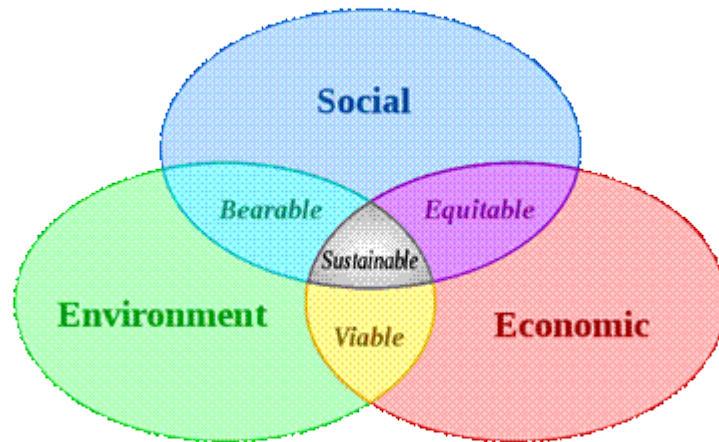


Sustainability



The main questions about sustainability are:

- ✚ [What is it?](#)
- ✚ [Why is it difficult?](#)
- ✚ [How can it be achieved?](#)
- ✚ [What can one do?](#)
- ✚ [Resources](#)

1. What is sustainability?

The Earth behaves as a single system comprised of physical, chemical, biological and human components. Scientist James Lovelock named this system *Gaia*, from Greek mythology - [Goddess of the Earth](#). It is a self-regulating system, and can be said to be 'living' because of the key role played by the biosphere. It depends on the energy provided by the Sun to drive the exchanges of energy and mass between the biosphere and other components of the Earth system: the atmosphere, the lithosphere (Earth's mantle, especially the thin soil 'skin'), and the hydrosphere (oceans and inland waters connected with other components through the hydrological cycle). Among the estimated millions of billions of planets in the Universe, Earth is the only known planet that supports life (as we know it).

The biosphere is organized into ecosystems, natural units consisting of all plants, animals and micro-organisms functioning together with the non-living physical factors. It uses resources of the Earth – sunlight, nutrients, water and gases – to propagate life in its various forms. As long as these resources are available, living organisms spread to colonize the available ecological niches

and compete with others for the same resources. Because of the interdependence within an ecosystem, individual species and organisms use products of other species, together with other environmental resources, to live and reproduce.

Like all other species, humans draw on the resources of the Earth to survive and prosper. However, because of our ingenuity, we have found ways of using more and more resources to grow in numbers, and to make our lives more comfortable. Some of these are 'renewable' thanks to the capacity of the biosphere to produce foodstuffs and other materials used by humans. Through our ingenuity, the capacity of the Earth to produce renewable resources has continually increased over the last about 10000 years. Other resources are non-renewable -they cannot be produced, regenerated, or reused on a scale large enough to support their consumption.

We have built up institutions and ways of taking up greater and greater amounts of both renewable and nonrenewable resources. As long as our use does not exceed the regenerative capacity of the biosphere, such use is sustainable. - With respect to non-renewable resources, sustainability requires that such resources be reused or recycled where possible; or used sparingly where not. In either case, the sustainability thus achieved is temporary, only delaying the time when such non-renewable resource is depleted and thus lost to human use; substitution then becomes the only option if the resource is still essential.

Sustainability has been an issue for all civilizations, and most previous civilizations perished because they violated sustainability rules. For example:

- ✚ The highly developed Sumerian civilization which invented cities and writing, declined because soil salinity induced by irrigation led to poor yields and lack of food. As land productivity declined, so did the civilization.
- ✚ For the Mayan civilization in central America, growing lack of resources caused by deforestation and soil erosion led to social disintegration.
- ✚ The once accomplished Easter Island civilization collapsed due to massive environmental degradation brought on by complete deforestation, together with the loss of wood for buildings, boats etc.

