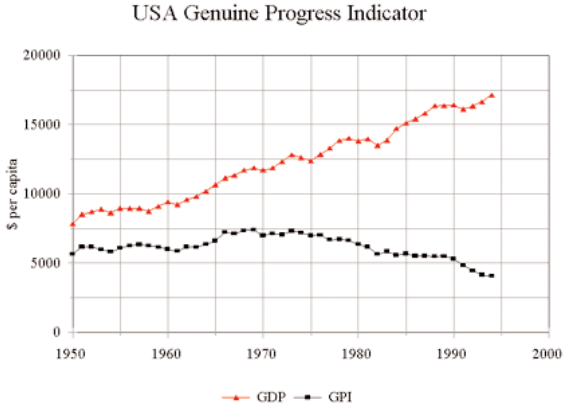
The most common statement heard around the world from politicians and business leaders is that we need more economic growth and we need GDP to grow. It is assumed that this will increase our welfare, but is it true? GDP accounts add all costs and benefits together as economic activity. It makes no distinction between expenditures on goods such as food, clothing, and shelter, or on costs such as pollution cleanup, crime, and illness. GDP accounts have no minus sign. Nothing is subtracted. This is like adding the payment and deposit columns together in your checkbook and thinking the total is meaningful. A lot of money could be going in and out, but are you ahead or behind?

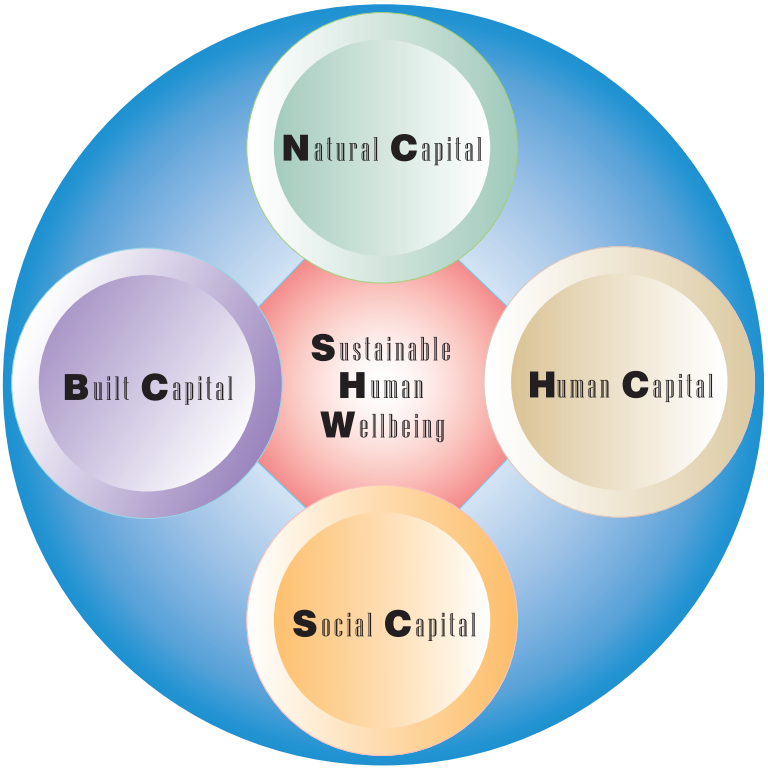
GDP at the national level is equivalent to a corporation adding together gross revenues and expenditures to determine profit. Since confusing expenses with revenues would be a huge accounting error at the corporate level, adding costs and benefits together as a measurement of welfare at the national level creates a huge distortion. Just as inaccurate accounting of financial assets can lead to the collapse of corporations (e.g., Enron, WorldCom), inaccurate accounting of the Earth's assets may lead to the unexpected collapse of human welfare.

GDP measurements have many other limitations as a measurement of welfare, even in measuring purely economic welfare. GDP does not reveal the distribution of wealth or income in society. If 1% of the society received 99% of the income and owned 99% of the wealth, GDP accounts would tell you nothing about it. GDP doesn't reveal the mix of goods and services being produced. It doesn't tell you if the economy is making "guns or butter". It doesn't reveal the depletion of natural resources, in fact that is counted as "growth". It reveals nothing about leisure time, social cohesion, crime, or many other important factors.

Alternatives to GDP

Many efforts have been made to correct the shortcomings of GDP. These include the Genuine Progress Indicator (GPI) by Redefining Progress, and the Index of Sustainable Economic Welfare (ISEW) by Herman Daly and John Cobb. These studies indicate that GDP and economic welfare were correlated until about 1977 in most industrialized countries. After that date GDP has continued to rise, while economic welfare has remained constant or is declining. The graph at right clearly illustrates this point.





What is the bottom line of Earth, Inc.?
To address the shortcomings of purely market-based accounting practices, the concept of a "triple bottom line" (measuring social and environmental costs and benefits in addition to a financial bottom line) has become accepted in many businesses. The concepts of natural, human, and social "capital" have been added to "built" capital in order to provide a more complete view of the factors that contribute to human wellbeing. And, since many aspects of natural, human and social capital provide benefits not confined to a single business or country, an accurate assessment of the capacity of the ecological-economic system to create and sustain human welfare must also consider these factors at the global level. We therefore take it as the goal of Earth, Inc. to maximize human welfare and sustain it indefinitely over time.

A Corporate Model
If one views the totality of the natural world and it's human inhabitants, and look at it through the lens of a business - including its assets, liabilities, flows of goods and services, "profits", and "losses" - one becomes able to make decisions that look at the long-term health of the company.

Some of the basic premises of this report include:

- Everyone on earth is a shareholder in Earth, Inc.

* The assets of Earth include not only built capital (GDP, infrastructure) and human capital (knowledge, health), but also natural capital (resources, land, eco-services) and social capital (trust, volunteering, networks, democracy). We assess and describe this total asset base in terms that make clear that all four forms of capital are essential to the successful and sustained operation of Earth, Inc.

* The balance sheet and profit and loss statement would include the assets and flows of all four capital types, which would make clear whether the overall gain or loss of assets is positive or negative. For example, built and human capital may be increasing, while natural and social capital may be declining. By evaluating all four factors a better determination of overall human welfare can be made.

"Men now begin to realize what as wandering shepherds they had before dimly suspected, that man has a right to the use, not the abuse, of the products of nature; that consumption should everywhere compensate by increased production; and that it is a false economy to encroach upon a capital, the interest of which is sufficient for our lawful uses." George Perkins Marsh, 184

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Definitions

Natural Capital - resources, land, eco-services, atmosphere, etc.
Built Capital - manufactured goods or items for consumption or used in the production of more goods and services. This includes the infrastructure of everyday life such as housing, roads, etc.
Human Capital - knowledge, health, capabilities, etc.
Social Capital - trust, volunteering, networks, democracy, etc.

Corporate Annual Report Definitions

Stock: The capital or fund that a corporation raises through the sale of shares entitling the stockholder to dividends and to other rights of ownership, such as voting rights. The number of shares that each stockholder possesses.

Fund: A sum of money or other resources whose principal or interest is set apart for a specific objective. An investment fund, such as mutual fund, or bond fund which provides future appreciation potential or current interest or dividends.

A typical Corporate Annual Report has four major sections:
Consolidated Statement of Income - Total revenues and total expenses which determine the income or profit of the company.

Consolidated Balance Sheet - Assets and liabilities which are used to operate the company

Consolidated Statement of Cash flows - Details of expenditures used in the operation of the business

Consolidated Statement of Shareholder Equity - Stock shares owned or dividends received by shareholders

Earth, Inc. Definitions

Stock: Dictionary- A supply accumulated for future use; a store.
The amount of a resource which provides a flow of useful goods, which may or may not be renewable. Example- the stock (reserve) of oil in the ground provides a flow of oil which is used for energy. It is not renewable in the short term, so once it is used up it is gone. A renewable resource such as a forest contains a stock of trees which are harvested for timber. Forests are renewable so the flow of timber can be maintained indefinitely if the flow rate does not exceed the regrowth rate.

Fund: Dictionary- an available quantity of material or intangible resources : supply
A resource which provides a flow of services instead of goods. Example- a forest is also a fund since without being harvested it provides a wide variety of services such as oxygen for breathing, air purification, Co2 absorption, habitat for animals, prevention of erosion, capture of rainwater, regulation of climate, etc. These are all "ecosystem services" provided by nature for free. Forests may also provide the service of recreation for humans, such as camping, hunting, and solitude.

Earth, Inc. Shareholders Report will contain four major sections:

A. Consolidated Balance Sheets-ASSETS and LIABILITIES
This section will include assets consisting of stocks and funds of built, natural, social, and human capital. Comparison of these assets from one year to the next will determine if there have been net gains or losses

B. Consolidated Statement of flows -FLOWS of goods and services
Flows of materials from stocks of renewable or non-renewable assets, or services from funds of renewable or non-renewable assets can be totaled and increases or decreases determined from year to year.

C. Consolidated Statement of Shareholder Equity-EQUITY
Shares of natural and cultural assets "owned" by shareholders. Actual and potential dividends to everyone on Earth are calculated.

D. Consolidated Statement of Income - THE "BOTTOM LINE"
Using an index or other means of comparing the four types of assets, a determination might be made of the condition of Earth, Inc.

REPORT ON:

Natural Capital

Assets:

- Ecosystem Services
- Agricultural Cropland
- Pastures
- Urban & Other Land
- Forests
- Non-timber Benefits
- Protected Areas
- Sub-soil Assets
  Oil, Coal, Minerals, etc.

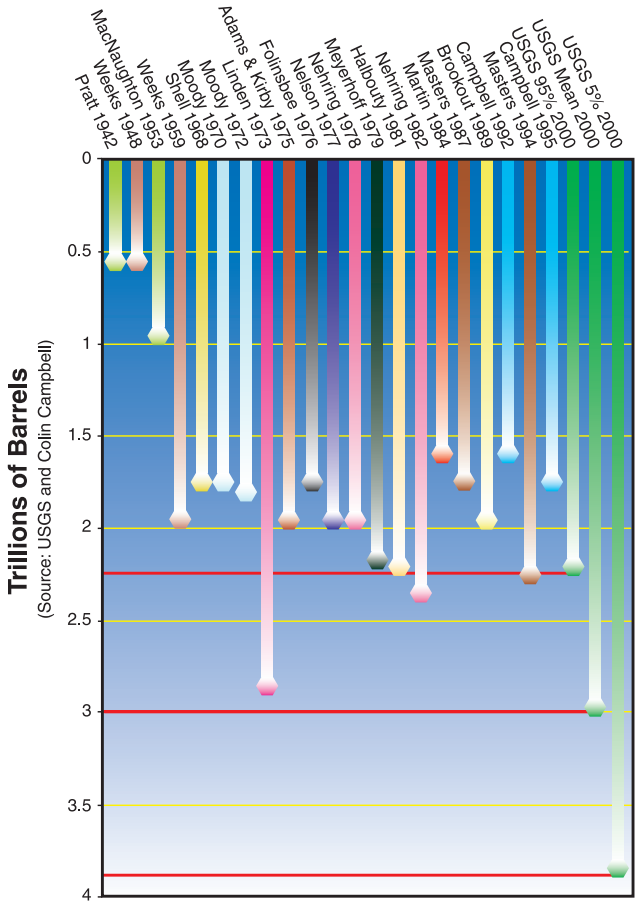
Consolidated Balance Sheets

Report on Natural Capital: Oil

STOCKS:

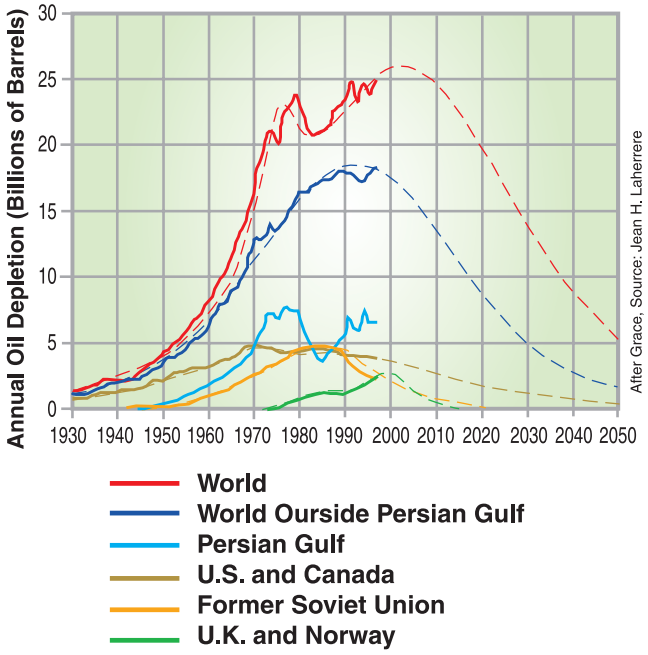
World data on pumping oil stocks out of the ground is normally defined as "oil production". Our first job in this section is to correct faulty language which provides inaccurate information to our shareholders. Oil, as a non-renewable stock of natural capital is not "produced", but is extracted and depleted by human beings for energy use. Nothing is produced. The earth produces oil over geological time periods from plants which have absorbed solar energy.

Few subjects elicit as much controversy as the remaining reserves (Estimated Ultimate Recovery=EUR) of world oil. Many estimates have been done over the years, with the most common estimate being approximately 2 trillion (2000 billion) barrels. For purposes of this report we will use this figure.

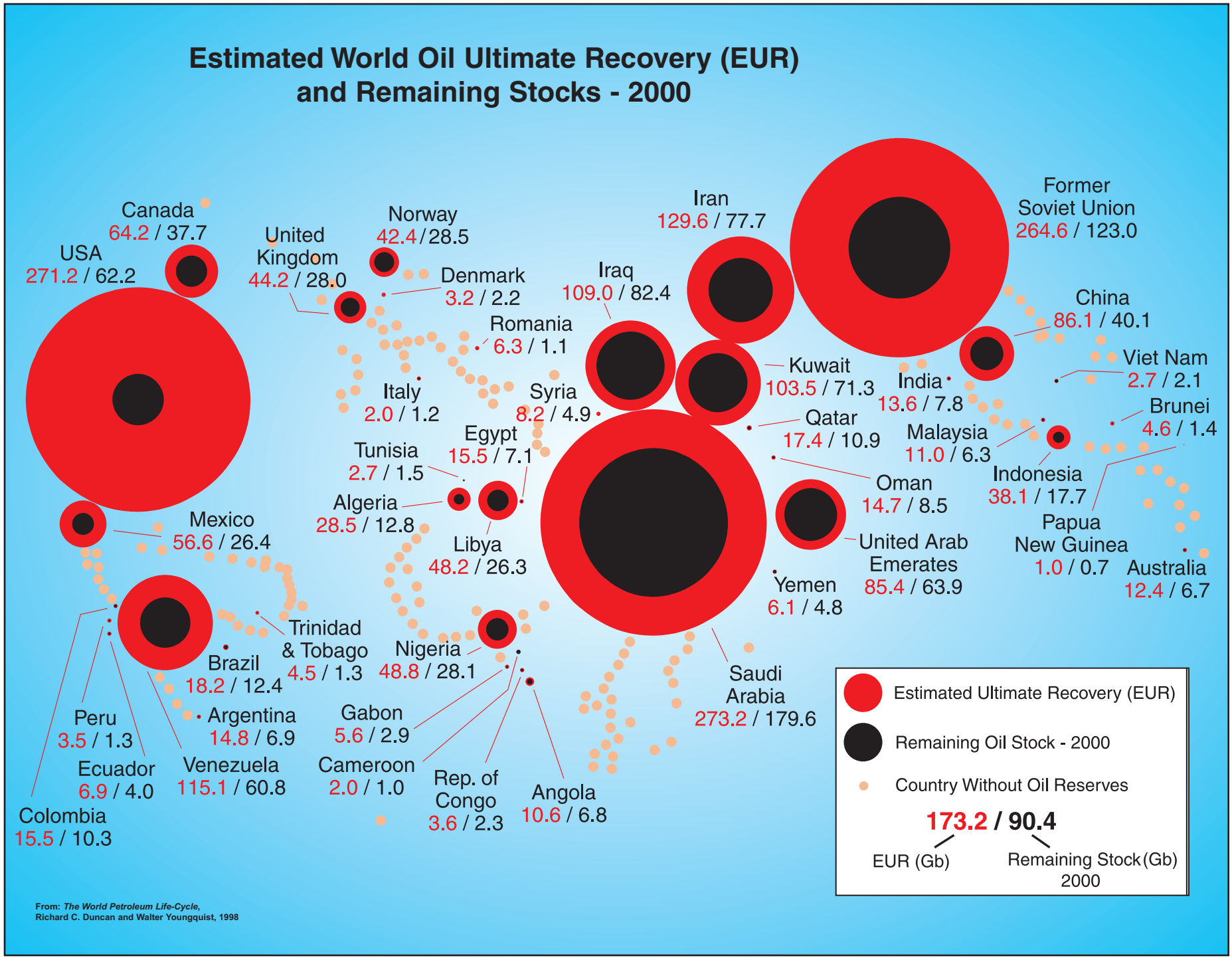


Published Estimates of World Oil Ultimate Recovery

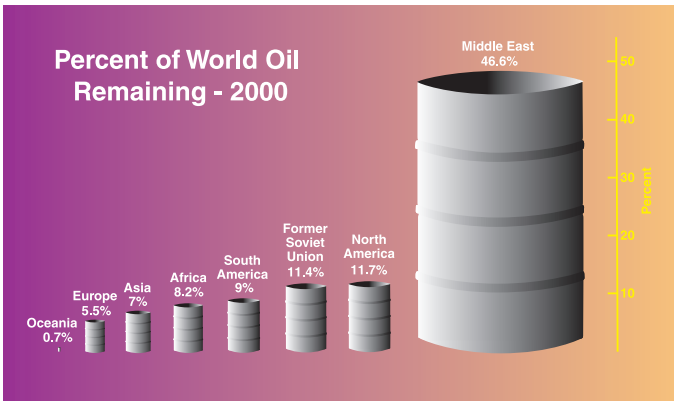
Many of these estimates are based on the work of M. King Hubbert, a geologist who worked for Shell Oil Co. and later for the U.S. Geological Survey. Hubbert applied mathematics, geology and physics to the question of remaining oil supplies. He correctly predicted the peak of US oil extraction in 1969, and using his methods Campbell and Laherrere produced the curve, shown below, accounting for the OPEC oil embargo in the 1970s. This predicts world oil extraction to peak in about 2004, and decline thereafter.



Using these methods Richard Duncan and Walter Younquist have calculated the estimated ultimate recoverable (EUR) oil from the 42 countries which extract 98% of world oil:



From: *The World Petroleum Life-Cycle*,
Richard C. Duncan and Walter Youngquist, 1998



World

The total world oil depletion by 2000 was 916.2 billion barrels representing 45.9% of the original total of 2 trillion barrels.

