

WHAT DO PEOPLE NEED?

All humans need basic things for their material
and physical well-being:

air **food** **water**
shelter

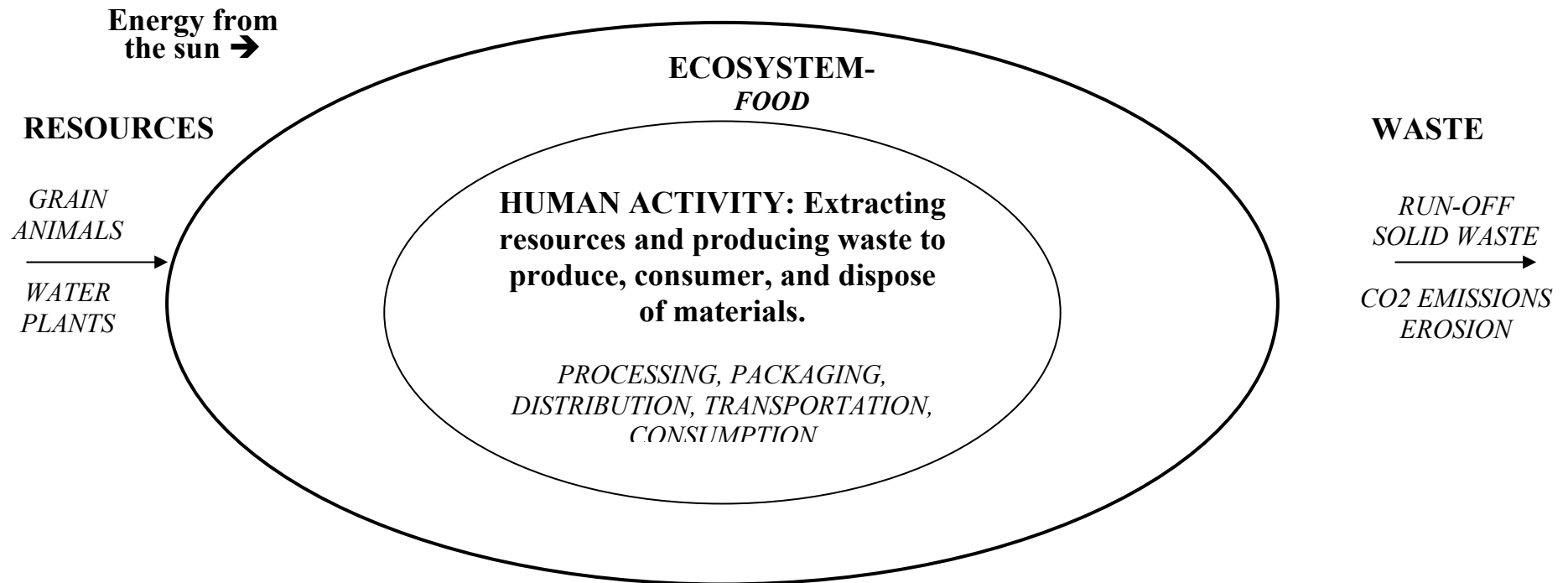
Can you think of other items?

What does it take to meet these needs?

Sources and Sinks

Nature (the ecosystem) is the source of all we consume.

The ecosystem also serves as a sink for all wastes.

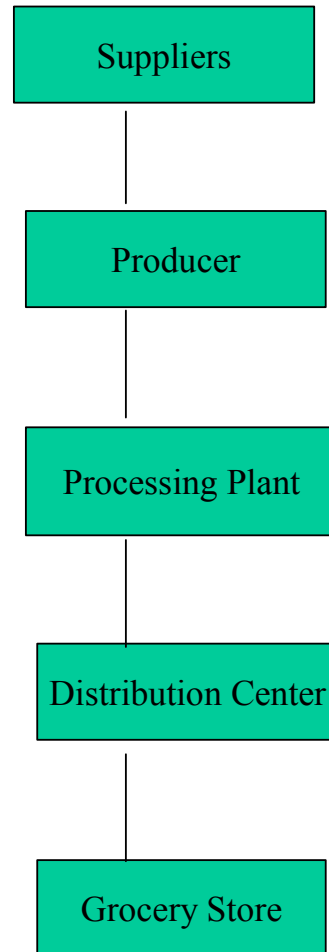


Adapted from Herman Daly. "Introduction to the Steady-State Economy." In *Economics, Ecology, Ethics: Essays Toward a Steady-State Economy*. Herman Daly, editor. San Francisco: W.H. Freeman. 1980.