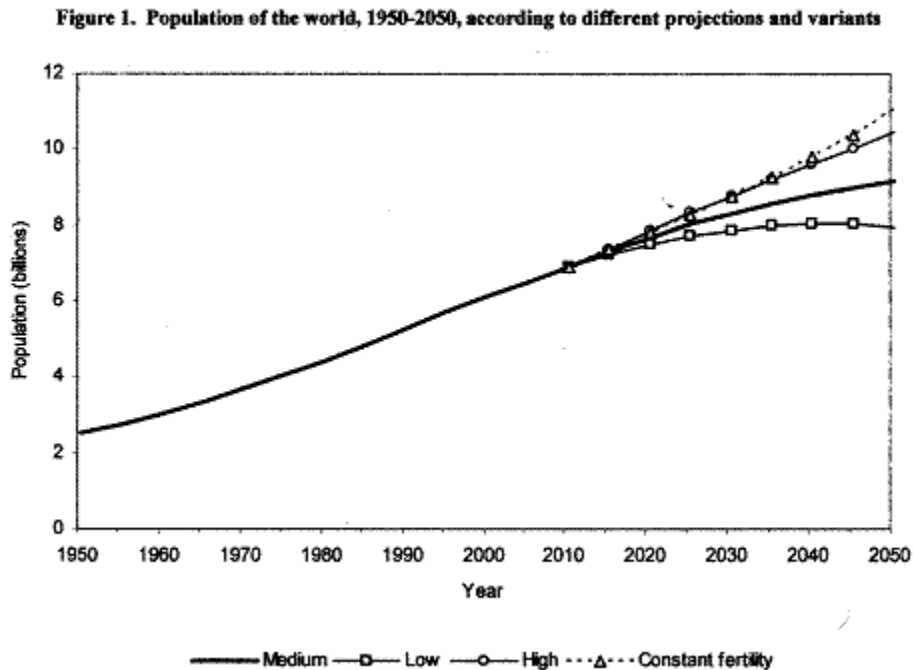
Sustainable use of Earth's resources is not less critical for our civilization. As Lester Brown pointed out: "In our modern high-tech civilization, it is easy to forget that the economy, indeed our existence, is wholly dependent on the earth's natural systems and resources. We depend, for example, on the earth's climate system for an environment hospitable to agriculture, on the hydrological cycle to provide us with fresh water, and on long-term geological processes to convert rocks into the soil that has made the earth such a biologically productive planet.... A four-year study of the world's ecosystems by 1,360 scientists, the Millennium Ecosystem Assessment, reported that 15 of 24 primary ecosystem services are being degraded or pushed beyond their limits. For example, three quarters of oceanic fisheries, a major source of protein in the human diet, are being fished at or beyond their limits, and many are headed toward collapse."

2: Why is it difficult? Challenges in achieving sustainability

Basically, ‘sustainability’ demands that the use of Earth’s resources by humans NOT exceed the regenerative capacity of the biosphere. This becomes easier if that capacity increases, such as has been happening through agriculture for many centuries. However, with the combined pressure of increasing population and desire for higher living standards, the demands have grown and have now exceeded the carrying capacity of the Earth. At the same time, the demands for higher productivity have resulted in soil degradation due to increased erosion and soil salinity; the area of land suitable for agricultural production has continued to decrease due to pressure for other land use options; and the water available for crops has become increasingly scarce because of climate variability and change as well as competition from other uses, especially in drought-prone areas of the world. That is to say, the carrying capacity of the Earth is not likely to increase further, quite the opposite is the likely course.

The trends are not encouraging. Consider:

- ✚ Even with an assumed decline in fertility levels, global population continues to increase from 6.8 billion in 2009 to a projected 9.1 billion in 2050 (for a medium population scenario; the estimated range is 8.0-10.5 billion), or another 34 percent. Most of this increase will be in Africa and Asia (to a total of 7.1 from the present 5.1 billion), where much soil degradation has already taken place and the environmental conditions are generally not favourable to further intensification of crop production. The good news is that population fertility levels continue to decrease in most developing countries.