U.S.

U.S. oil depletion by 2000 was 209 Gb out of an original endowment of 271.2 Gb, representing total depletion of 77.1% by 2000.

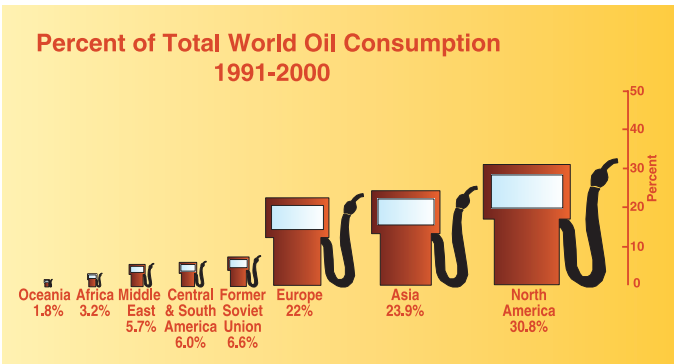
FLOWS and LOSSES:

World:

From 1991-2000 world oil extraction totaled 252.8 Gb (billion barrels) which was 12.7% of the total original oil stock. Using Dubai spot prices of oil for each year this represents a natural capital loss of $4,993 trillion (2001 US dollars). At this rate the remaining 1079.8 billion barrels would last 42.7 years.

U.S.:

In the period from 1990-200 30.2Gb of oil were extracted in the United States representing 21% of the total original endowment. At this rate the 62.2 Gb (billion barrels) remaining will last for approximately 20 years. However, the U.S. consumption rate is far higher than can be met by domestic sources of oil.



EROR:

Since oil is a non-renewable resource economics tells us that as it becomes scarce the price will go up and substitutes will be found. However, an exact substitute for oil is very unlikely due to the unique Energy Rate of Return (EROR) of oil.

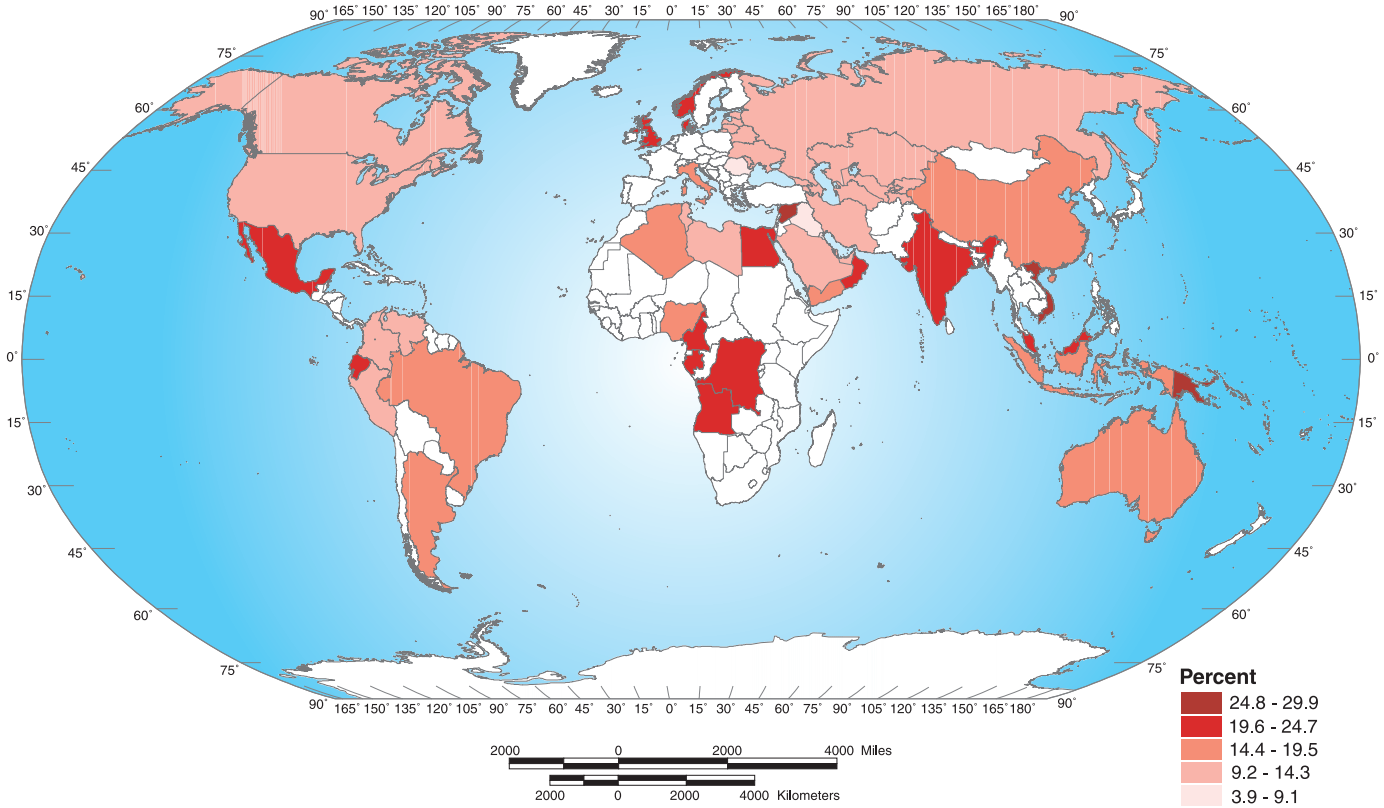
The amount of energy obtained compared to the

WORLD & REGIONAL OIL DEPLETION

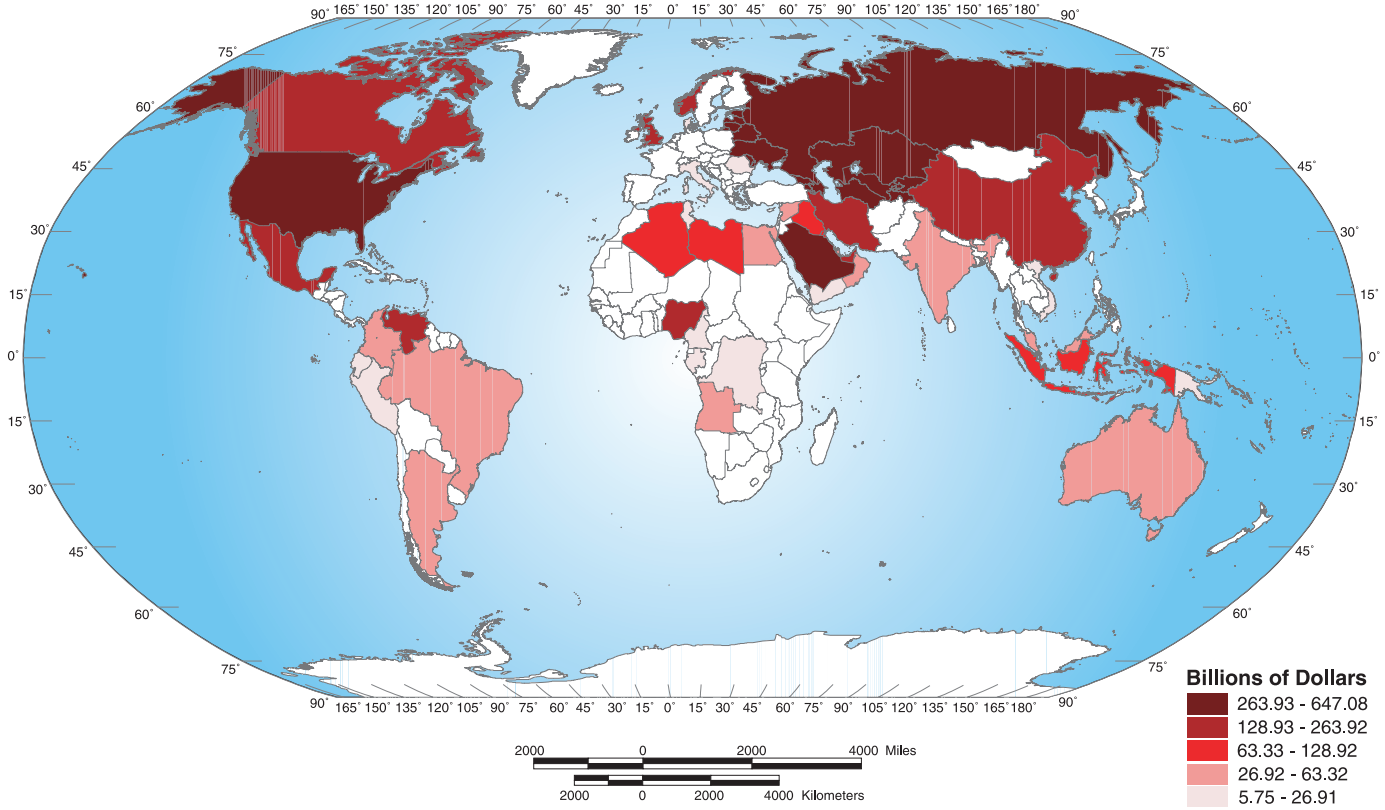
Country & Region	Loss Gb 1990-2000	EUR Gb	Loss in 2001$ (billions) 1990-2000	% Depleted 1990-2000
Algeria	-5.1	28.5	-$101.30	-17.9%
Angola	-2.3	10.6	-$46.19	-22.1%
Cameroon	-0.4	2.0	-$8.27	-21.0%
Congo Rep. (Brazzaville)	-0.8	3.6	-$15.33	-21.6%
Egypt	-3.2	15.5	-$63.32	-20.8%
Gabon	-1.2	5.6	-$23.82	-21.6%
Libya	-5.3	48.2	-$104.59	-11.0%
Nigeria	-7.5	48.8	-$147.92	-15.4%
Tunisia	-0.3	2.7	-$6.66	-12.5%
Africa	**-26.2**	**165.5**	**-$517.41**	**-15.8%**
Brunei	-0.6	4.6	-$12.58	-13.8%
China	-11.1	66.1	-$220.08	-16.9%
India	-2.7	13.6	-$53.36	-19.9%
Indonesia	-5.7	38.1	-$111.81	-14.9%
Malaysia	-2.7	11.0	-$52.44	-24.2%
Vietnam	-0.7	2.7	-$13.62	-25.2%
Asia	**-23.5**	**136.1**	**-$463.88**	**-17.3%**
Denmark	-0.8	3.2	-$15.78	-24.5%
Italy	-0.4	2.0	-$6.89	-17.6%
Norway	-10.3	42.4	-$203.14	-24.3%
Romania	-0.5	6.3	-$10.12	-8.1%
United Kingdom	-9.2	44.2	-$180.93	-20.9%
Europe	**-21.2**	**98.1**	**-$416.86**	**-21.6%**
FSU	**-28.7**	**264.6**	**-$570.86**	**-10.8%**
Iran	-13.4	129.6	-$263.92	-10.3%
Iraq	-4.2	109.0	-$83.91	-3.9%
Kuwait	-6.6	103.5	-$128.92	-6.4%
Oman	-3.1	14.7	-$61.44	-21.2%
Qatar	-2.1	17.4	-$42.06	-12.2%
Saudi Arabia	-32.8	273.2	-$647.08	-12.0%
Syria	-2.1	8.2	-$40.35	-25.0%
United Arab Emerates	-9.1	85.4	-$178.92	-10.6%
Yemen	-1.2	6.1	-$23.31	-19.4%
Middle East	**-74.5**	**747.1**	**-$1,468.90**	**-10.0%**
Canada	-8.7	64.2	-$172.57	-13.6%
Mexico	-11.9	56.5	-$234.62	-21.0%
USA	-30.4	271.2	-$600.25	-11.2%
N. America	**-51.0**	**392.0**	**-$1,007.43**	**-13.0%**
Australia	-2.3	12.4	-$45.72	-18.5%
Oceania	**-2.6**	**13.4**	**-$51.47**	**-19.3%**
Argentina	-2.7	14.8	-$53.27	-18.3%
Brazil	-3.1	18.2	-$61.46	-16.9%
Colombia	-2.2	15.5	-$43.02	-14.1%
Ecuador	-1.4	6.9	-$26.91	-19.8%
Peru	-0.4	3.5	-$8.50	-12.4%
Trinidad & Tobago	-0.5	4.5	-$10.11	-11.4%
Venezuela-	10.9	115.1	-$214.38	-9.5%
S. America	**-21.2**	**178.5**	**-$417.66**	**-11.9%**
TOTAL WORLD	**-252.8**	**1996.0**	**-$4,993.85**	**-12.5%**

Any discrepencies are due to the additional 2% of countries included in the total, but not in the country list.

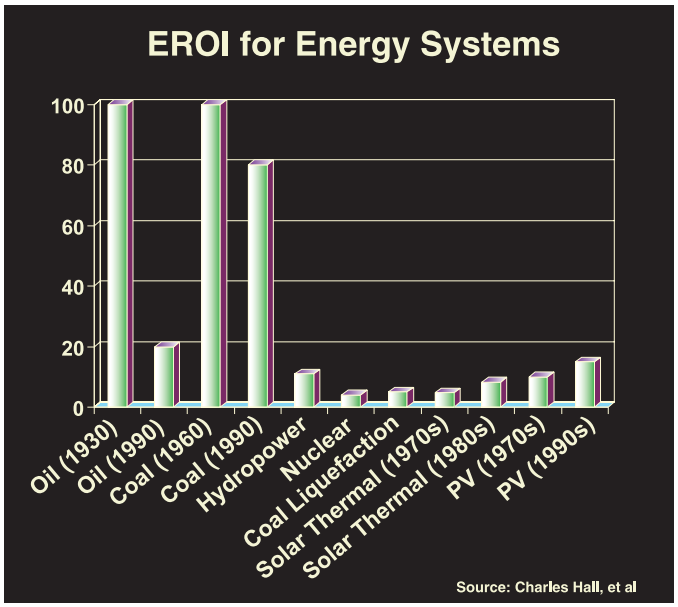
Percent Depletion of Total Oil Stocks, 1990-2000



Dollar Loss from Oil Depletion, 1990-2000



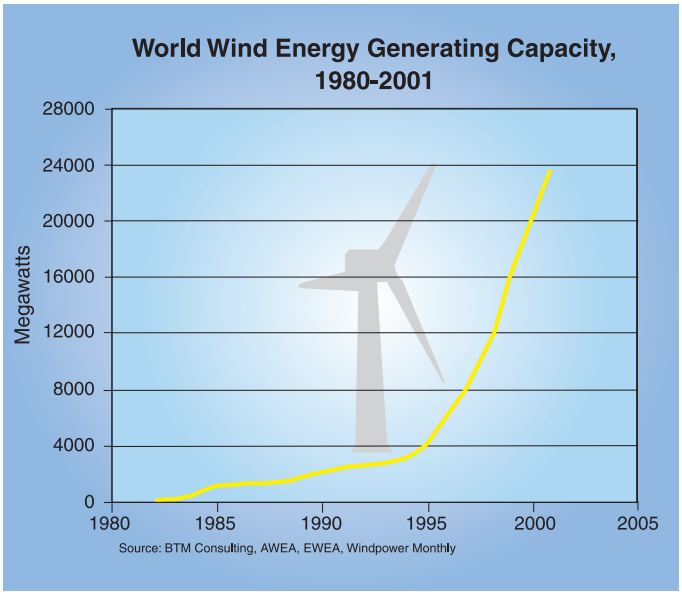
amount of energy invested in extracting or creating the energy is known as the EROR (Energy Rate of Return). Prior to large scale depletion, fossil fuels had the highest EROR. This means that money invested in oil provided a far greater return than any other energy source. As oil becomes more difficult to find and the most easily accessible wells are depleted the EROI declines.



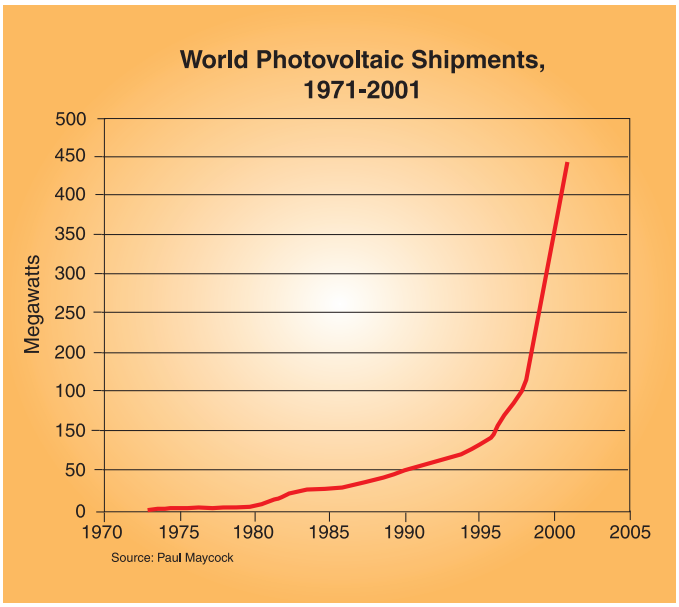
Weak and Strong Sustainability:

For non-renewable resources, the idea of investing the proceeds of extraction, especially into alternatives to replace the original resource is known as "weak sustainability". It is called "weak" because the original resource is replaced by a substitute, compared with "strong" sustainability where the resource is considered irreplaceable and depletion is adjusted to consider the needs of future generations. The application of strong or weak sustainability depends on the type of resource. Some resources such as oil may be replaceable, others such as the ozone layer or water are not. The substitution of alternative energy sources for oil is well underway. Some oil companies, notably BP and Shell have diversified into being energy producers and have invested in solar, wind, and fuel cells. This fulfills the desireability under weak sustainability of investing some of the proceeds of non-renewable resources into renewable replacements.

Wind Power:



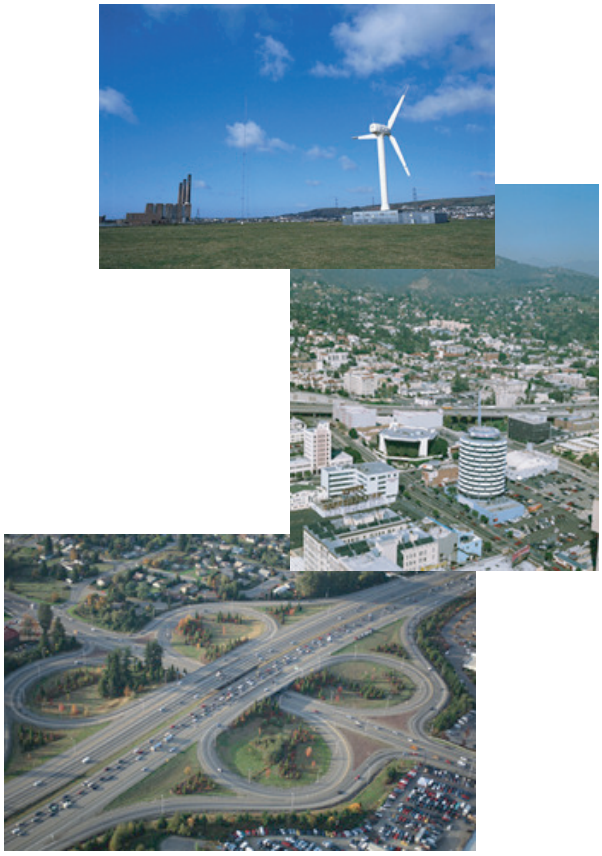
Solar Power:



Investments for installed wind energy from 1990-2000 at the prevailing price per kwh each year amounted to $5.5 billion dollars. Investments in installed photovoltaics amounted to approximately $6.2 billion from 1990 based on an average cost of $5 per watt.. The energy rate of return on wind energy is much higher than for photovoltaics, but both are renewable and neither adds CO2 to the atmosphere. Together the investment amounts to $11.7 billion. This is only .2% of the natural capital loss of $5 Trillion for oil depletion from 1990-2000, but is a step in the right direction.