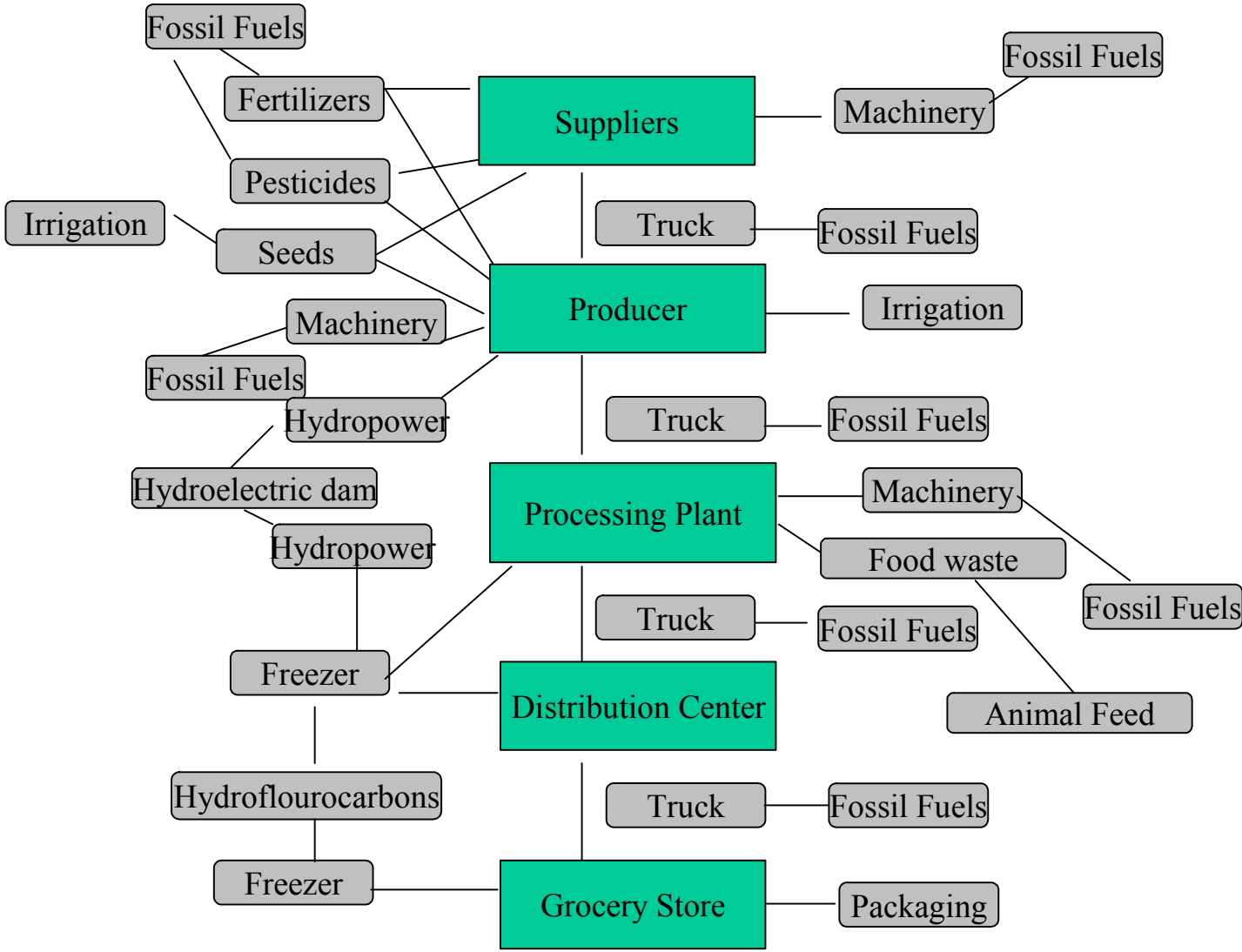
Different types of land function as both sources and sinks:

LAND USE TYPE	SOURCE FUNCTION	SINK FUNCTION
Cropland	Food	Absorbs fertilizers, pesticides
Grassland/ Pastures	Meat, ???	Absorbs animal waste
Forests	???	Sequester Carbon Dioxide emissions
Marine/Inland Waters	Fish, Aquatic Life, ???	???
Built-up Land	Infrastructure, Transportation, Industry, Capturing Renewable Energy	???

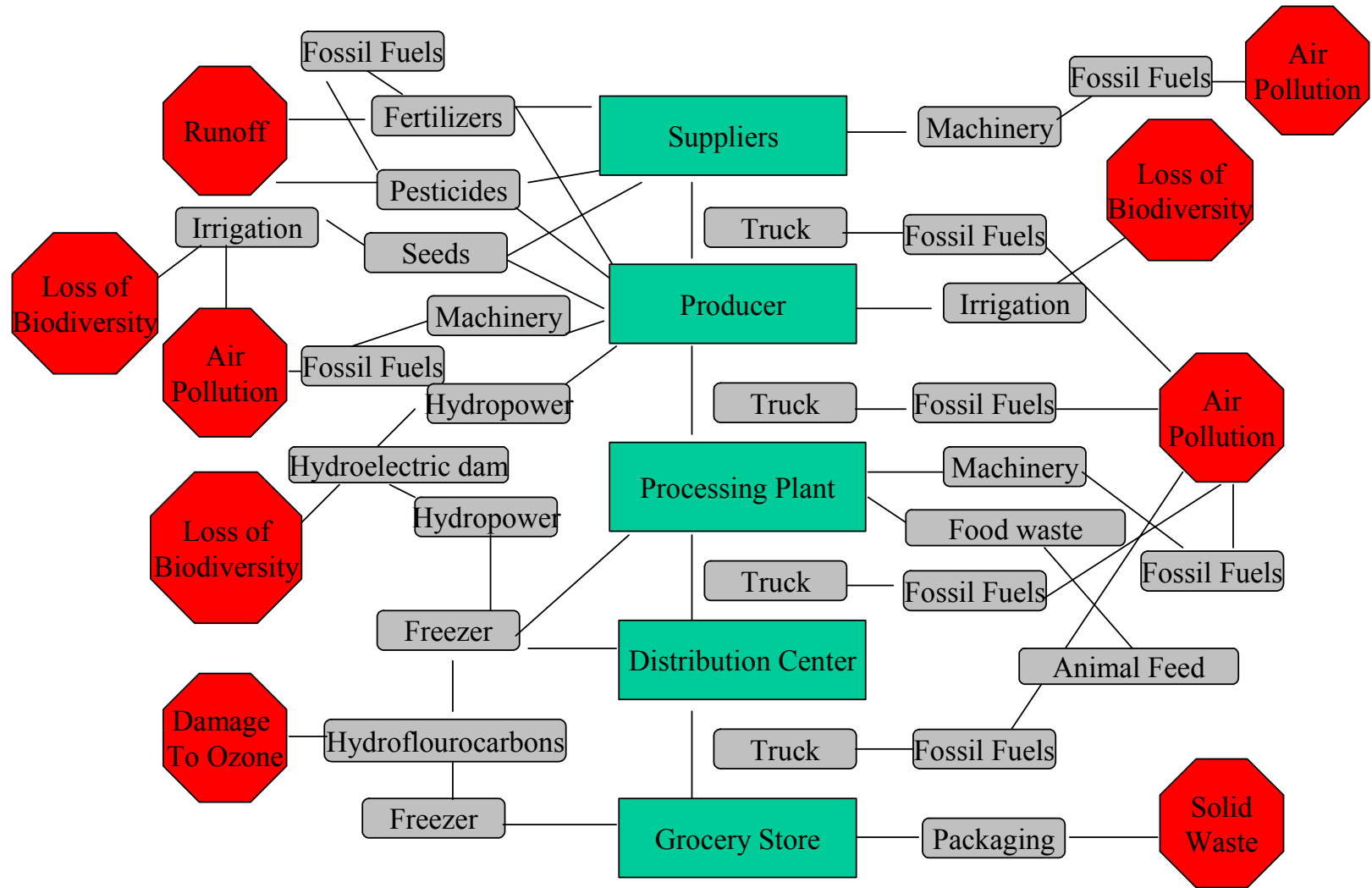
CONVENTIONAL POTATO



CONVENTIONAL POTATO

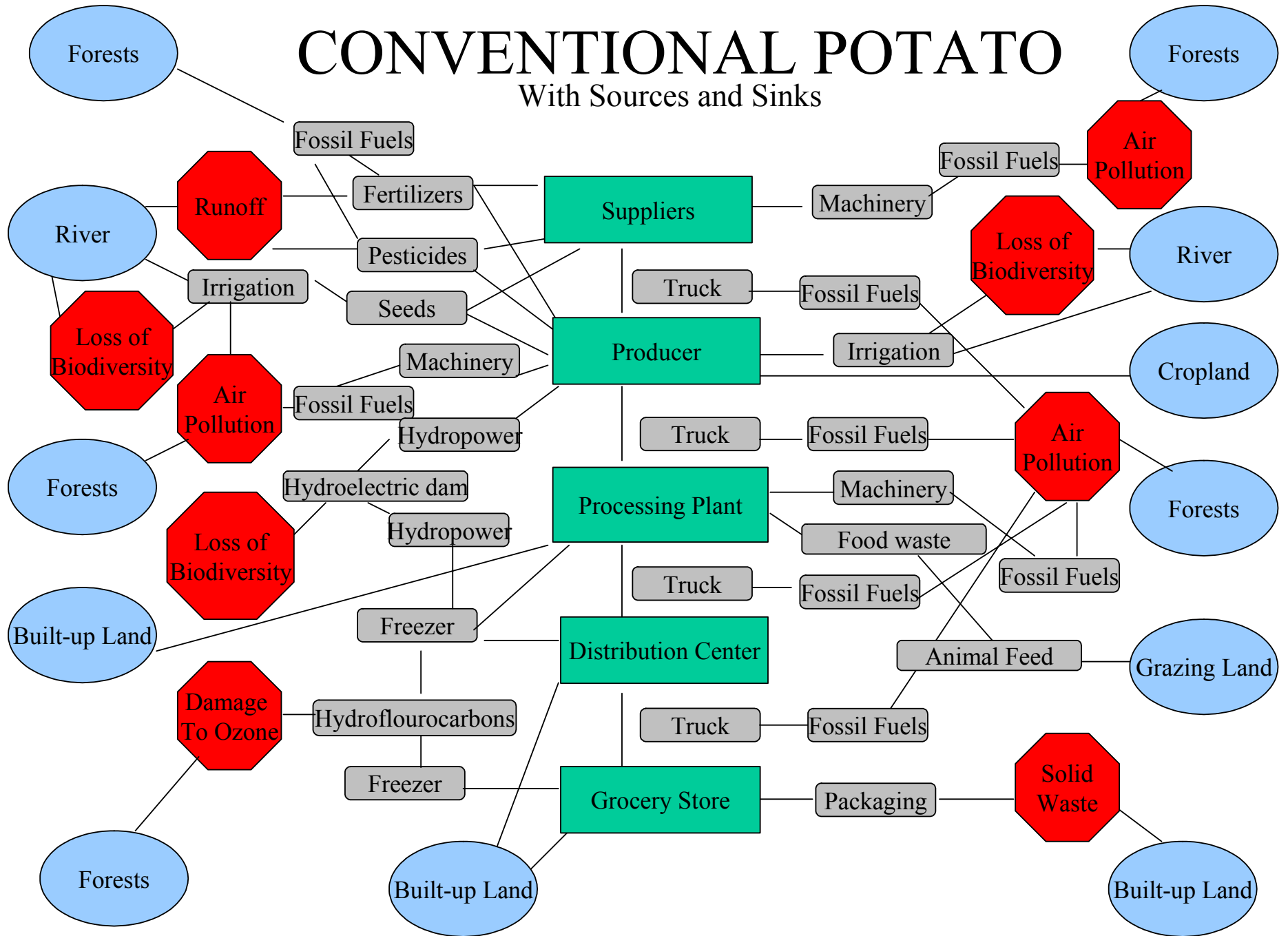


CONVENTIONAL POTATO

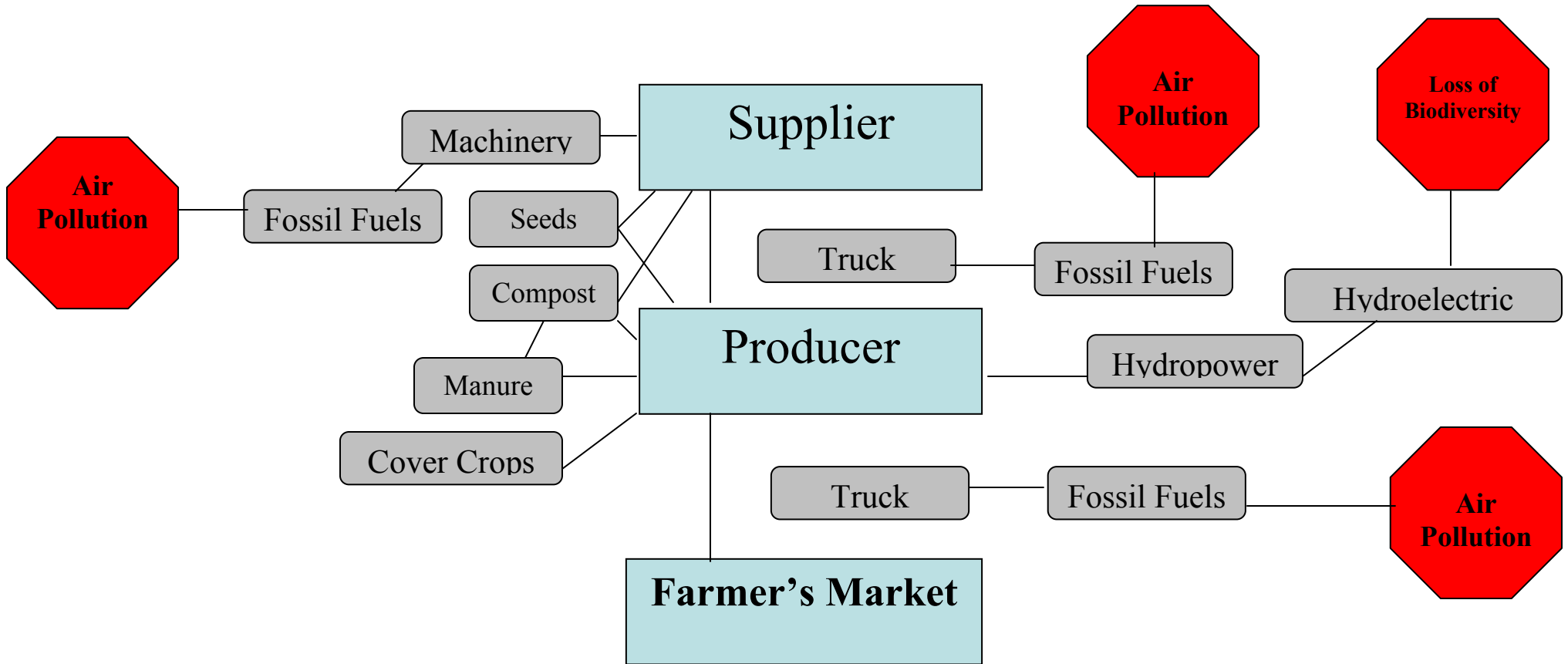


CONVENTIONAL POTATO

With Sources and Sinks



LOCALLY GROWN, ORGANIC POTATO



ECOLOGICAL FOOTPRINT

Redefining Progress's Ecological Footprint Analysis measures the amount of renewable and non-renewable ecologically productive **LAND AREA** required to support the resource demands and absorb the wastes of a given population or specific activities.