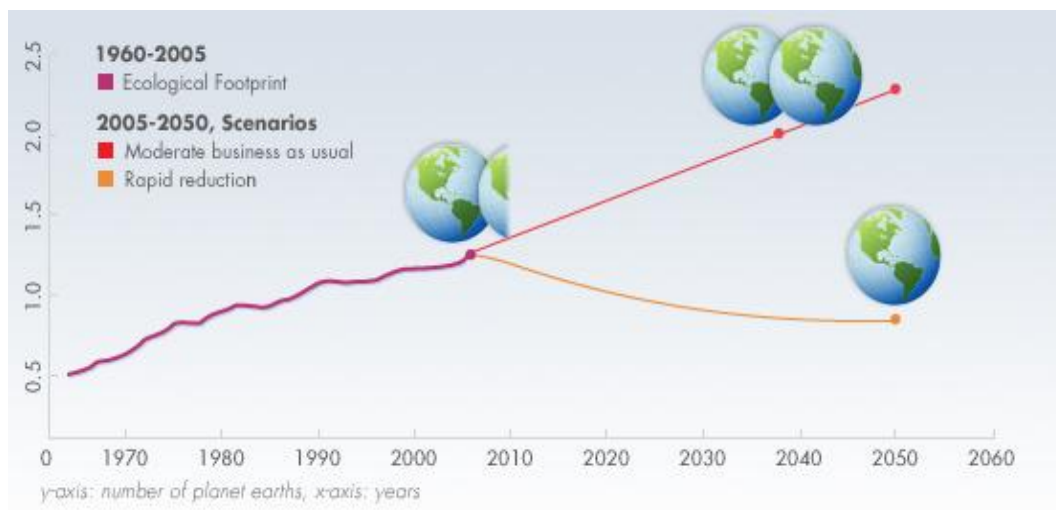


Source: World Population Prospects 2008 (UN report)

- ✚ Desire for high living standards enjoyed by western countries is increasingly a goal of people in developing countries including China, India, Brazil, and others. With the large

populations of these countries, even modest increase in resource consumption will have further dramatic effect on the total resource demand.

- ✚ The carrying capacity of the Earth has already been exceeded. This has been established using Ecological Footprint, a measure of the land and water area (cropland, pasture, forests and fisheries) a human population requires to produce the resource it consumes and to absorb its wastes, using prevailing technology. Today humanity uses the equivalent of 1.3 planets to provide the resources we use and absorb our waste. Moreover, it is estimated that if current population and consumption trends continue, by the mid 2030s we will need the equivalent of two Earths to support us.