REPORT ON:

Built Capital



Assets:

Stocks

- Produced Assets
- Machinery & Equipment
- Structures
- Housing
- Roads & Transportation

Flows:

- GDP

Liabilities:

Stocks

- Pollution Levels
- CO_2
- CFC Levels

Flows:

- Emissions by Country
- Financial Damage from Climate Change
- Insurance Losses

Consolidated Balance Sheets

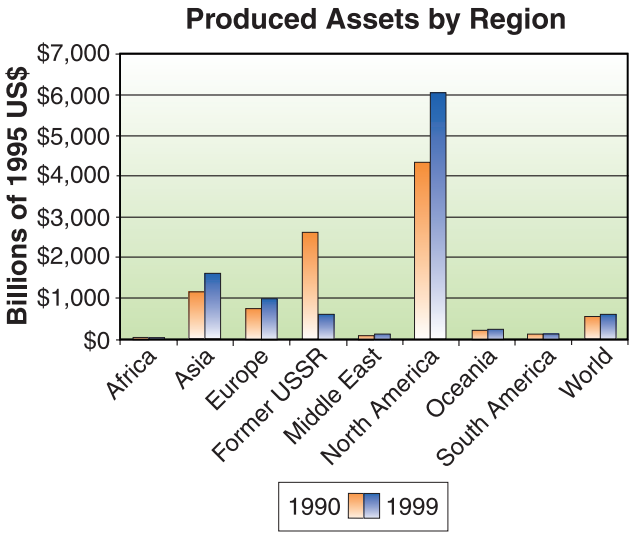
Report on Built Capital Assets

STOCKS:

Built capital is a measure of housing, roads, electricity infrastructure, and all built structures that comprise communities. Built capital is measured in two ways: physical assets, the stock, and Gross Domestic Product (GDP), the flow. Of all the capitals calculated in this report, built capital is most closely aligned with standard measures of economic progress.

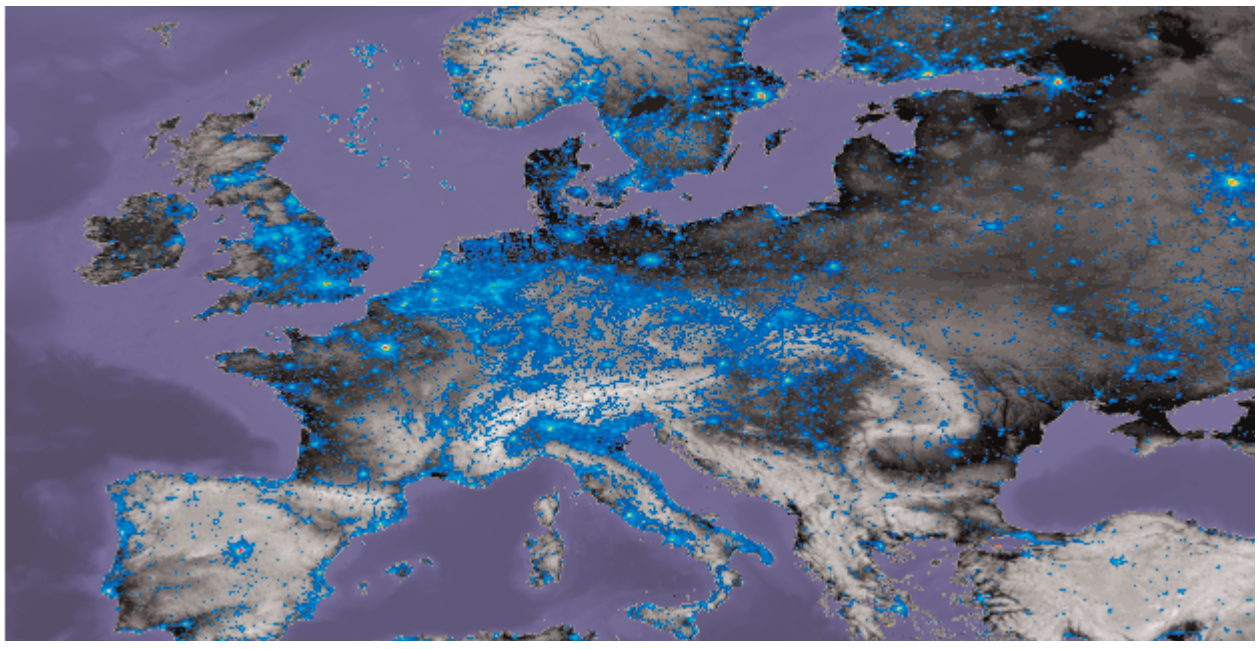
Produced Assets:

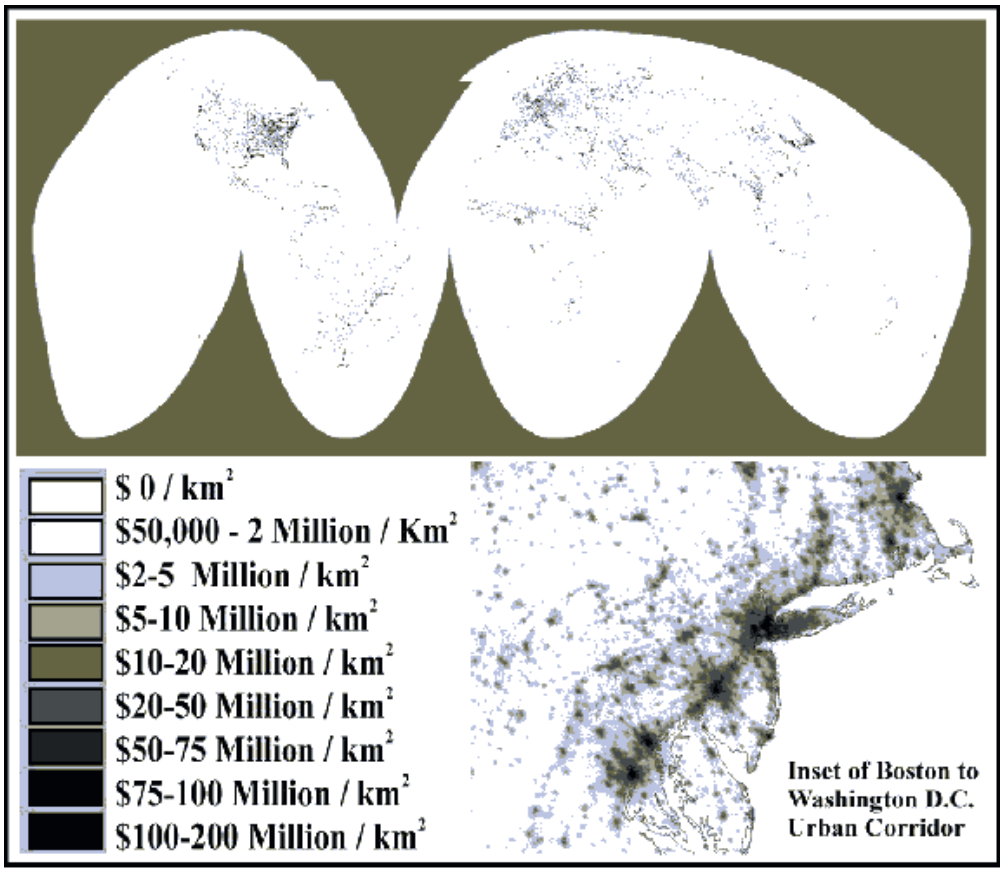
Produced assets, the stock, are estimated by examining the capital investment of countries. Data



was acquired from unpublished World Bank estimates. Their means of obtaining the data employed the Perpetual Inventory Method, which derives data from investment information, along with assumptions about asset lives and an initial assumption about the capital stock (based on an assumed initial capital-output ratio) (Kunte et al. 1998). Over the period of time from 1990 to 1999, the world's average produced assets increased only slightly. Most striking is the plummeting of the Former USSR's produced assets. Also notable is the North America region's height above all other regions; compared with North America, Africa barely registers on the same graph.

Nighttime light intensity from satellite imagery of Europe identifies the spatial locations of built capital.



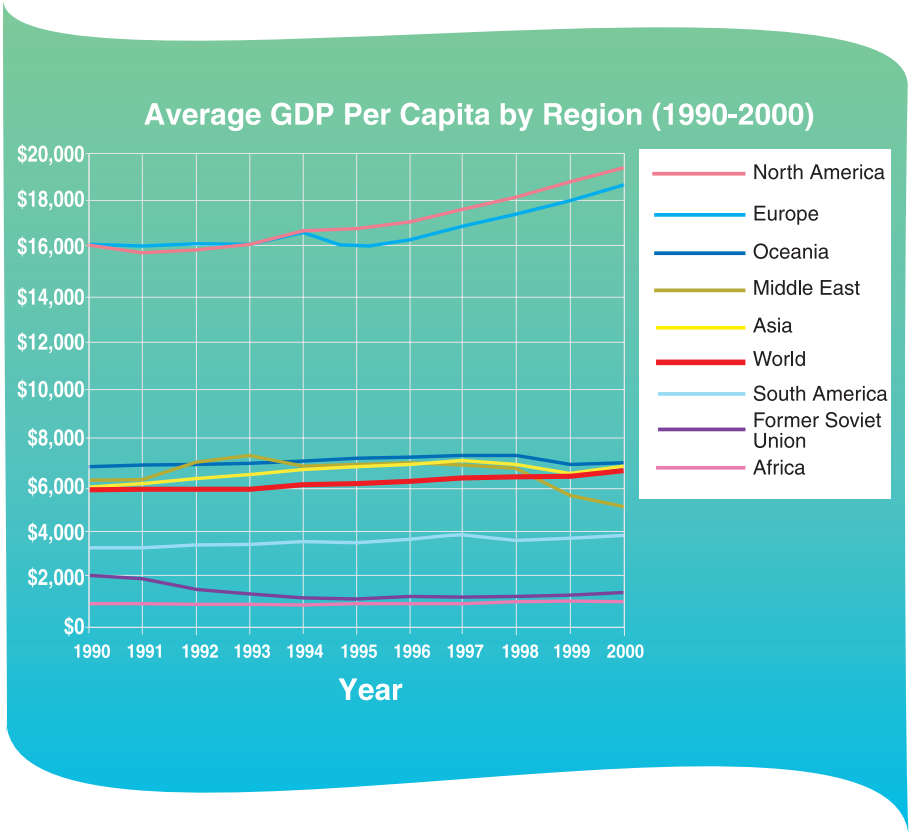


Nighttime light imagery can be used as a proxy to calculate marketed economic activity (GDP).

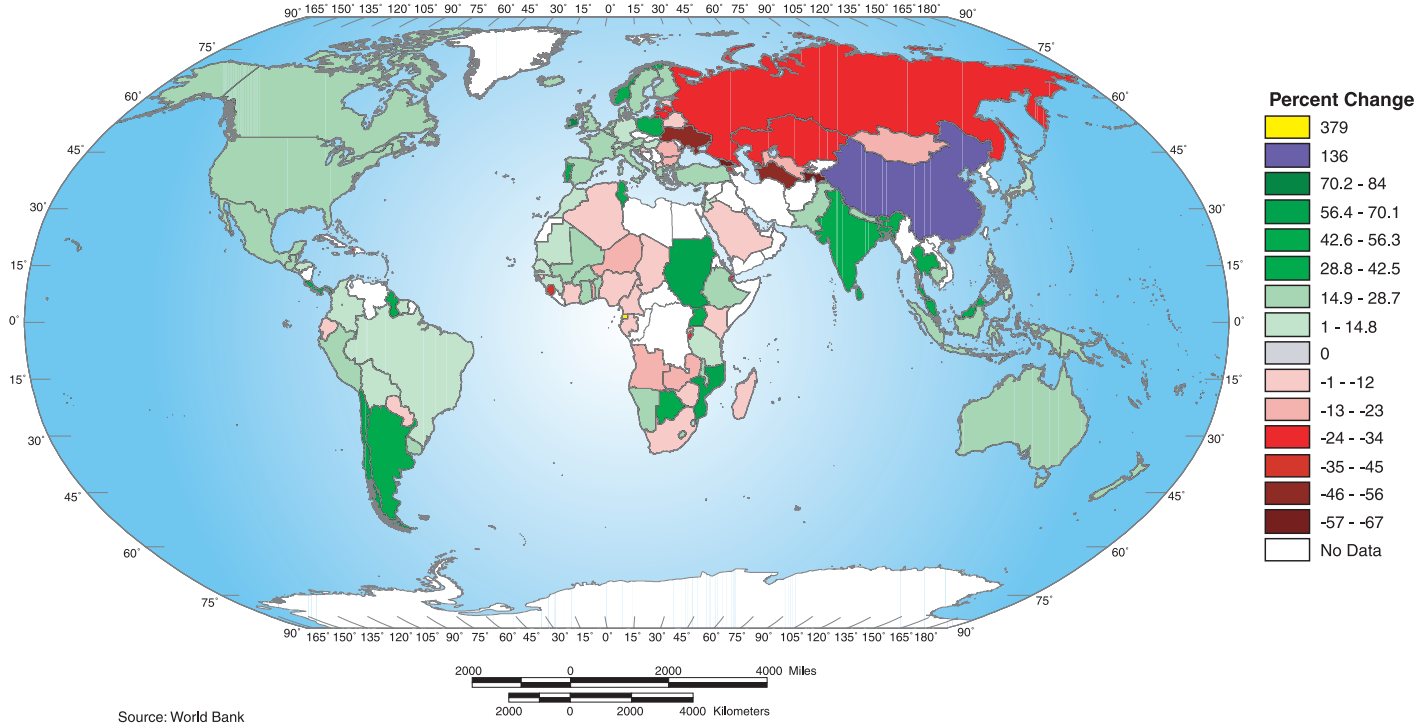
FLOWS:

Gross Domestic Product (GDP)

Gross domestic product (GDP) is a measure of the annual market value of all goods, services, and structures produced in an economy. GDP is the standard economic means of measuring progress. In the graph below, GDP has been calculated per capita by region, using data acquired from the World Bank. In 2000, world per capita GDP was $6,594. For that same year, per capita GDP was $1,038 for Africa and $19,448 for North America, highlighting global economic disparity. Many of the same trends witnessed in the produced assets graph can be witnessed in the GDP graph - the world average increased only slightly; the Former USSR lost ground over the decade; and North America swept upward, paralleled by Europe.



Percent Change GDP, 1990 - 2000



Source: World Bank

Case Study: Indonesia

Indonesia, an archipelago in southeast Asia, provides an interesting case study in the insights built capital can provide. Graphs of Indonesia's produced assets and Indonesia's GDP show a striking similarity. In 1997, there is a notable change in the slope of the line. In the case of produced assets, the line flattens out as it approaches the year 2000. In the case of GDP, there is a dramatic drop between 1997 and 1998, followed by a modest rise in the ensuing years. Something striking happened to rechart Indonesia's course set on economic progress.

In July of 1997, the Far Eastern Economic Review published an article which stated that as much as 30% of World Bank funds disbursed to Indonesia had been diverted for corrupt uses. Suharto, who had served as president of Indonesia since the 1960's, was widely regarded as the corrupt culprit. Over the years, he had placed family members in strategic leadership positions, and his family held sway over much of Indonesia's economic life. In October of 1997, the country's currency began to fall. On its heels, the stock market plummeted. The International Monetary Fund (IMF) agreed to provide Indonesia with a $40 billion aid package in exchange for economic reforms, but Suharto was reluctant to implement reforms. Indonesia's currency continued to plummet, from a high of 2,880 rupiah to the dollar before the crisis to a low of 17,000 rupiah to the dollar as the crisis reached a feverish pitch.

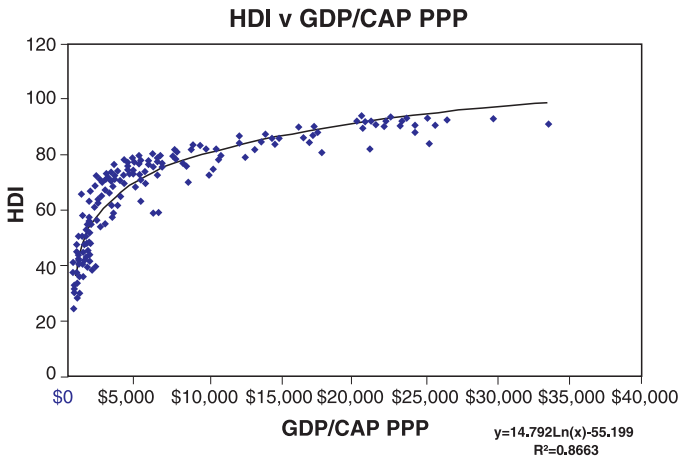
In May of 1998, amidst student protests and riots over rising prices, Suharto stepped down. The freefall witnessed in the GDP graph ended, and Indonesia began to make modest gains in GDP, though by 2000, it was only back to 1994 levels.

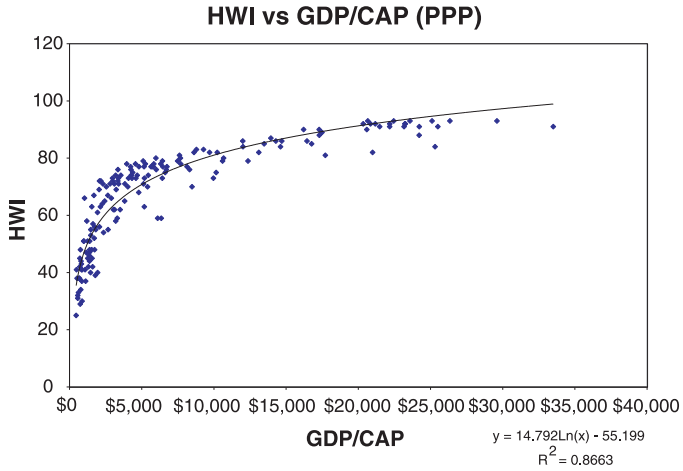
Indonesia's physical assets stagnated between 1998 and 2000. The road to regaining international trust and achieving an economic recovery is long. The example of Indonesia shows a clear link between built capital and the economic and political stability of the country. Under apparently unstable political or economic regimes, investment typically slows or stops completely. Though Suharto's corruption began long before 1997, it wasn't until this corruption was exposed that economic repercussions were felt.