The Ecological Footprint is an indicator that measures sustainability. Footprints may be measured on individual levels as well as national levels. The index tracks the consumption and waste patterns of individuals, communities, businesses and nations, and has shown that we overuse our planet's natural capital by up to 25%.

Footprint results are expressed in global acres (or global hectares in metric measurement) of biologically productive land.

1 Hectare = 2.5 Acres



ECOLOGICAL FOOTPRINT QUIZ EXCERPTS



Food Footprint

2. How much of the food that you eat is processed, packaged and not locally grown (from more than 200 miles away)?

- Most of the food I eat is processed, packaged, and from far away
- Three quarters
- Half
- One quarter
- Very little. Most of the food I eat is unprocessed, unpackaged and locally grown.



Goods Footprint

3. Compared to people in your neighborhood, how much waste do you generate?

- Much less
- About the same
- Much more



Shelter Footprint

5. What is the size of your home?

- 2500 square feet or larger
- 1900-2500 square feet
- 1500-1900 square feet
- 1000 -1500 square feet
- 500-1000 square feet
- 500 square feet or smaller



Mobility Footprint

10. On average, how far do you go by car each week (as a driver or passenger)?

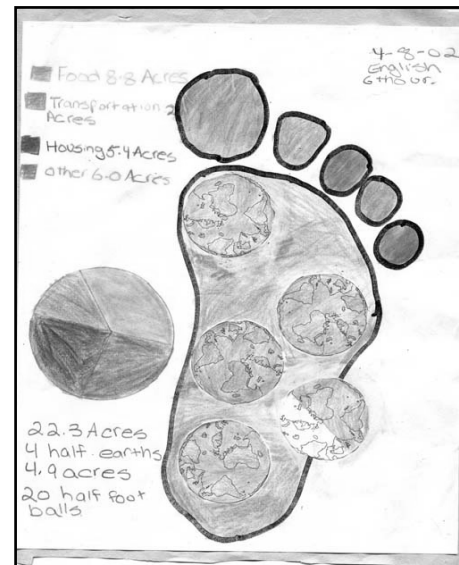
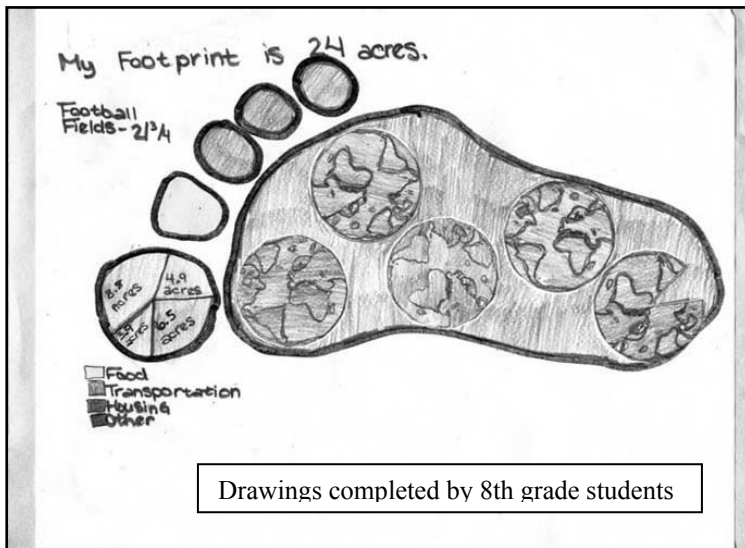
- 400 miles or more
- 300-400 miles
- 200-300 miles
- 100-200 miles
- 10-100 miles



CONDENSED QUIZ RESULTS

The full Ecological Footprint quiz measures:

- # of acres required to provide your resources and sinks
 - # of planets required if everyone lived like you
- # of acres by sector (food, transportation, housing, etc.) that comprise your footprint