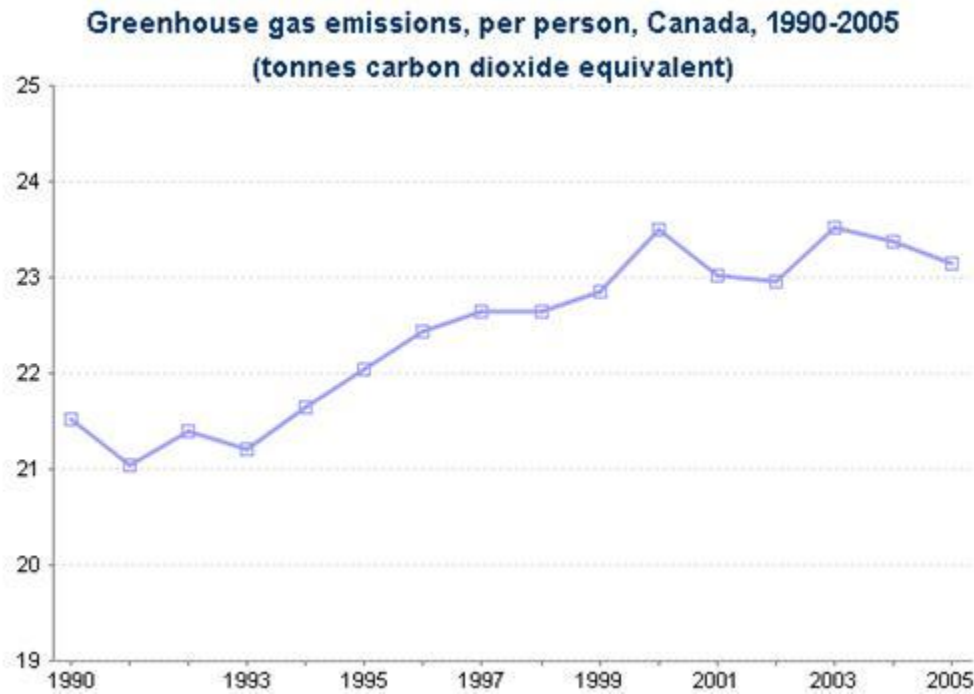


Source: Global Footprint Network

Earth Overshoot Day is another way to track increasing human pressure on the environment. It shows the day on which the global Ecological Footprint is equal to the biocapacity, i.e. capacity of ecosystems to produce useful biological materials and to absorb waste for that year (measured in hectares). For the remainder of the year, natural 'capital' is being depleted and waste accumulating in an unsustainable way. Before 1986, the Overshoot Day was beyond December 31, indicating that the resource use was sustainable. By 2008, the Overshoot Day was on September 23 and steadily advancing towards the summer season.

- ✚ Climate change is underway and its effects are real. It is already having negative impacts in many parts of the world, through both extreme events (droughts, floods, landslides) and gradual deterioration of the environment (desertification, glacier melt). Furthermore, the concentration of greenhouse gases exceeded the threshold necessary for a relatively stable climate, thus causing several rapid changes: Arctic sea ice decrease, Greenland ice sheet and glaciers melting, ocean acidification, and shifts in climatic zones. Recently, it has been established that to reverse the environmental trends the threshold concentration of carbon dioxide would have to decrease to below 350 ppm (parts per million), a level which was exceeded in the late 1990s. It has also been determined that the climate change that takes

place due to increases in carbon dioxide concentration is largely irreversible for 1,000 years after emissions stop. Yet, the concentration of greenhouse gases continues to increase, with Canadians being among the largest per capita polluters in the world; within Canada, Alberta and Saskatchewan contribute about three times the average of the remaining provinces and territories. Ecological resources will be greatly affected by climate change through water availability, changes in temperature, different seasonality patterns and extreme weather events, among others.



Source: Environment Canada (<http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=64>)

The pressure on Earth's resources will continue to increase while at the same time, the ability of the biosphere to produce materials for humans and to absorb their waste will diminish. Both developments have been underway for some time; and decisive human action is the only chance for turning these trends around. See GW feedback dynamic

In summary:

3. Options for achieving sustainability

By definition, sustainability exists if total global demand for resources is less than global supply of these resources.

Global demand = (number of people) X (demand/person)

Global supply = Biological capacity (Biocapacity) = (available area) X (Biocapacity/hectare).

So for sustainability to be achieved, theoretically the options are:

1. Fewer people
2. Lower demand/ consumption per person
3. Higher biocapacity/ hectare
4. Larger productive area (number of hectares).

From the discussion above, options 1 and 4 are clearly unrealistic in the short term and contrary to the historical as well as present trends.

Regarding option 3, further increases are undoubtedly possible, e.g. further improvements in agronomic practices, introduction of genetically modified crops, etc.. Such intensification measures, while they continue to be pursued, will also carry their own environmental costs; furthermore, their potential is diminished a priori by the demands placed on the biosphere (and thus reduced biocapacity) over the last 50 years.