What does this indicate about our standard definition of progress? Despite a quality of life which may have suffered under corrupt rule, all economic indicators pointed towards progress. In this case, "progress" meant an increased concentration of wealth among corrupt officials. The standard economic measures are not enough to measure well being or quality of life. It's time to expand our understanding.

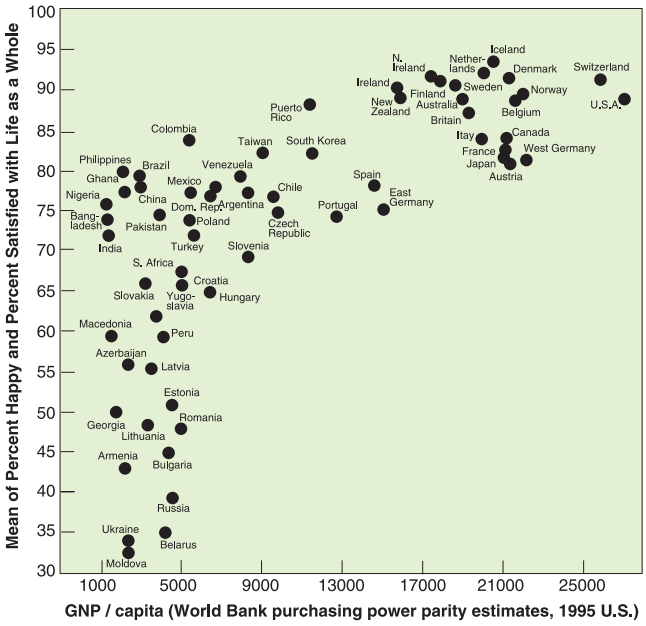
Built Capital section contributed by:
Brooke Wilkerson

How important is built capital and GDP to welfare? Correlations were done with the UN Human Development index and the Prescott-Allen Human Welfare index.

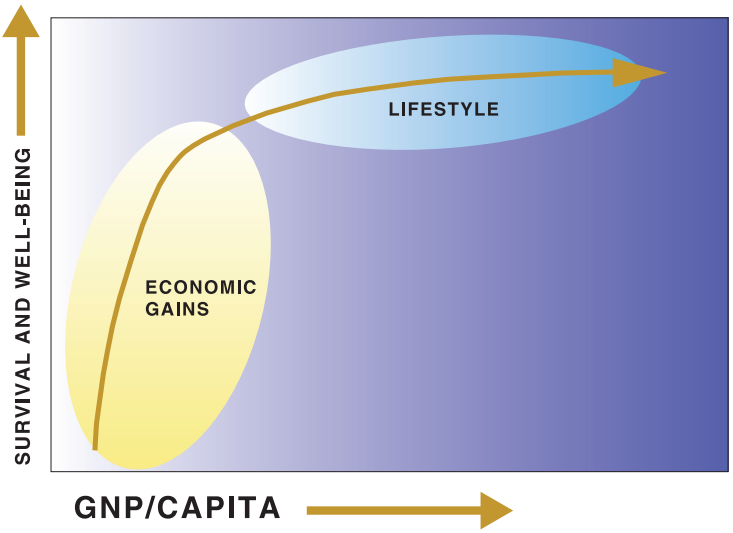




Additionally Inglehart, et al did a correlation with subjective measures of happiness and life satisfaction from the World Values survey. Whether using objective or subjective measurements, these graphs all show a very strong relationship with human welfare up to about $10,000 per capita GDP.



Subjective well-being by level of economic development.
Source: World Values Surveys; GNP/capita purchasing power estimates from World Bank, World Development Report, 1997.
R = .70 N = 65 p<.0000



Source: R. Ingelhart, 1997

Above the $10,000 level the contribution of GDP to welfare declines. Inglehart characterizes the primacy of economic gains at the lower income levels and "lifestyle" at the higher level. Our assessment is that at least three factors are at work. First the contributions of human, social, and natural capital are left out of GDP. Second, once material needs have been met, other factors become more important. Third is the possibility of "uneconomic growth". "Uneconomic growth" occurs when the costs of growth exceed the benefits. The accumulation of material possessions invariably leads to pollution, sprawl, and depletion of resources. At a certain point these costs outweigh the benefits and further growth is detrimental to welfare.

Water-related loss; not just barrier islands.
Numerous historical buildings and museums were underwater in Dresden. The world-famous Semper Opera House and the Zwinger (photo) could not be defended despite colossal efforts on the part of the hundreds of helpers. The art treasures in museums are often not insured, as many local authorities cannot afford the insurance premiums.

Built Capital Liabilities

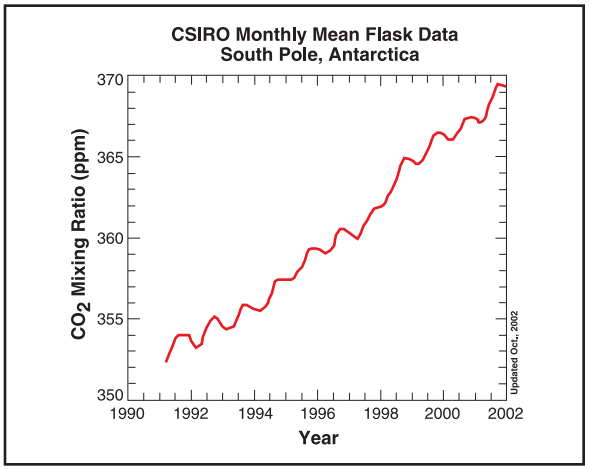
CO2 and Climate Related Economic Losses

Introduction

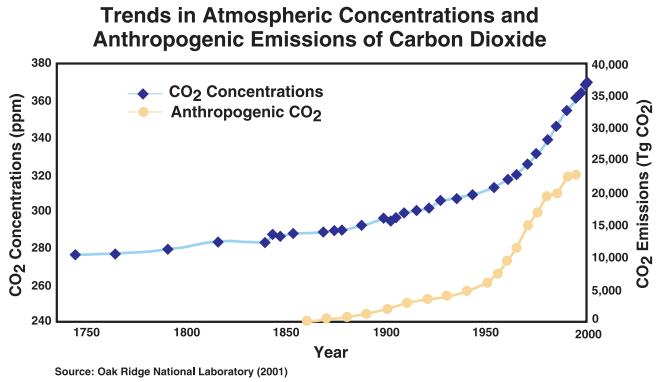
The consumption of fossil fuels to produce built capital, energy, and transportation services results in emissions including CO2. As a byproduct of economic production, CO2 impacts natural capital in the form of climatic stability, and can be considered as a liability of built capital, at least when it is based on burning fossil fuels. One approach to estimate the liability created by anthropogenic (human-produced) carbon dioxide emissions, is to look at the global scale of economic losses due to weather related storm catastrophes in the decade of the 1990's.

STOCKS:

During the decade in question, the atmospheric carbon dioxide level (stock) in parts per million, increased from 353 ppm to 369 ppm, which was a 4.5% increase for the decade or .45% annually on average.

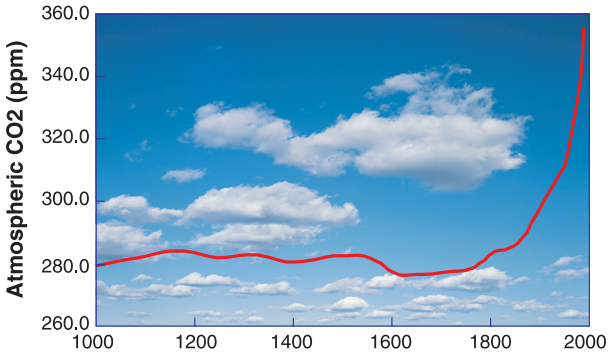


Stock: Global CO2 Levels



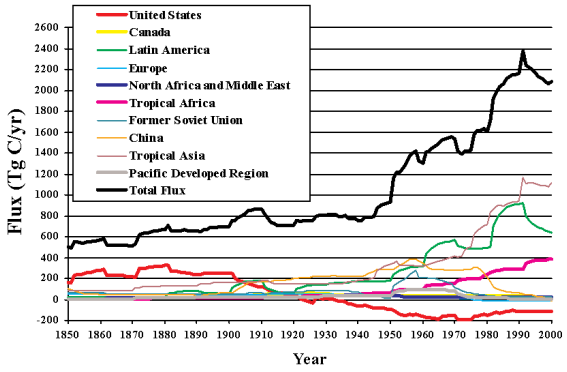
The historical data shows that C02 concentration has basically held in the range of 280 ppm, from the years 1000-1800 A.D. The concentration then increased on a standard J curve, coinciding with the advent of significant coal emissions and then the combustion of other fossil fuels. This anthropogenic contribution has roughly increased the percentage of all atmospheric carbon loading by 66% in the last two centuries. Because fossil fuel combustion has been proven as the majority green house gas contributor, it is typically chosen as an indicator for anthropogenic contribution.

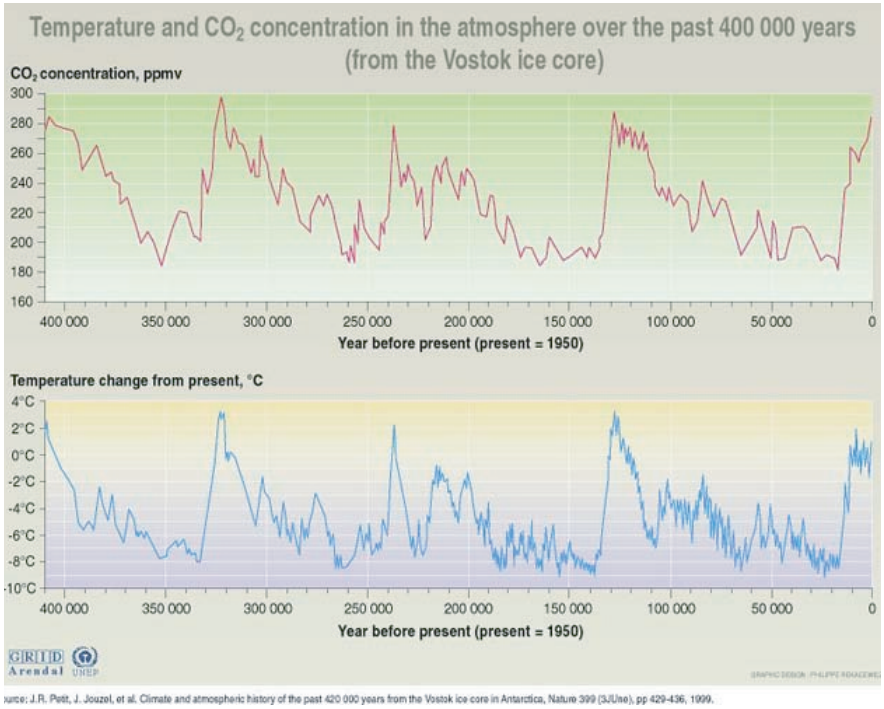
Atmospheric CO2 Variations Since 1000BC



Another factor in the anthropogenic picture, is that land use change has radically affected the planet's natural ability to absorb CO2 as a result of deforestation and wetland obliteration. The trend overall has been a loss of the ability to cycle and absorb CO2 of 1700 tg (trillion grams) C between the years 1900 and 1990. Hence, this CO2 has been added to the atmosphere and contributed to the greenhouse effect. The 1990's, however, have shown a significant drop in CO2 flow into the atmosphere due to land use change. This appears on the graph to be due to the contributions of Latin America, tropical Asia, and China.

Annual Net Flux of Carbon to the Atmosphere from Land-Use Change: 1850-2000
(Houghton and Hackler)





Source: J.R. Petit, J. Jouzel, et al. Climate and atmospheric history of the past 420 000 years from the Vostok ice core in Antarctica, Nature 399 (3JUne), pp 429-436, 1999.

Although there are many opinions about the effects of climate change, the correlation between CO2 and global temperature has been well documented. (see Graph on temperature and CO2) The Goddard Institute at NASA has determined that for every doubling of CO2 concentration, we will be forcing up the temperature on the planet by 3 degrees F. At the current .45% yearly increase, by 2050 we will have a 24% increase in CO2, to a level of 456 ppm C02. This corresponds to an accompanying .7 degree average temperature increase. The predictions for rise in sea level by 2100 vary from 2-5 feet.

This could have dire consequences for entire nations; the low lying areas of Bangladesh are in jeopardy of being flooded, which alone would dislocate millions of people and represent a loss of many billions of dollars. The United States stands to suffer as well. Simply in terms of the luxury real estate market, tremendous loss could be incurred via loss of coastline. Just to examine one state in particular, the following may serve as a good model for what is as stake:

…"A team at the Woods Hole Oceanographic Institute has calculated Massachusetts's loss of land to the rising sea as warming progresses. Using the rather modest U.S. Environmental Protection Agency projections of sea level rise by 2025, they calculated that Massachusetts would lose from 7,500 to 10,000 acres (3,035 to 4,047 hectares) of land. Based on just the lower estimate and a nominal land value of $1 million per acre for ocean-front property, this would amount to a loss of at least $7.5 billion of particularly expensive property by then. Some of the 72 coastal communities included in the study would lose far more land than others. Nantucket could lose over 6 acres and Falmouth 3.8 acres a year." (Copyright © 2001 Earth Policy Institute Lester R. Brown November 15, 2001)

"2000 was the fifth hottest year ever recorded for global surface temperatures, following 1998, 1997, 1995, and 1990. Every year of the 1990s was among the planet's hottest 15 since records began in 1880, making it the hottest decade on record" (Climate of 1999 - Annual Review, National Climatic Data Center,

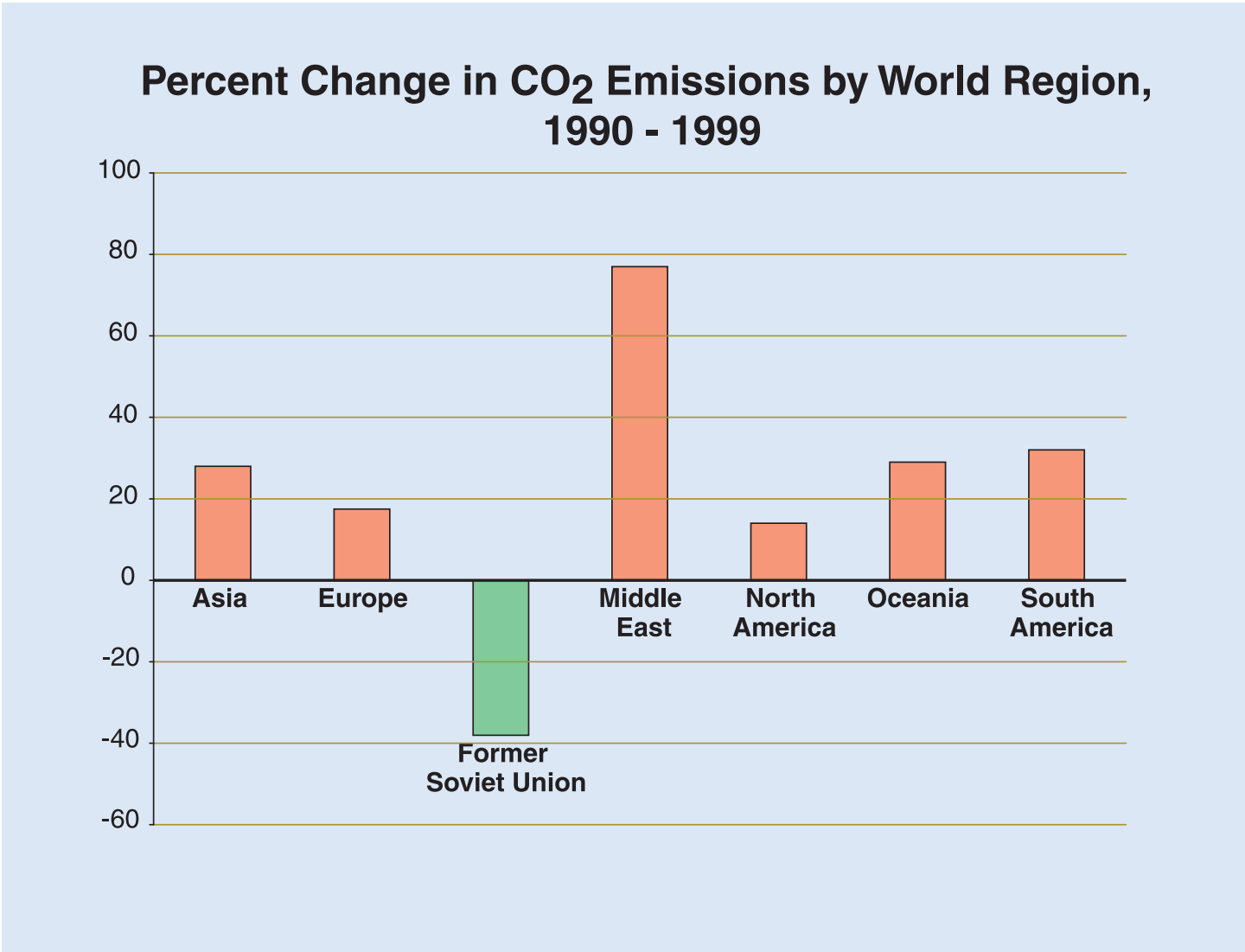
National Oceanic and Atmospheric Administration, 12 Jan. 2000, http://www.ncdc.noaa.gov/ol/climate/research/1999/ann/ann99.html)