LIVING BEYOND OUR LIMITS



Amount of ecologically productive land available for each person on earth =

1.89 hectares

Global ave footprint s

2.2 hecta

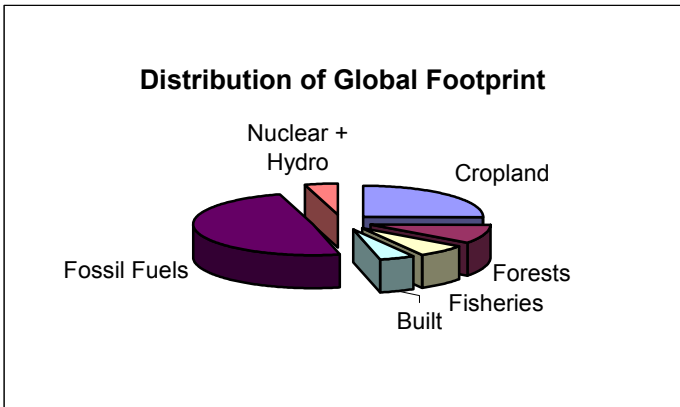
Average US footprint size=

9.57 hectares



LAND USE TYPES

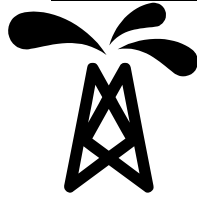
Ecological Footprint accounts track people’s use of six primary land or water resources:



- **Cropland** provides crops for food, animal feed, fiber, and oil
- **Grasslands** and **pasture** support grazing animals for meat, hides, wool, and milk
- **Forests** provide timber, wood fiber, and fuelwood
Forest sinks sequester carbon dioxide (CO₂) emitted from the burning of fossil fuels
- **Marine** and **inland waters** supply fish and other products
- **Built-up land** accommodates infrastructure for housing, transportation, industry, and for capturing renewable energy.

Because people use resources from all over the world and pollute far away places with their waste, Footprints sum up all these areas, wherever they may be located on the planet.

RENEWABLE VS. NON-RENEWABLE RESOURCES



**Non-
finite**

non-renewable resources, like fossil fuels and metals, exist in amounts and thus cannot be replenished.

Renewable resources, like solar energy and trees, are materials that can be replaced through natural processes.

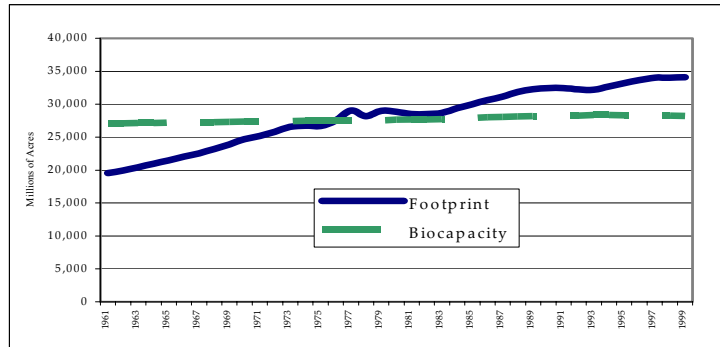


Since non-renewable resources are limited, we must turn to alternative sources rather than deplete the entire supply for future generations. However, renewable resources can be depleted if drawn down more rapidly than nature can build them back up. If we harvest more timber than can re-grow, the forest dies. If we catch more fish than are spawned, the stocks die out. If we dump more carbon dioxide into the atmosphere than nature can reabsorb, the atmosphere is no longer hospitable to life. In order to lessen our global ecological footprint, we must take steps to ensure that we are using our renewable resources in a sustainable fashion, or within their regenerative capacity (biocapacity).