Thus, **option 2** currently provides the greatest opportunity to increase prospects for sustainability of human actions. There are numerous reasons for this, including:

- ✚ The high individual consumption is a recent phenomenon that began in earnest after World War II. At that time the US government decided to reorient the vast war production machinery to consumer goods machinery. There is no inherent necessity for people to be compulsive consumers.
- ✚ The demand per person varies greatly among continents and countries. For example, the Ecological Footprint is about 9 hectares (ha) for the U.S., 5 ha for the U.K., and 0.5 ha for Afghanistan. With the world footprint of 1.3, there is much room for adjustments by the highly consuming countries.
- ✚ The goods are produced far from the places of consumption, necessitating high energy and other transportation costs.
- ✚ The consumption is highest in developed countries. It has been estimated that the developed countries with 25% of the world's population consume 75% of all energy, 85% of all wood products, and 72% of all steel produced. At the same time, these societies that also have high capacity for the development and introduction of new technologies and of other solutions to specific environmental problems.
- ✚ The consumption patterns are not healthy, due to the goods produced and purchased, types of food consumed (leading to obesity and increased susceptibility to various illnesses), lifestyle choices, and other factors. Many of these effects could be diminished by better consumer choices.
- ✚ By making prudent choices, consumers affect the amount and properties of goods offered as the producers as well as market respond to demand signals.

4. What can one do?--Promoting sustainability

Reduced consumption of consumer goods is the most powerful and effective way to promote sustainability at the present time. This refers not only to material goods like appliances and food but also to energy, transportation, and all other goods we pay for in the course of daily living: multiple vehicles per family, recreation vehicles, clothing, etc.. With fewer purchases, the entire chain from raw materials through manufacturing to waste will become less demanding on natural resources and therefore more sustainable. As citizens, we also have many opportunities to encourage governments and other people in making choices that favour sustainability.

Excessive consumption is not only bad for the environment, it is not good for people either. In 1979, Jimmy Carter described the plight of the Americans: “*Human identity is no longer defined by what one does, but by what one owns. But we've discovered that owning things and consuming things does not satisfy our longing for meaning. We've learned that piling up material goods cannot fill the emptiness of lives which have no confidence or purpose.*” Similarly, Clive Hamilton in his recent book “Growth fetish” argued that the policies of unfettered capitalism failed, since the underlying purpose of the creation of wealth is happiness; and people in general are no happier now than 50 years ago, despite the huge increase in personal wealth.

From sustainability viewpoint, the Happy Planet Index (HPI) is of interest because it measures the ecological efficiency of supporting human well-being. It presumes that *most people want to live long and fulfilling lives, and the country which is doing the best is the one that allows its citizens to do so, whilst avoiding infringing on the opportunity of future people and people in other countries to do the same.* The HPI attempts to measure production of human well-being (not necessarily material goods) per unit of extraction of or ‘imposition upon nature’. With the HPI, central American countries (Colombia, Costa Rica, Panama, Cuba) are near the top; Austria is 61st, Switzerland 65th, Canada 111th, the US 150th among 178 countries (http://en.wikipedia.org/wiki/Happy_Planet_Index).

It is encouraging that many people have worried about sustainability issues raised above, and a number of concepts, action groups, and movements have resulted. People who are concerned about sustainability have many choices for action – primarily as consumers, but also as voters, workers and in their other roles:

- ✚ Practice Reduce, Reuse, Recycle: This is the big one, and much information is available from various sources.
- ✚ Change lifestyle to, for example:
 - Simple living (voluntary simplicity): a lifestyle characterized by minimizing the 'more-is-better' pursuit of wealth and consumption.
 - Downshifting emphasizes finding an improved balance between leisure and work and focusing life goals on personal fulfillment and relationship building instead of the all-consuming pursuit of economic success (“Slow Down and Green Up”).