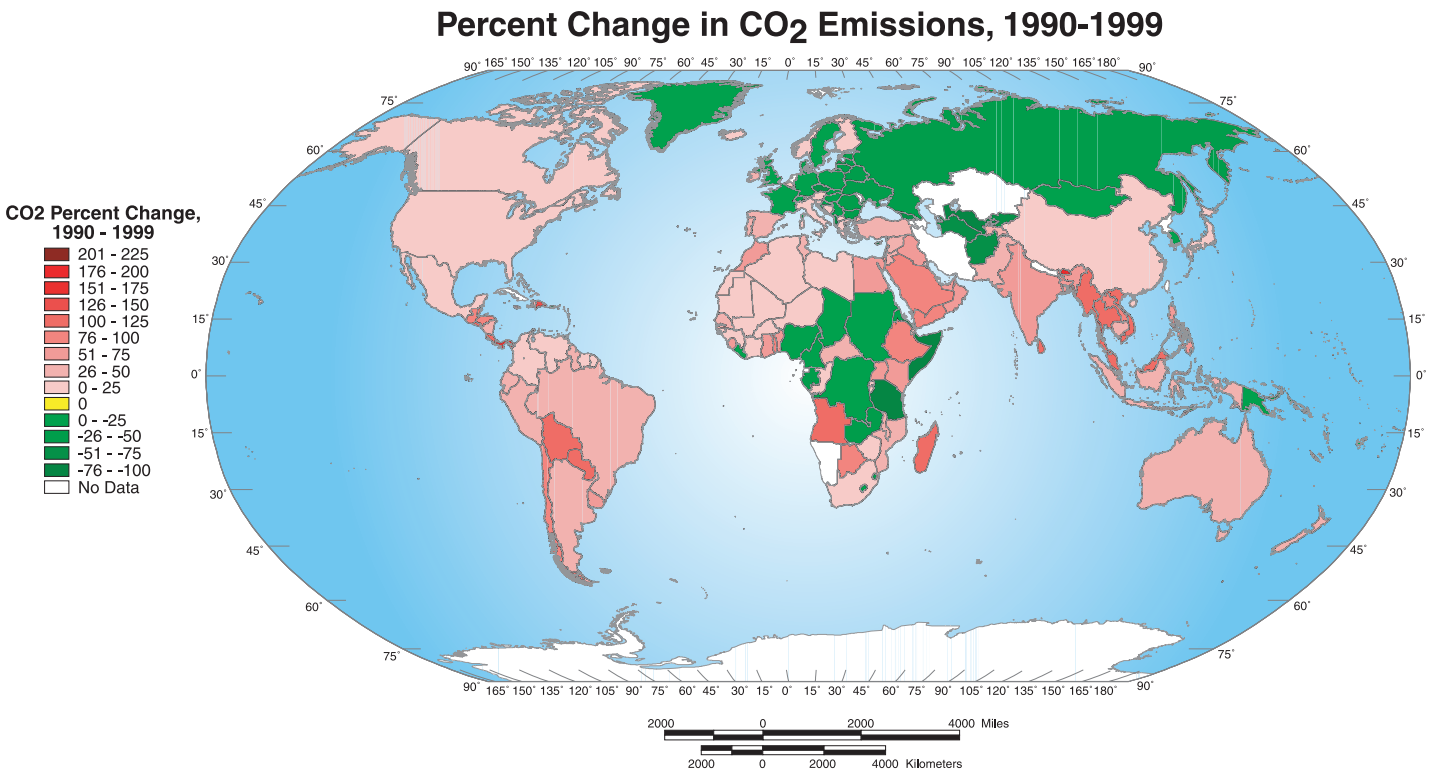
FLOWS:
Fossil Fuel Emissions by Country

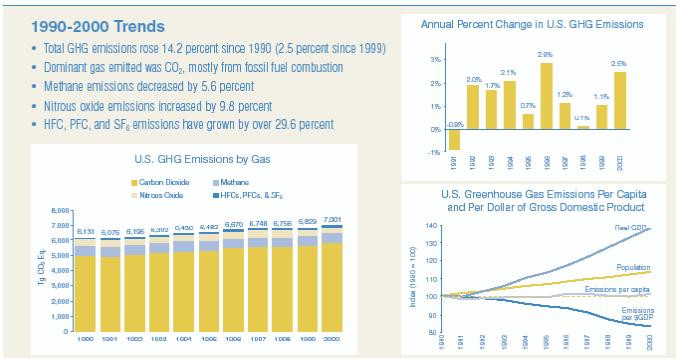
The main driver of the C02 atmospheric loading is clearly the combustion of fossil fuels. The overall trends for emissions by region can be seen in the graph below.

Overall, the percentage change for each of the regions is as follows:
Europe: 17.5%
Former Soviet Union: 38% decrease (though as no data is reported for several regions of the Former soviet Union in the early 1990's, a 25% decrease is probably more likely. Using the 1992-1999 figures, there is a 28 percent reduction)
Middle East: 77%
North America: 14%
Oceania: 29%
Asia: 28%
South America: 32%
One interesting country, in terms of tracing fossil related emissions: (Note, units in gigatons): The United states: 17 % increase from 4,834,340 to 5,648,240 g tons

Clearly, the United States is driving the North American C02 contribution and this has steadily increased through the decade.



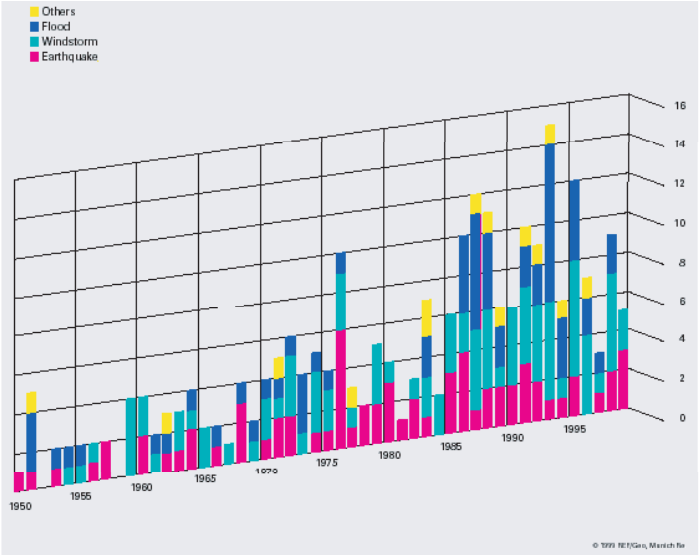


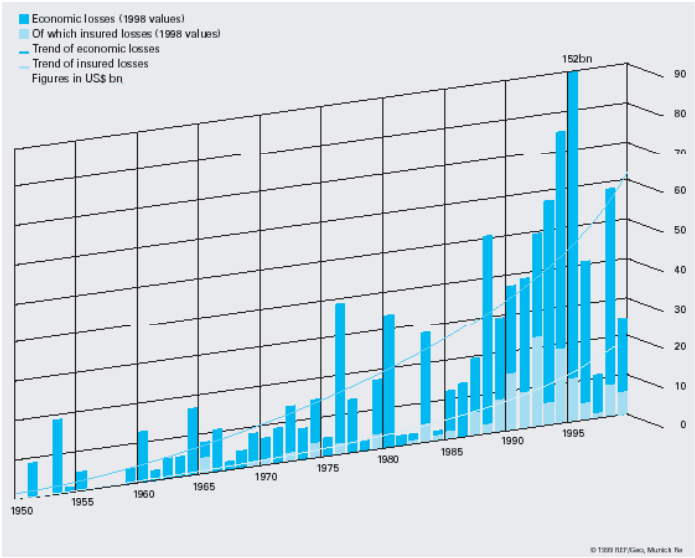


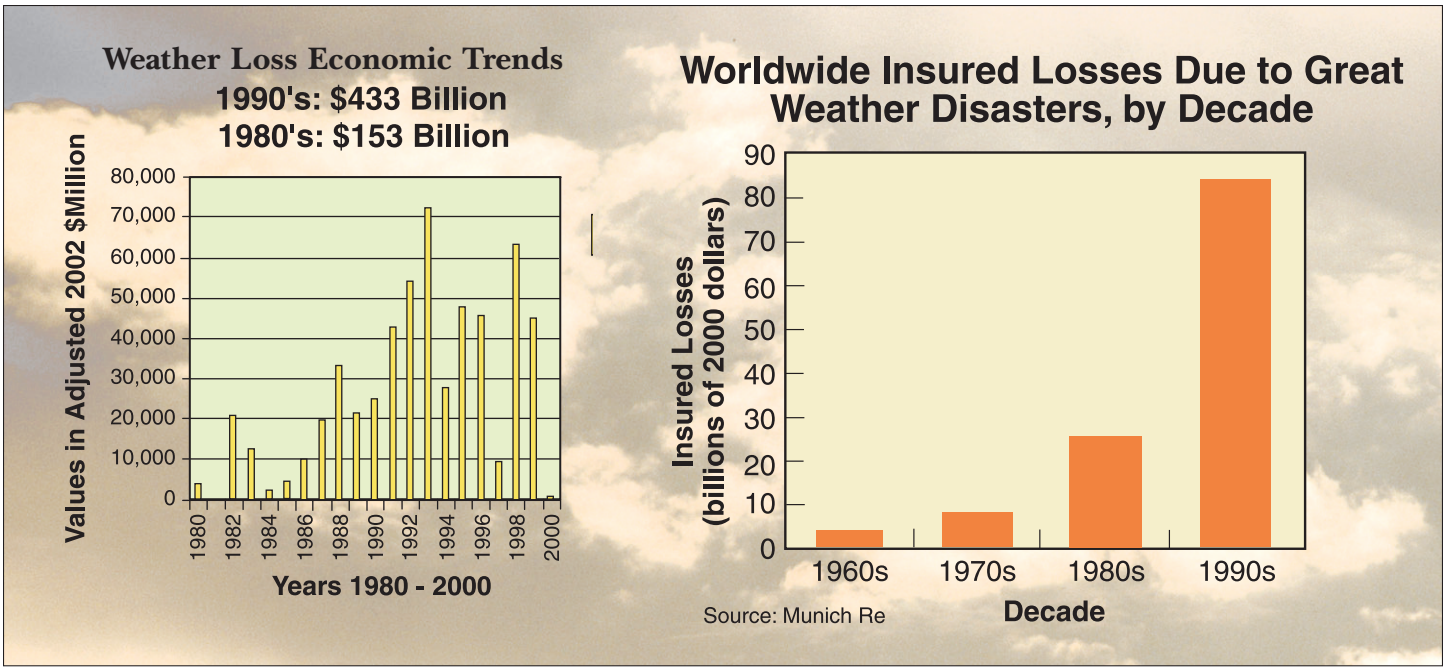
Economic Loss Due to climate change

Economic losses from severe weather can provide some measure of the current liability of CO2 emissions. There is no doubt that each region is contributing to global climate change. But what does this mean in terms of economic loss? The trends for global economic loss as related to storm events show an 180% increase in total economic losses for the 1990's as compared to the 1980's. This represents an increase of 280 billion dollars, from 153 billion to 433 billion dollars. Insured losses showed an increase from 25 billion in the 1980's to 90 billion in he 1990's. The economic losses reported are adjusted for 2002 dollars, and there seems to be a great deal of discrepancy with these figures to what was reported previously by international sources such as the Insurance group Munich RE. It is very difficult to get accurate loss figures from the global reinsurance companies as these figures are proprietary. Needless to say the insurance industry is concerned about climate change.

As can be gleaned from the graphs, the major increased areas of economic loss have to do with an escalating trend in wind and water related storms, rather than volcano and earthquake related storms. This is consistent with IPCC (International Panel for Climate Change) and others' predictions forecasting the violent effects of a warming environment.







There is no doubt that part of the increase in economic damage from severe weather is due to the increase in built capital over time such as housing, particularly in vulnerable coastal areas. Likewise, some of the increase in insured losses is due to the greater amount of insured property. Determining the amounts due to climate change and the amounts due to increased built capital and insurance was beyond the scope of this report.

However, independent of the increase in property or insurance, the frequency of severe weather has been increasing over the last several decades.

Definition of great natural catastrophies:
Natural catastrophies are classed as great if the ability of the region to help itself is distinctly overtaxed, making interregional or international assistance necessary. This is usually the case when thousands of people are killed, hundreds of thousands are made homeless, or when a country suffers substantial economic losses, depending on the economic circumstances generally prevailing in that country.

Long-term Statistics 1950 - 2002

Decade	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1999	Last 10 Years
Number	20	27	47	63	91	70
Economic Losses	42.1	75.5	138.4	213.9	659.9	550.9
Insured Losses	-	6.1	12.9	27.0	124.0	84.5

Factor	80s:60s	90s:60s	Last 10:60s
Number	2.3	3.4	2.6
Economic Losses	2.8	8.7	7.3
Insured Losses	4.4	20.4	13.9

Conclusion:

The liability of CO2 as a byproduct of fossil fuel emissions and built capital is demonstrated by the increase in severe weather and higher temperatures. The data shows evidence of a two fold increase in economic losses in the 1990's over the1980's, which are directly attributable to increased storms of both wind and water related nature. Not addressed in this investigation is concern about the possible shift in ocean conveyor belts which have historically warmed Europe. Further, there are other aspects of global warming which may instigate other dynamics not well understood, such as the sudden unloading of methane hydrate in the ocean. This could conceivably release massive amounts of methane into our atmosphere, a greenhouse gas even more potent than CO2.

CO_2 and climate related
economic losses section contributed by:
Tim C. White

REPORT ON:

Human Capital

Assets

- Education / Training
- Literacy
- Healthcare
- Life Expectancy
- Infant Mortality
- Clean Water / Sanitation

Liabilities

- HIV/AIDS, Malaria
- Tuberculosis
- Cigarettes
- Unemployment

Consolidated Balance Sheets

Report on Human Capital: Life Expectancy and Health Expenditures

Introduction:
In this report, human capital is not just a measurement of the physical labor of humans and the know-how stored in their brains, that might contribute to industrial production. We are defining Human Capital as a measure of all the human dimensions that contribute to well being. A variety of indicators could be used including life expectancy at birth, literacy or illiteracy rates, infant mortality rates, health expenditure, and education expenditure. In this section we will look at life expectancy at birth as a "stock" of years, and per capita health expenditure (in current United States dollars) as a flow of resources that adds or detracts from life expectancy. Data for life expectancy was obtained from the World Bank for the years 1990 and 2000. Data for per capita health expenditure was collected for the period 1990-1998, also from the World Bank. In analyzing this data, it was noted that health expenditure data was not available for any country in the Former Soviet Union until 1992 and most countries in the region until 1994.

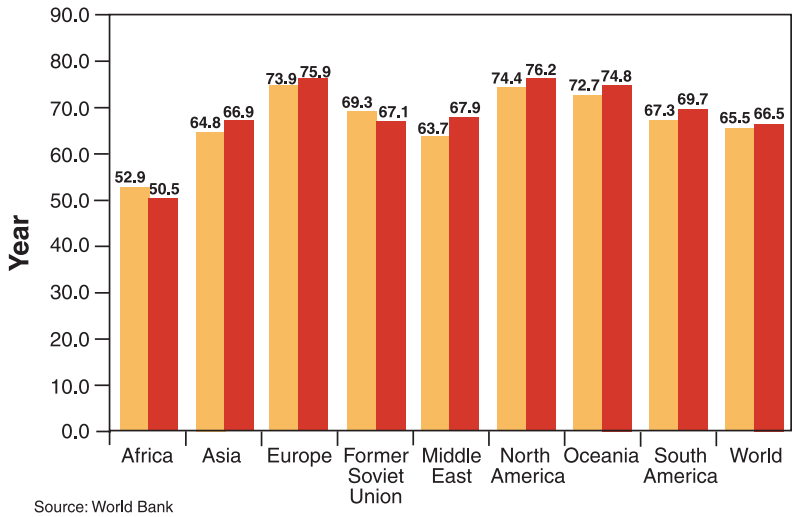
STOCKS: Life Expectancy
Worldwide average life expectancy increased slightly (1 year) from 65.5 years in 1990 to 66.5 years in 2000. Regionally, all areas except the former Soviet Union and Africa showed an increase. The Middle East experienced the largest gain of 4.2 years. In the Former Soviet Union and Africa, life expectancy decreased by 2.1 years and 2.4 years respectively.

In the Former Soviet Union, this decline is likely attributed to a variety of factors related to the collapse of the Soviet Union in 1990 and its republics declaring independence. The transition from centralized governance to independent states was not necessarily a smooth process and a decline in basic services was likely. According to United Nations Development Programme (UNDP),

> *"The political process of the breaking up of the Soviet Union has been remarkably peace ful, but also resulted in a "state desertion", with a governance vacuum still unresolved… When transition becomes only a partial process, primarily benefiting the young, the dynamic, the mobile, the connected, and leaving behind the vulnerable, then the surge in poverty, already so visible, will destabilize societies and reverse whatever this new economic growth is capable of."* (UNDP/RBEC, 1999)

Additionally, the decline may be a result of problems with the data. Because the Soviet Union and its republics were undergoing major changes in 1990, the data collected

Average Life Expectancy at Birth



Source: World Bank

during that transition period is likely to be less accurate than more recent data. As noted above, health expenditure data was not even available during the early 1990s. In acknowledgement of the need for better data in this region, the UNDP Regional Bureau for Europe and the Commonwealth of Independent States (REBC), responded by developing a program for Human Development Statistics and Reporting in the early 1990s. The goal of this program is to meet the "urgent need to develop, collect, analyze and publish social and demographic statistics" (UNDP/ RBEC), and it began publishing National Human Development Reports in 1995.

Each year the report publishes the latest trends in the quality of people's lives as measured by economic factors, including per capita GNP, social and human factors, such as health and education (UNDP/ RBEC). Therefore, post-1985 data probably more accurately depicts trends in this region.

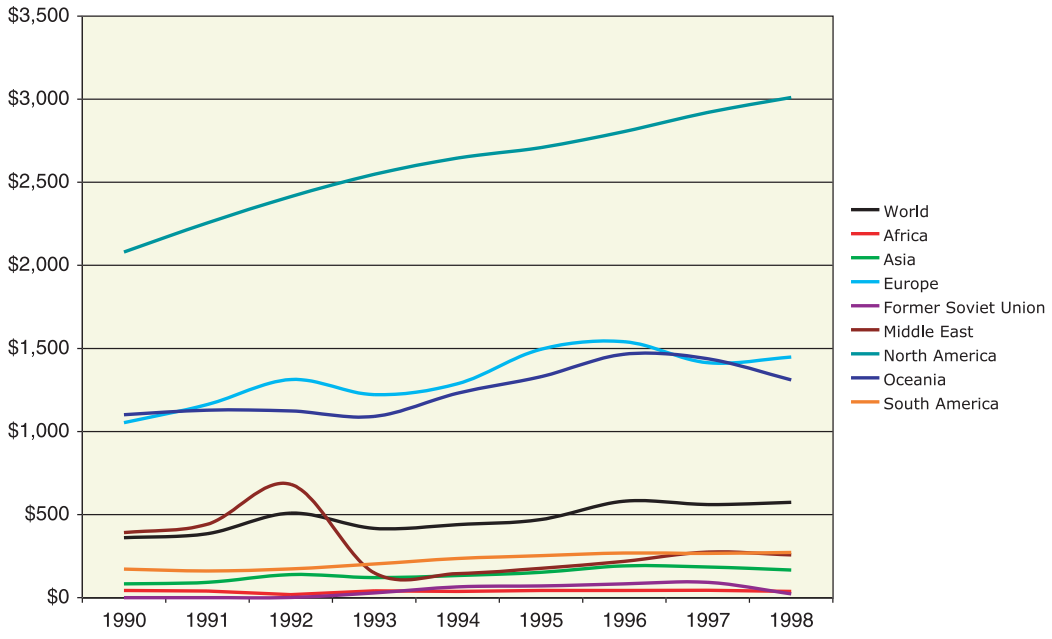
Decline in life expectancy in Africa is primarily attributed to the HIV/AIDS epidemic on the continent. Worldwide outbreaks began in the mid-1980s and between 1990 and 2000 the disease reached epidemic levels on the African continent. Africa continues to dwarf the rest of the world in how the region has been affected by HIV/AIDS. It is home to 70% of the adults and 80% of the children living with HIV/AIDS in the world (AVERT). The impacts of the epidemic are both human and socioeconomic. The challenge facing Africa is not only in "sustaining and expanding prevention successes, but in providing adequate treatment, care and support to the millions of people living with HIV/AIDS or orphaned by the epidemic" (UNAIDS, 2002).

FLOWS: Health Expenditures

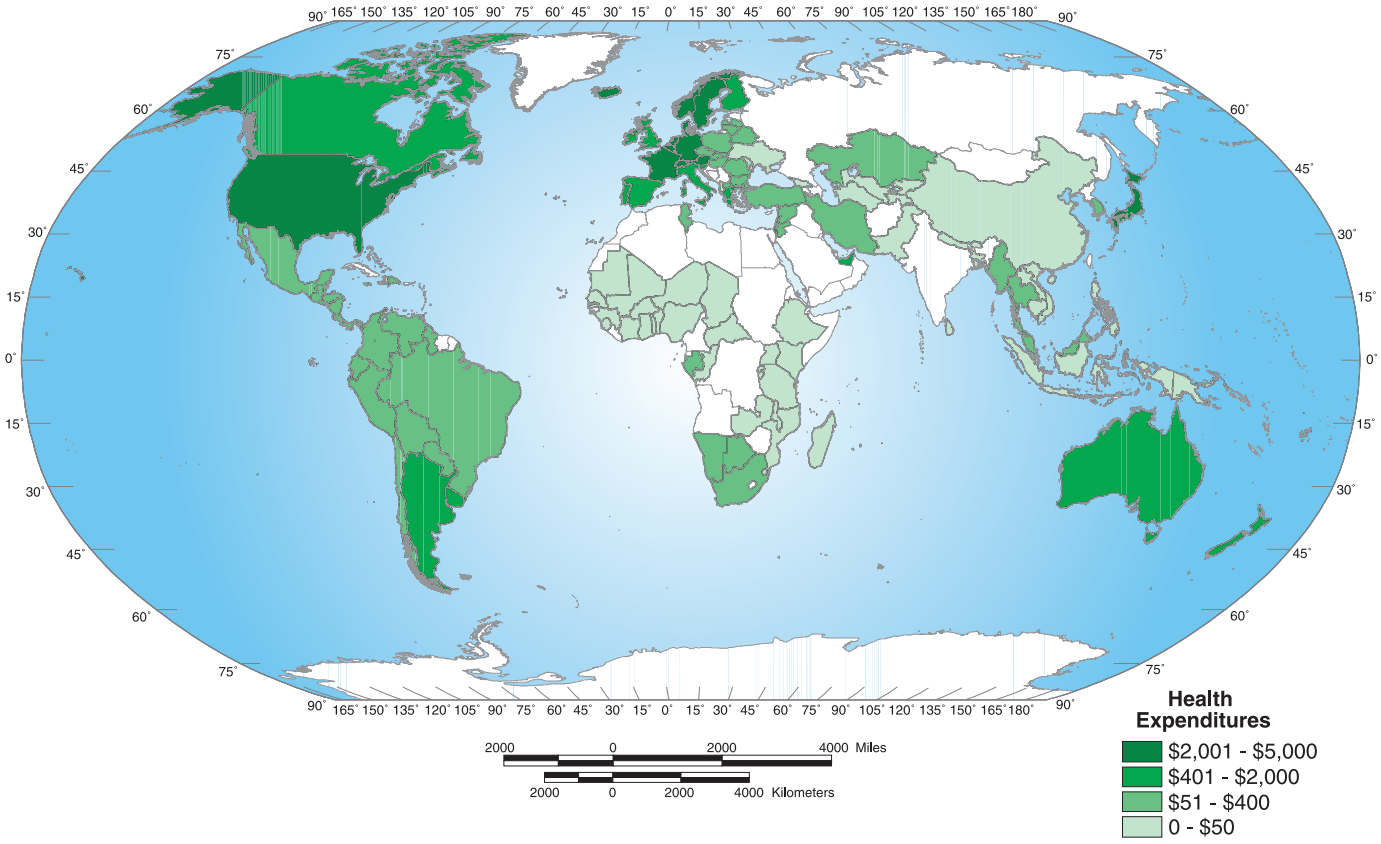
Expenditure on healthcare varies tremendously around the world (Figure 2). For example, in 1998 the United States spent $3,010.39 on each of its citizens while Ethiopia expended only $4 per person. In 1998, on average, $597.29 was spent on each world citizen. This amount represents about a 50 percent increase per capita healthcare expenditure worldwide since the 1990 average of $373.50.

Regions seem to cluster in three groups regarding per capita health expenditure: less than $500, between $1,000 and $2,000, and greater than $2,000. The regions containing countries typically considered to be developing generally comprise the less than $500 category, including Africa, Asia, Former Soviet Union, South America, and the Middle East. Oceania and Europe are in the second category with per capita health spending generally in the $1,100 to $1,500 range. North America is the lone region in the final category. It is important to note that in

Per Capita Health Expenditure by Region 1990-1998



Per Capita Health Expenditures, 1990 - 1998

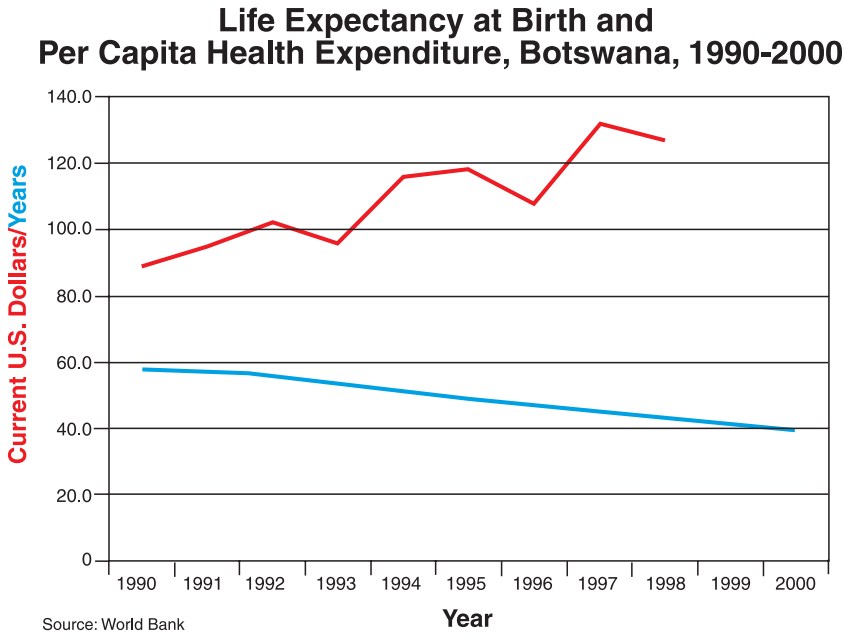


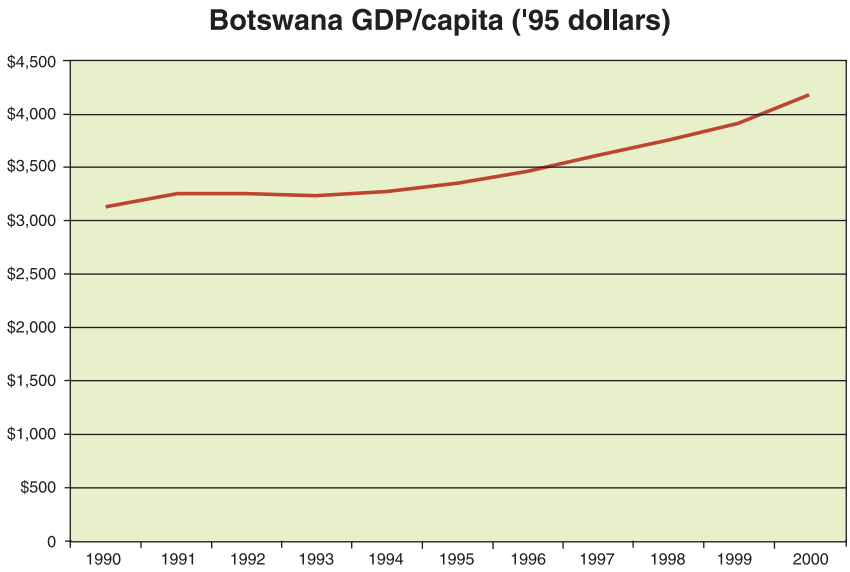
some regions one or two countries dominate the regional averages. In Oceania for example, New Zealand ($1133) and Australia ($1714 per capita in 1998) expenditures shape the regional average and make it appear as though the region has adequate resources for healthcare. However, the other two countries in the region for which 1998 data is available, Fiji and Papua New Guinea, have very low expenditures- $86 and $25 respectively. Canada and the United States' high expenditures similarly mask Mexico's low expenditure in the regional averages. Mexico should be among the countries that spend under $500 per capita on healthcare.

Case Study: Botswana

Botswana has a relatively high per capita health expenditure compared to other countries in the Africa region. Spending ranges from a low $89 in 1990 to a high of $132 in 1997. This is well above the average in the region which ranges from a low of $17.76 in 1993 to a high of $44.70 in 1996. Despite this, Botswana experienced the most serious decline in the world of life expectancy, dropping from 56.8 years in 1990 to 39.0 years in 2000. This decline can be attributed to the HIV/AIDS epidemic which is occurring on the African continent. Due to this epidemic, life expectancy at birth has been reduced to 39 years since the first reported case in 1985. The United States Agency for International Development (USAID, 2002) predicted that life expectancy would have been 72 years, if it were not for AIDS. While 19 percent of the general population has HIV/AIDS, the prevalence rates vary by age group. HIV/AIDS prevalence rate for those ages 15-49 is 39 percent, the highest in the world (Fredriksson & Kanabus). For individuals 15 years old and younger the rate of HIV/AIDS is less than 2 percent, but 58.1% (males) and 41.9% (female) of infant deaths are due to HIV/AIDS (UNDP Botswana).

This example illustrates that the government increasing health expenditure does not necessarily positively correlate to improved health for all its citizens, as reflected in life expectancy. The





(UNDP) states:

> *"Unlike in many other developing countries, in Botswana, financial resources have never been the most critical constraint on the design and imple mentation of a comprehensive and coherent HIV and AIDS programme. Yet, in 1998, 13 years since the first case of HIV and AIDS was reported, there was no semblance of a coherent government, let alone nation-wide, response to the epidemic."*

Additionally, money that was invested into the epidemic had a low impact because:

> *"The volume of public resources allocated to its containment betrayed limited appreciation of the implications of HIV and AIDS for the economy, society, households and individuals. Policy and programme responses were thus severely hamstrung by excessive focus on government, especially the Ministry of Health, to the exclusion of other actors. (UNDP)*

During the period when life expectancy declined by nearly 18 years, Botswana's real GDP per capita was rising by nearly 34%. This was not due to a reduction in population, because despite the decline in life expectancy, the overall population of the country was increasing due to a high birth rate. Greater economic wealth per person was produced in 2000 than in 1990, but this had no impact on life expectancy, and as previously explained, money was not the limiting factor. This demonstrates how ludicrous it is to use GDP as a measure of human wellbeing.

However, there is hope for the region. Botswana is politically stable and has enjoyed a period of unbroken peace since 1966. Additionally, it has a steady and relatively lucrative income as a result of its diamond mines. The government is recognizing that its resources were not being targeted correctly and therefore not successfully containing the HIV/AIDS epidemic plaguing the country. The most recent response effort (1997-2002) was expanded to include education, prevention and comprehensive care including the provision of antiretroviral treatment and to include many previously excluded stakeholders, such as youth and pregnant women. The overall aim is "not only of reducing HIV infection and transmission, but also reducing the impact of HIV and AIDS at all levels of society" (AVERT).

This report only touched on two aspects of human capital, life expectancy and health expenditure. In further investigating this relationship for the Former Soviet Union region and for Botswana, it was clear a multitude of factors impact both the amount of resources devoted to healthcare and life expectancy. These cases illustrate that government stability, equality, the HIV/AIDS epidemic, the manner in which government finances are allocated, the types of health-related programs the government supports, and many other factors are influential for human capital.

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Human Capital section contributed by:
Karen Fligger

REPORT ON:

Social Capital

Assets

- Networks
- Volunteering
- Trust
- Democracy / Political Transparency
- Freedom-Press, Political, Organizing
- International Treaties

Liabilities

- Inequality
- Refugees
- Crime
- Suicide
- Military Actions

Consolidated Balance Sheets

Diplomatic Capital - Social Capital at a Global Scale

Introduction:

Robert Putnam expounds at length the concept of social capital in Bowling Alone (Simon and Schuster 2000). He describes social capital as the networks of individuals - formal and informal, which grease the wheels of civic society. "The community as a whole will benefit from the cooperation of its parts," wrote L.J. Hanifan, an early social capitalist, in 1916. This section looks at networks on a global scale, where the individual units are not persons, but nations. We attempt to answer the following: Are we as a community of nations increasingly being governed by common laws and norms? Are we agreeing to live harmoniously together, to treat each other well, and to participate in the stewardship of our common home? Is our global network expanding? Is there a measurable impact on our wellbeing of belonging to an international network?

Methods:

Multilateral international treaties signed before 1990 and between 1990 and 2000 were examined. Scores of treaties exist and it wasn't possible to examine all of them, so several lists of treaties were used: the CIA's list of major environmental treaties (Including some that are hybrid environmental and peace agreements such as the Test Ban Treaty); the UN's list of major human rights treaties; and two other peace treaties -- the Non-proliferation Treaty and the Chemical Weapons Convention -- found on the US State Department's website.

Selected examples of treaties used:

- Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water
- Treaty on Non-proliferation of Nuclear Weapons
- Convention on Wetlands of International Importance (Ramsar)
- Montreal Protocol on Substances that Deplete the Ozone Layer
- Convention on Biological Diversity
- International Convention on the Elimination of All Forms of Racial Discrimination
- Convention on the Elimination of All Forms of Racial Discrimination Against Women

STOCK:

Correlations with Wellbeing

Because the ultimate goal of this report is to demonstrate the impact that each type of capital has on sustainable human wellbeing, correlations were done between various measures of wellbeing and number of treaties signed. Robert Prescott-Allen's Human Wellbeing Index is based on a range of factors including life expectancy, fertility rate, GDP, inflation, unemployment, public debt, primary, secondary, and university enrollment, communications, political rights, civil liberties, and corruption. The HWI for 2000 correlates significantly (though not very strongly) with number of treaties signed (see Figure 2). The UN's Human Development Index rank for 2000 (based on life expectancy at birth, adult literacy, school enrollment, and GDP) shows a stronger correlation with treaties signed (see Figure 3). There is also a very weak but statistically significant correlation between Life Satisfaction (as measured by the World Values Survey) and treaties signed (see Figure 4).

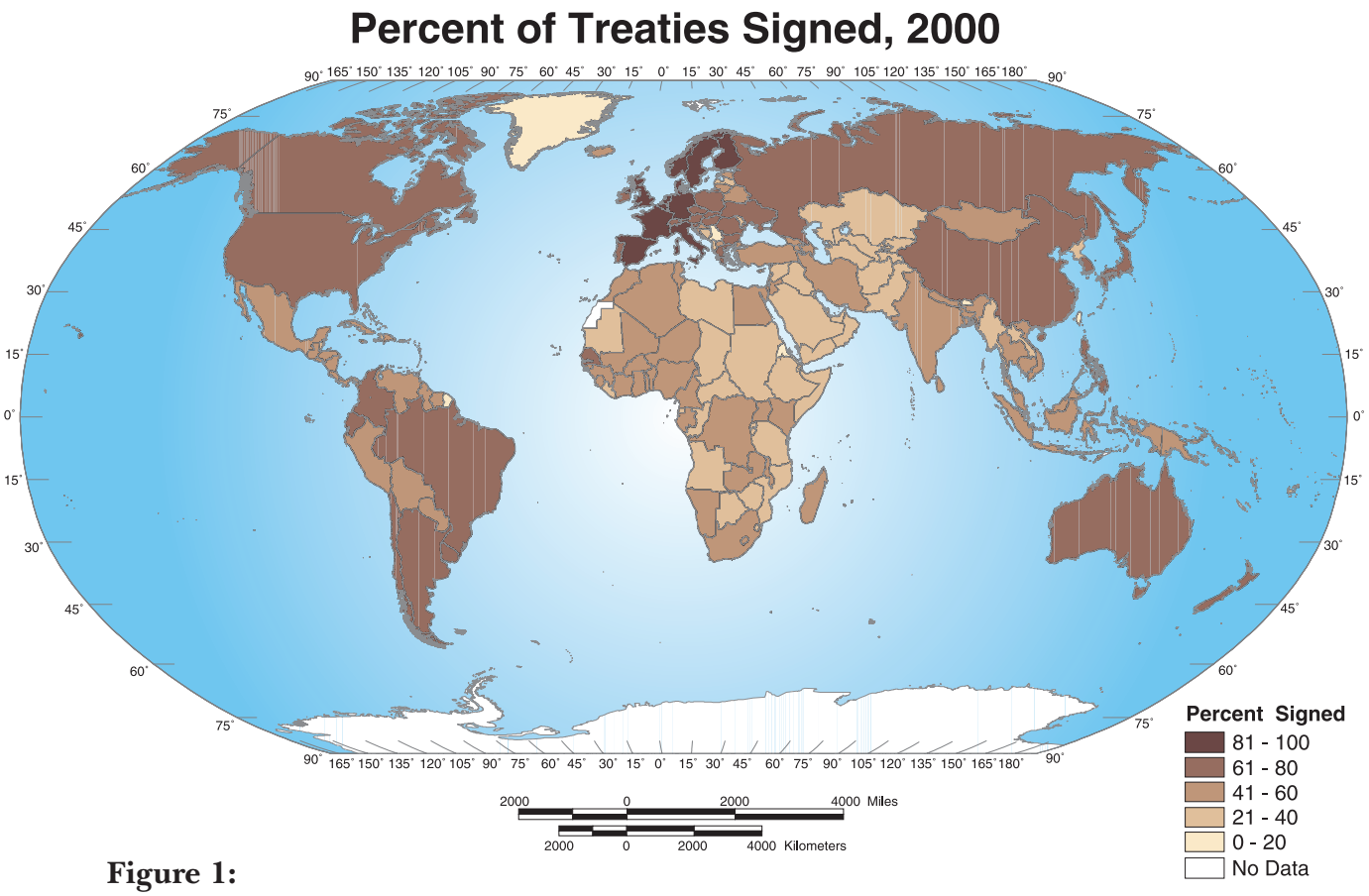

Figure 1:

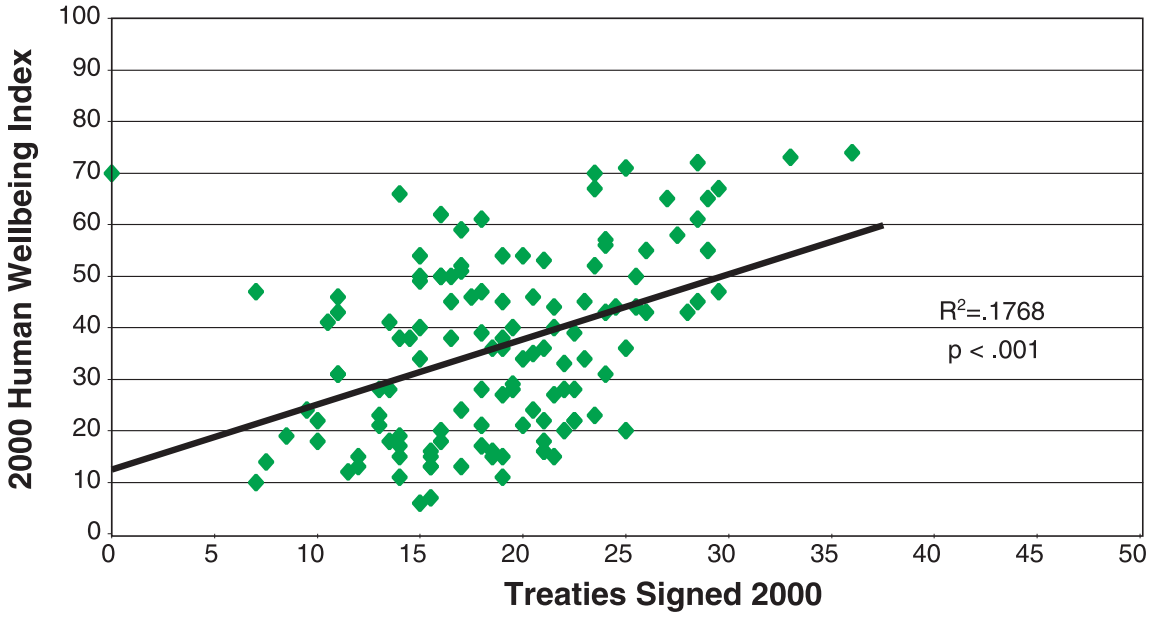

Figure 2: Human Wellbeing Index for 2000 plotted against treaties signed 2000

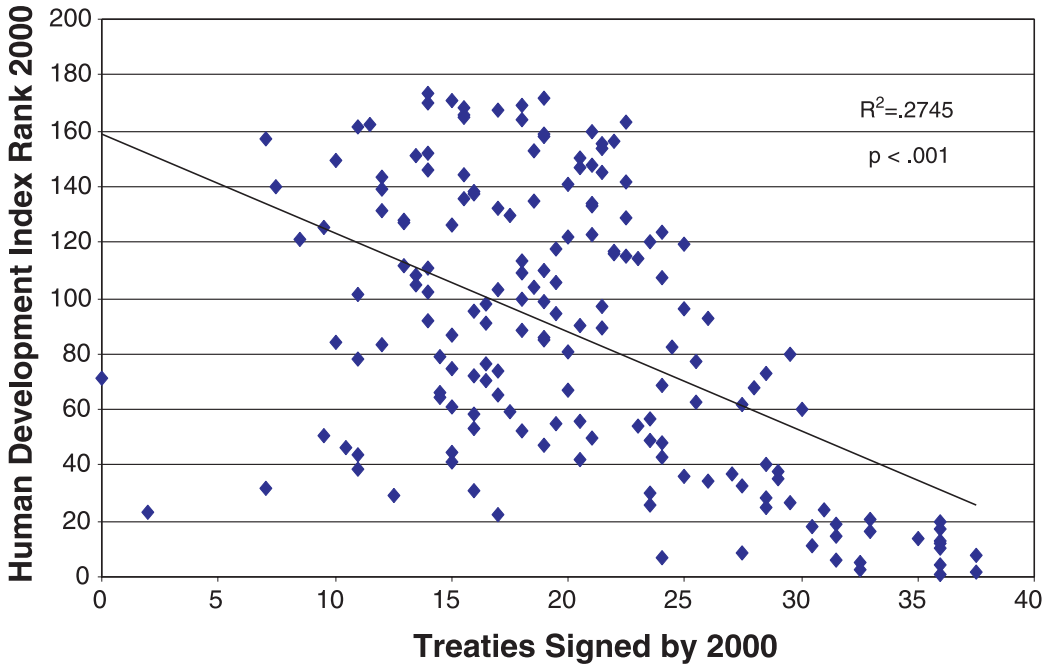

Figure 3: U.N. Human Development Index Rank for 2000 plotted against treaties signed 2000

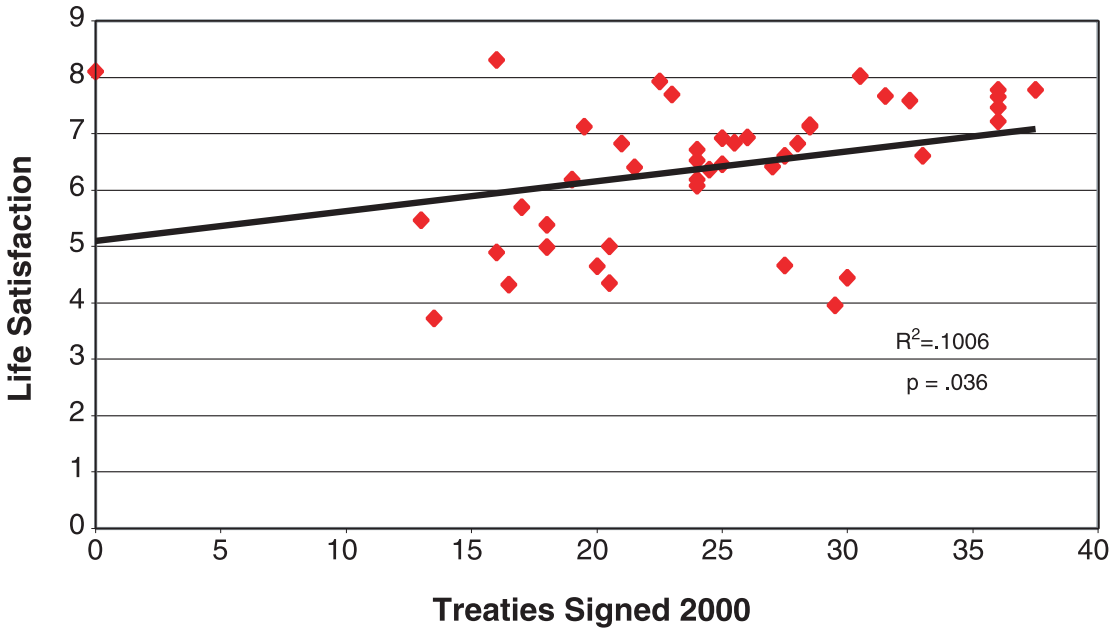

Figure 4: World Values Survey Life Satisfaction Scores for 1995 plotted against treaties signed 2000

These correlations are interesting because they show that a relationship might exist between what seem to be fairly independent variables. One possible interpretation is that the citizens of nations who are part of a global network are better off - more secure, better educated, healthier, etc. Or one might simply say governments which act in the interests of their people do so in all their spheres of influence: foreign and domestic. Alternatively, one might say that a government, be it a democracy or dictatorship, is a reflection of the mindset of the people of that nation, and hence interactions and networks at the government scale are a reflection of interactions and networks at the individual level. A nation of cooperators will sign many treaties, a nation of lone rebel independent types will sign fewer. It would be a good idea to plot treaties signed against GDP also, since it does seem that wealthier nations may sign more treaties.

Sweden and the Netherlands are noteworthy because they are party to 91.5% of the treaties examined here - the highest rate of any country. These countries also have very high standards of living, codes of social responsibility, high levels of education, etc. We might suspect that if Putnam were to measure social capital in these countries, it would be high as well. It's also interesting to note that Sweden has the highest GPI rating of any nation.

FLOWS:

The results seem to indicate an increasing level of connection between nations, an intensifying in density of a world network between 1990 and 2000. As a world community we averaged a 39.2% signature rate per nation in 1990 and a 43.7% signature rate per nation in 2000 for the treaties selected. This proportional increase is compounded by an absolute increase in the number of treaties available for signature (of those treaty areas examined, 26 were available 1990, 41 in 2000).

With the exception of South America, all regions have shown an increase in proportion of treaties signed between 1990 and 2000 (see Figure 1). The Former Soviet Union stands out as the region where this increase has been most dramatic. This can be explained in large part by the rearrangement of political boundaries in this part of the world during the period examined (see Problems and Errors). It might also be viewed as evidence that these young nations are buying into the concept of international cooperation and making the international network a priority during their early stages of organization.

Individual nations show mixed results, with some increasing in proportion of treaties signed and others decreasing. The United States was among the nations with the highest rates of signature in 2000 and showed a substantial increase from 1990 to 2000. Extending the analysis to 2003 might reverse this trend, as several major multilateral treaties have been broken by the Bush administration while others are going unratified.

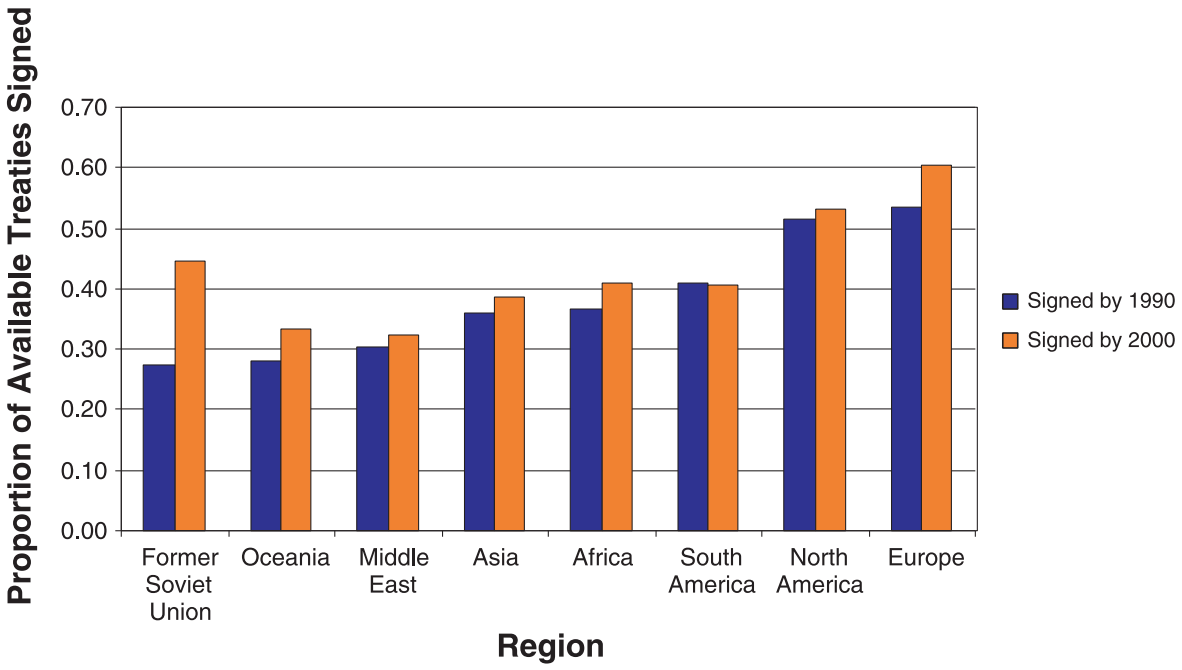

Figure 1: Change in Proportion of Treaties Signed from 1990 to 2000 by Region

PROBLEMS/ERRORS:

There are problems with using the signing of treaties to measure a world network of cooperation. In the first place, signing a treaty doesn't guarantee compliance, neither is there any guarantee that a new administration will feel itself bound by treaties an older administration signed. It's interesting that North Korea signed the Nuclear Nonproliferation Treaty in 1985 and Afghanistan signed the Convention on the Elimination of All Forms of Discrimination Against Women in 1980.

It is interesting to consider what Putnam might have to say about the merits of measuring the strength of a diplomatic network through treaties. Perhaps he would argue that treaties are the international version of contracts, which have increased significantly in recent years along with the number of lawyers who must see to it that they're done right. According to Putnam, the erosion of trust among individuals has led to an increase in the formalized "put it in writing" sort of trust provided by contracts and a rapidly growing legal profession. There are however, few other ways to measure trust and cooperation between nations.

The fact that international boundaries fluctuated between 1990 and 2000 complicates matters. It is responsible for the large regional jump for the former Soviet Union, whose individual states did not yet exist in 1990. The status of Yugoslavia and of Czechoslovakia also changed during the course of the decade, leaving smaller nations whose names were not on the map in 1990.

This illustrates one problem with data collection from different sources. The environmental treaty data are from the CIA's online World Factbook. In this format, each treaty has a list of parties as well as information about when the treaty was opened for signature and when it went into effect. It does not include the date each country signed the agreement. This explains why nations belonging to the former Soviet Union and Yugoslavia that did not yet exist in 1990 are recorded as having signed treaties prior to that time. While data for countries that did not exist before 1990 could simply be removed, this would only eliminate some of the error, since there may be other countries that are recorded as having signed a given environmental treaty by 1990 that in fact signed it later. The best way to correct this problem would be to find another environmental treaty database that includes the year a country signed.

The human rights treaty data, which came from the UN by way of a University of Minnesota website, was presented in a different format. Here information was provided about the date of signature for each nation. For the human rights treaties, 1990 and 2000 data reflect both which treaties were available for signature and who had signed them at that point.

The non-proliferation treaty data came from the state department and included year of signature. The Chemical Weapons Agreement data came from the state department as well and included only the original signatories.

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Social Capital Section contributed by:
Brynne E. Lazarus

REPORT ON:

Shareholder Equity

Equity From:

- Human & Social Services
- Common Assets
- Natural Capital
- Ecosystem Services

Shareholder Equity

Equity: Definition (Merriam-Webster Online)
1a: a right, claim, or interest existing or valid in equity
b: the money value of a property or of an interest in a property in excess of claims or liens against it
c: a risk interest or ownership right in property
d: the common stock of a corporation

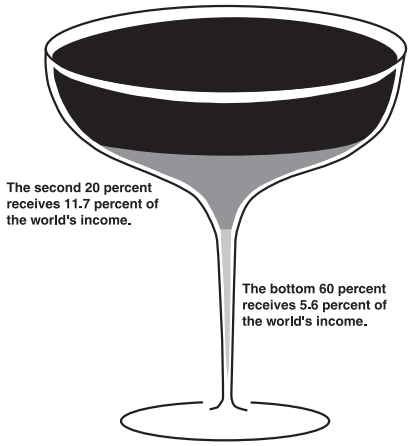
2 a : justice according to natural law or right; specifically : freedom from bias or favoritism

Current Status of Earth Shareholder Equity

The World Bank has calculated financial wealth per capita based on human, produced and natural capital as follows. The chart at right displays those results.

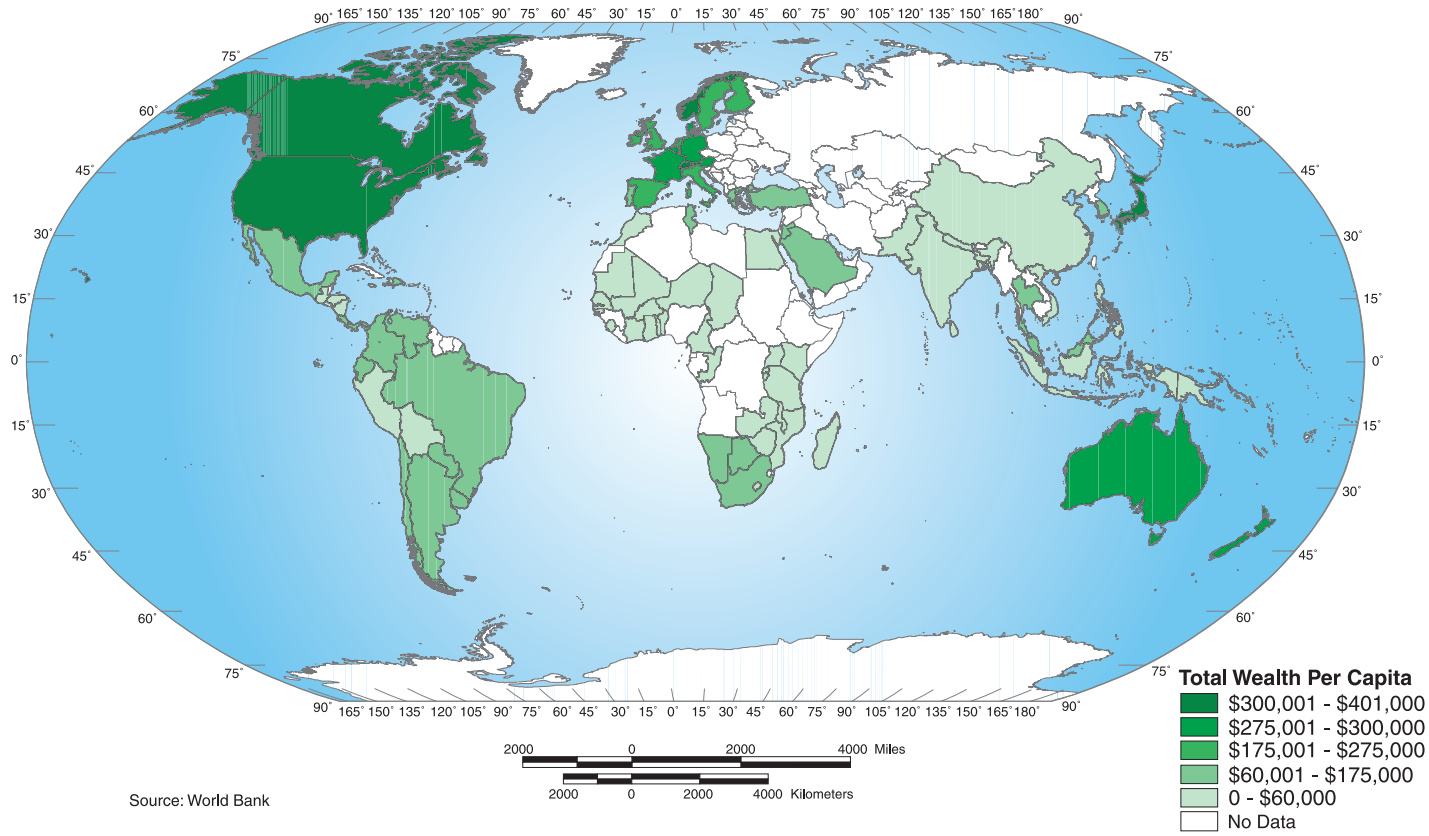
This information by itself provides an incomplete picture of the status of Earth Shareholder Equity because it leaves out the distribution of wealth. The graphic at right portrays the current distribution of financial wealth globally:

World Region	Total Wealth	Human Resources	Produced Assets	Natural Capital
North America	326,000	249,000	62,000	16,000
Pacific OECD	302,000	205,000	90,000	8,000
Western Europe	237,000	177,000	55,000	6,000
Middle East	150,000	65,000	27,000	58,000
South America	95,000	70,000	16,000	9,000
North Africa	55,000	38,000	14,000	3,000
Central America	52,000	41,000	8,000	3,000
Caribbean	48,000	33,000	10,000	5,000
East Asia	47,000	36,000	7,00 0	4,000
East and Southern Africa	30,000	20,000	7,000	3,000
West Africa	22,000	13,000	4,000	5,000
South Asia	22,000	14,000	4,000	4,000



Source: U.N. Development Programme

Total Financial Wealth Per Capita



Source: World Bank

During the 1990's this trend has accelerated. In 1960 the top 20% of world population had an income 30 times greater than the bottom 20%. As of 1995 the richest 20% had 82 times the income of the bottom 20%. Between 1987 and 1993 the number of people with incomes of less than $1 per day increased by almost 100 million to $1.3 billion. In 100 countries, income per inhabitant today is lower than it was in 1985. 1.6 billion individuals now live worse than at the beginning of the 1980's. Clearly the growth in world GDP alone, from 1990-2000, is an inadequate indicator of global financial wealth.