- Sustainable living aims to reduce an individual's or society's use of the Earth's natural resources by e.g. reducing carbon footprints through altered methods of transportation, energy consumption and diet.
 - Ethical consumerism: the intentional purchase of products and services that the customer considers to be made ethically. It is practiced through 'positive buying' (ethical products are favoured) or 'moral boycott' (negative purchasing and company-based purchasing).
 - De-growth: economical strategy proposed for developed countries because on a planet where 20% of the population consumes 80% of the natural resources, a sustainable development cannot be possible for this 20%; the right term for the developed countries should therefore be a sustainable de-growth.
- ✚ Speak against 'consumerism', "the equation of personal happiness with consumption and the purchase of material possessions".
 - ✚ Help educate others about the necessity of sustainability. There are many sources of information, some of them listed below.
 - ✚ Beware of advertising. Ads encourage us to want more and buy more, often regardless of our true needs; to buy things that are newer, faster, fancier, more fashionable, a different colour, larger or smaller, just like what everyone else has or different from what everyone else has.
 - ✚ Join environmental groups working towards sustainability (some listed below) and participate in their campaigns for environmentally sustainable policies and actions.
 - ✚ Support the establishment of sustainable environmental policies at all levels of government - municipal, provincial, federal. Join campaigns for passing legislation supporting sustainable practices.
 - ✚ Support fair trade of goods, certification of products, and socially responsible investment.

As you work to bring about sustainability in individual and collective actions, do not get discouraged by the magnitude of the task. Remember the wisdom of previous generations passed on to us as messages of hope:

Drop by drop a river is made (Afghan proverb)
A journey of thousand miles starts with one step
(Chinese proverb).

5. Resources:

5a) About sustainability:

Earth as self-regulating system of which humans are a part:

http://en.wikipedia.org/wiki/Gaia_hypothesis#Recent_developments

Biosphere and its organization:

<http://en.wikipedia.org/wiki/Ecosystem>

Collapse of civilizations because of ecological degradation:

<http://www.earth-policy.org/Books/PB3/index.htm>

Measures of sustainability:

http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_basics_overview/

http://en.wikipedia.org/wiki/Genuine_Progress_Indicator

http://en.wikipedia.org/wiki/Happy_Planet_Index

Feedback Dynamics of Global Warming by David Wasdell:

<http://www.bigpicture.tv/videos/watch/fb7b9ffa5>

5b) Challenges in achieving sustainability:

World population trends: <http://www.un.org/esa/population/unpop>

Population growth and food supplies: <http://dieoff.org/page57.htm>

Ecological Footprint and Earth Overshoot Day:

http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

Climate change: scientific basis, greenhouse gases, impacts, mitigation, adaptation:

<http://www.ipcc.ch/>

United Nations documents relevant to sustainability:

<http://www.un-documents.net/k-001303.htm>

5c) Lifestyle options:

Simple living: http://en.wikipedia.org/wiki/Simple_living Sustainable living:

http://en.wikipedia.org/wiki/Sustainable_living

Downshifting: <http://en.wikipedia.org/wiki/Downshifting> Ethical consumerism: http://en.wikipedia.org/wiki/Ethical_consumerism

Zero waste: http://en.wikipedia.org/wiki/Zero_waste

5d) Environmental groups promoting sustainability:

In Canada:

The David Suzuki Foundation: <http://www.davidsuzuki.org/>

The Pembina Institute: <http://www.pembina.org/>

Zero Carbon Canada: <http://www.zerocarboncanada.ca/>

World Wildlife Fund Canada: <http://wwf.ca/>

Local to Prince Edward County, Ontario:

County Sustainability Group: <http://www.countysustainability.ca/>

Quinte Sustainability: <http://www.quintesustainability.ca/>

Quinte Conservation: <http://quinteconservation.ca/site2/>

The Prince Edward Stewardship Council:
<http://www.ontariostewardship.org/councils/princeedwardcty/>

Ecological Farmers Association of Ontario: <http://www.efao.ca/>

Canadian Organic Growers: <http://www.cog.ca/>

Upper Canada Woods Cooperative: <http://www.ucwc.ca/>

Community Development Council: <http://www.communitydevelopmentcouncil.ca/>

Ontario Lake Waterkeeper: <http://www.waterkeeper.ca/>

Community Living Prince Edward: <http://www.clpe.on.ca/>

Habitat for Humanity Prince Edward-Hastings: <http://www.habitatpeh.org/>

Permaculture Canada: <http://www.permaculturecanada.ca/files/>

Eco Earthwalk (Grafton) <http://www.ecoearthwalk.ca/>