What does an Earth Shareholder own? What is a share of the earth?
The distribution of wealth from produced assets and human resources will always be subject to debate and negotiation among various interests, governments, and political systems around the world. In this report we would like to focus on those resources which are inherently the common property of all Earth Shareholders, namely those assets produced neither by labor, nor by capital.

As a shareholder in Earth, Inc. each person on Earth shares a common inheritance of natural and cultural assets. These assets contribute actual or potential dividends to everyone on Earth. Actual and potential dividends can be computed on a per capita basis for ecosystem services, human and social services, and rent on natural and common assets. Our operating assumption will be that the contributions to welfare from natural capital and the shared cultural heritage of humankind should be equitably distributed among all shareholders, while the value added to these assets by individual or collective effort (labor or capital) should belong to the individuals who contributed that value.

Additionally, our goal in managing "Earth Inc." should be to create sustainable Shareholder Equity rather than short-term dividends. Therefore, Earth, Inc. should be managed to create a perpetual stream of benefits to shareholders, rather than be liquidated as quickly as possible for maximum short-term gain.

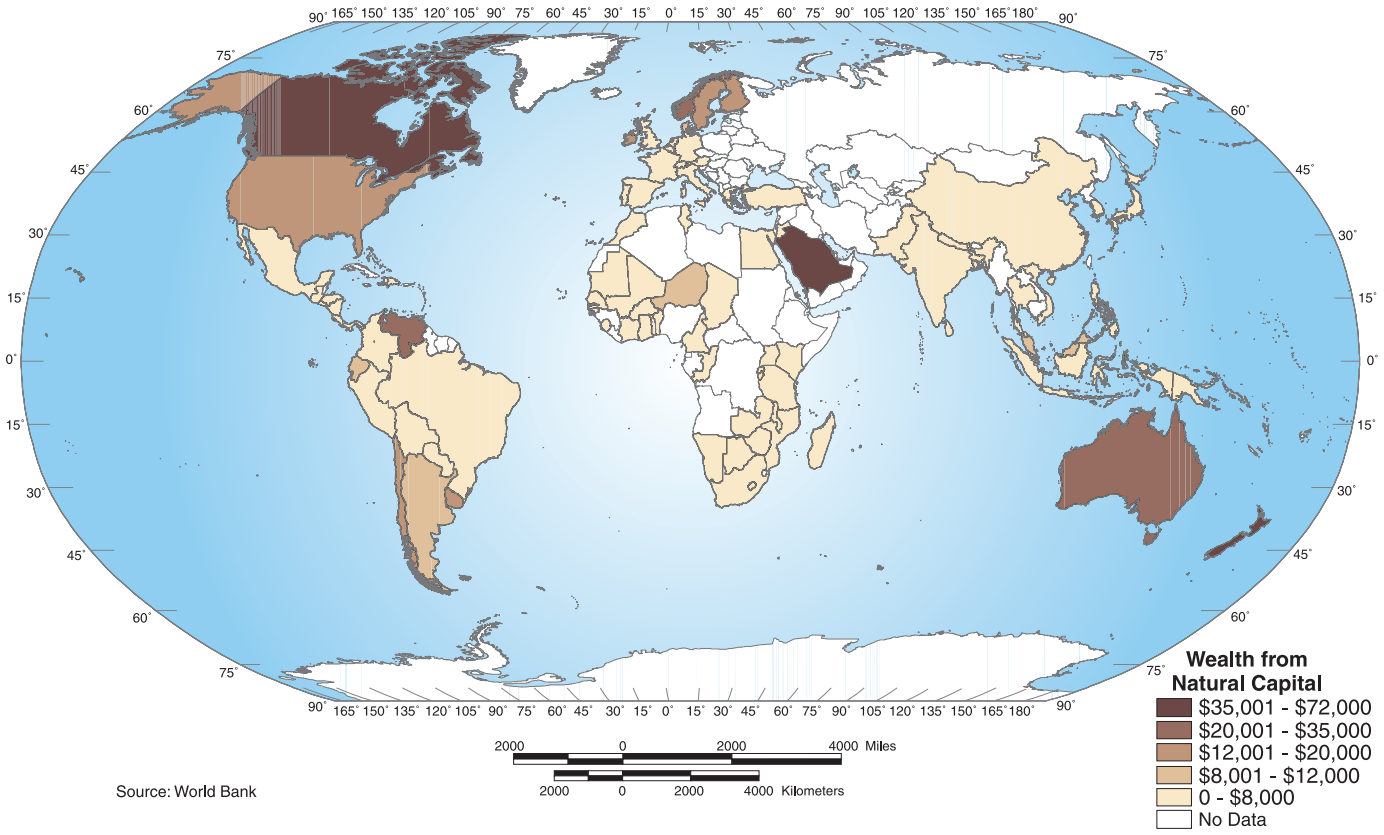
Equity from Human and Social Services:
Governments often provide services to their citizens from tax funding, which in many countries includes health care, education, welfare, unemployment, old age pensions, and disability. Governments often provide infrastructure such as roads, rail, water and sewage treatment. Other government services include research funding, access to museums, public lands and national parks. Governments provide for common defense, regulate the environment and working conditions, and operate the judicial system. These benefits provide for human welfare, but are very unequally distributed globally.

Equity from Common Assets
Many public goods cannot be assigned property rights and are inherently public such as the atmosphere, ozone layer, national defense, judicial system, etc. There is a class of public goods, which in the past had no property rights assigned, that have been termed common assets. These include the electromagnetic broadcast spectrum, fishing rights, mineral rights, aircraft landing rights, orbital satellite slots, products of government research such as the internet, patents on genetic structure, cap and trade permits for emissions of pollutants such as Sulphur dioxide, Nox, or Co2, etc. Rental values on these assets could be retained as earth shareholder equity, instead of being privatized as many of them are being done currently.

Equity from Natural Capital
UN Resolution 1803 (XVII) of 14 December, 1962/ Declaration of Permanent Sovereignty over Natural Resources:
"Violation of the rights of peoples and nations to sovereignty over their natural wealth and resources is contrary to the spirit and principles of the Charter of the UN, and hinders the development of international co-operation and the maintenance of peace."

Another View:
"The meek shall inherit the earth…
Except for the mineral rights."
J. Paul Getty

Per Capita Wealth from Natural Capital



Source: World Bank

Country	Natural Capital
North America	16,000
Pacific OECD	8,000
Western Europe	6,000
Middle East	58,000
South America	9,000
North Africa	3,000
Central America	3,000
Caribbean	5,000
East Asia	4,000
East and Southern Africa	3,000
West Africa	5,000
South Asia	4,000

Total National wealth from Natural capital has been calculated regionally by the World Bank for 1997 including pasture land, crop land, timber resources, non-timber resources, protected areas, and subsoil assets. Urban land was included in built capital, but should be included in natural capital, and would add a substantial amount.

NOTE from World Bank report; *"It should be mentioned at the outset that natural capital values are primarily based on instrumental or use values of the environment and that important ecological and life support functions of natural systems have not been valued. Depleting natural capital reduces the value of ecosystems services…[Harvesting renewable natural capital at a sustainable rate can maintain the same level of ecosystem services.] For countries rich in sub-soil assets the importance of investing, rather than consuming, returns from extraction of oil, minerals, coal, gas, and other exhaustible resources needs to be stressed."*

Equity from Ecosystem services

Adding to the natural capital values calculated by the World Bank are the values of ecosystem services. The services of nature provide at least $33 Trillion worth of free benefits to humans, which is equivalent to $5322 each for the 6.2 billion people on earth. These services include:

Gas, climate, and water Regulation, Water supply, Erosion control, Soil formation, Nutrient cycling, Waste treatment, Pollination, Biological control, Habitat, Food production, Raw materials, Genetic resources, Recreation, Cultural resources.

A Model for Sustainability and Shareholder Equity

An existing model of shareholder equity in natural capital, combined with weak sustainability currently exists in the US state of Alaska. Oil resources in Alaska belong to the people of the

state. The severance tax rate on oil is 12.25%-15% of extraction value depending on the age of the oil field, and 10% on natural gas. Royalties paid by oil companies drilling in Alaska are partly used for state revenue, but a large portion is placed in a permanent fund (APF), which is invested for the benefit of the citizens of Alaska. Without depleting the capital fund, interest is paid as an annual dividend to every resident of Alaska who has lived in the state for more than one year. Payments have averaged over $1000 per year in recent years (Table1).

Table 1

21 years of dividends	
2002	$1,540.76
2001	$1,850.28
2000	$1,963.86
1999	$1,769.84
1998	$1,540.88
1997	$1,296.54
1996	$1,130.68
1995	$990.30
1994	$983.90
1993	$949.46
1992	$915.84
1991	$931.34
1990	$952.63
1989	$873.16
1988	$826.93
1987	$708.19
1986	$556.26
1985	$404.00
1984	$331.29
1983	$386.15
1982	$1,000.00

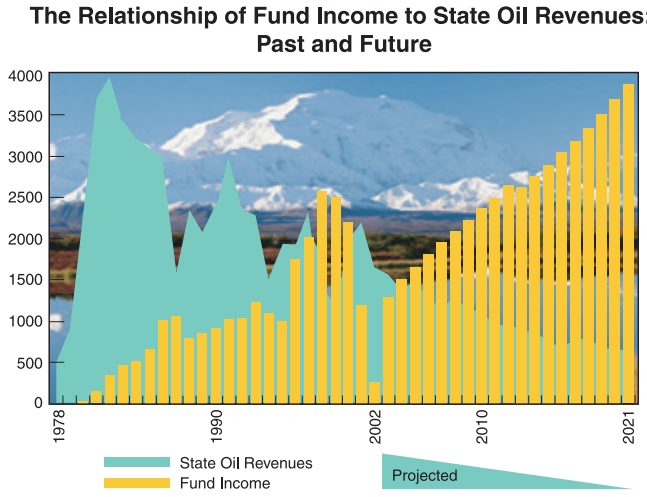


Figure 2: Alaska Model

Figure 2 illustrates the transformation of natural capital into a sustainable stream of financial capital. As state oil resources are used up, the citizens of Alaska will still have a large and growing capital fund earning interest for them. This will continue indefinitely as long as the fund is managed well, and the state government is prevented from spending the funds.

The APF demonstrates the principle of weak sustainability replacing oil income with investment income. This assumes that oil is replaceable (substitutable) by money, a highly dubious assumption, considering the unique qualities of oil. The APF is one of the few cases in the world where the public has obtained property rights to natural capital. Governments usually retain rights to these resources, and revenues are used for general government expenditures, or quite often end up in the bank accounts of government officials, especially in authoritarian regimes. By establishing earth shareholder equity to common assets and natural capital, these benefits will accrue to the population at large, rather than to government officials and their associates, or to corporate owners.

Case studies of Shareholder Equity

Kuwait has an estimated oil reserve of more than 94 billion barrels, translating into a per citizen oil wealth of 142,000 barrels, which at today's levels is worth $2.1 million per person. However, mismanagement, militarization, and lack of a private market economy have resulted in a Kuwaiti budget deficit. Recent proposals for a Niger Delta fund and Iraq fund would establish oil funds in these countries paying direct dividends to the populace rather than enriching their undemocratic rulers.

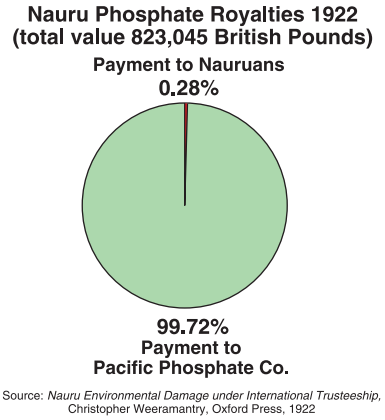


Figure 3: Business as usual model

In 1968, following years of struggle, the island of Nauru gained independence and control over their lucrative phosphate deposits. From then on, the annual income from phosphates of around $100 million was shared between The Nauru Royalties Trust Fund, Nauruan landowners and the Government. By 1976, the annual tax-free income for every Nauruan had reached $37,000.

Nauru has also invested these funds for the time when phosphate runs out. By no means was this resource managed wisely or sustainably, and the island has been devastated. The people have high levels of obesity and severe health problems such as diabetes. Nevertheless, Nauru is one of the few examples where people have regained equity in their own natural assets.

Usurious rates of rent on agricultural land paid by tenant farmers around the world has been cited by nobel prize winning economist Joseph Stiglitz as a major cause of poverty. This is another egregious case of denying earth shareholders equity in their own resources, and allowing this equity to be privatized into a small group of hands. One of the highest sources of natural capital equity is in urban land value, which is often taxed somewhat for local public services, but the vast majority of land rent accrues to private landowners. By contrast, all land in Canberra, Australia the nation's capital, is owned by the Commonwealth of Australia. Land is leased for a term, usually 99 years. Leasehold tenure was adopted so that speculation in undeveloped land could be avoided, and future increases in the value of land remained in the public purse.

Hong Kong, China also grants 50 year leases to land, subject to a 3% rental payment. Recently the islands of Eigg and Gigha in Scotland bought back the rights to all the land on the islands and put them into community ownership.

In the past wealth from natural and common assets has flowed mostly into the hands of government or private individuals and corporations. The trend towards privatization of unclaimed natural and common assets is accelerating. To counteract that trend Earth Shareholders are inherently entitled to equity in those assets which are not the products of labor or capital, and to democratically choose the amount paid in dividends and the proportion spent on government services.

The Bottom Line

Consolidated Statement of Operations
THE BOTTOM LINE

Sustainable Human Wellbeing

Sustainable human wellbeing is the new bottom line. In the final Earth Shareholder's Report this section will make an attempt to combine and synthesize the information contained in the sections on built, natural, human, and social capital. There are many possibilities on how to synthesize this information. Information could be summarized regionally and an overall assessment made for each region. This would combine the Regional reports section into the consolidated statement of Operations. For example:

Sample North America Regional Summary:
North America is dominated by the US both in population, economic production, built capital, and consumption. The key factor in regard to the US economy is the high level of fossil fuel consumption combined with nearly 80% depletion of oil by 2000. This demand for oil requires a high level of oil imports primarily from the Middle East where most of the reserves are located. Although US CO2 emissions have continued to rise during the 90's at an average rate of 1.7% per year, one positive development is the decrease in emissions per unit of GDP by approximately 15%. Etc.

Correlations with Human Welfare

The correlations done in the built and social capital sections with Human development (HDI), human welfare (HWI), and happiness and life satisfaction could be expanded to cover all the factors studied, and correlations done with each one. Perhaps all the factors could be combined into a single correlation with human welfare. In order to do this all the factors would have to be converted into dollar terms or an index created so the factors could be added together. It may not be necessary to combine all the indicators together into a single unit. Each type of capital may be complementary to the others. Each may be essential on its own.

Sustainability
Correlations with human welfare do not necessarily consider the sustainability question, which relates to the ability to continue current practices indefinitely into the future without harm, and intergenerational equity. How much are we leaving to the next generation? Equity does not necessarily require that we leave them better off than us, but it does require that we leave them the same opportunities we have. Both of these criteria primarily relate to the depletion of non-renewable resources and exhaustion of renewable resources beyond the recovery point.

Depletion of non-renewable resources can be justified if some proceeds are invested in replacements for them, which is described as weak sustainability. There are very few examples of this worldwide. Current economic thinking is based on the premise that all resources have substitutes, and that when a resource becomes scarce the price will rise and a substitute will be found. Perhaps this will come true, although the unique qualities of oil suggest that there are no equivalent substitutes. Some resources have no substitutes such as the atmosphere, ozone layer, or biodiversity, etc.

Exhaustion of non-renewable resources beyond the recovery point applies to endangered species and bio-diversity, use of the earth and atmosphere as a sink for waste, and over-fishing among others. Some of these factors may not be able to recover from overuse. The final report needs a method to measure sustainability of various current practices. Depletion of non-renewable resources without replacement measures, and exhaustion of renewables beyond the recovery threshold could be used as a guide for measuring sustainability.

Assessment of Future Liabilities:
This section will attempt to summarize potential future problems if current trends continue. For example: As oil stocks pass 50% and begin to decline, those countries who are major importers of oil may face severe impacts due to price increases. Until alternative sources of energy are developed, countries which are heavily dependant on oil may face major shocks and disruptions.

Historical evidence indicates that continued increases in CO2 from burning fossil fuel will likely result in ever increasing global temperatures leading to severe weather events and resulting economic damage. Rising sea levels may inundate low-lying areas with massive population dislocations, loss of life, and economic damage. If it is not confronted, the AIDS crisis will continue to have major impacts on life expectancy and quality of life particularly in Africa. If global economic growth continues to result in increasing concentrations of wealth, the quality of life for billions of people may continue to decline. This may result in political turmoil, increasing instability, and foment terrorism, etc.

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