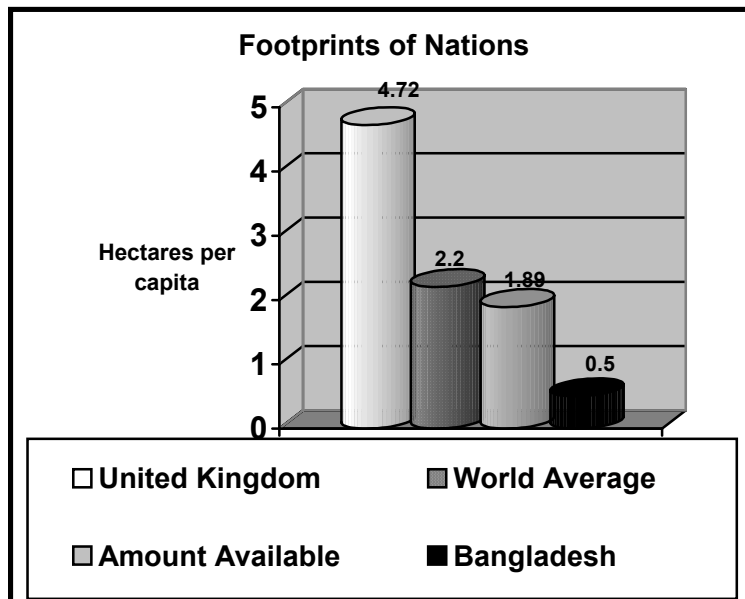
OVERSHOOT

Overshoot, or ecological deficit, is defined as taking more than nature can renew. This occurs when human consumption and waste production exceed the capacity of the Earth to create new resources and absorb waste.

Humanity's Footprint vs. Earth's Biocapacity



Nature can be seen as a stock of resources that we call natural capital: forests, topsoil, atmosphere, freshwater, climate. The flow of these resources—the growth in forests, the cleansing of water, the natural absorption of air pollution, the regulation of climate—can be viewed as the "interest" accruing on that natural capital. During overshoot, natural capital is liquidated to support current use rather than natural interest. Consequently the Earth's ability to support future life declines.



There are 1.89 hectares (4.5 acres) of ecologically productive land available for each person on earth. However, current average usage is about 2.2 hectares (5.5 acres), resulting in 20% total overshoot.

SUSTAINABILITY

Sustainability is a new, broad concept with variable definitions. The United Nations offers a leading role in defining and creating sustainable conditions for the world.

“To meet the needs of the current generation without compromising the ability of future generations to meet their own needs”

- United Nations World Commission On Environment and Development (The Brundtland Commission), *Our Common Future*, 1987

“Living within the carrying capacity of the Earth’s life support systems.”

- United Nations Environment Program

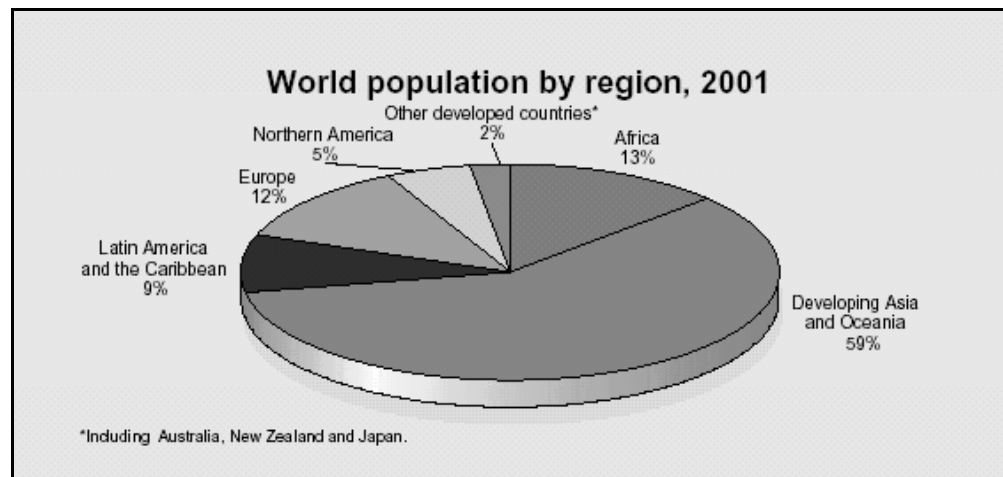
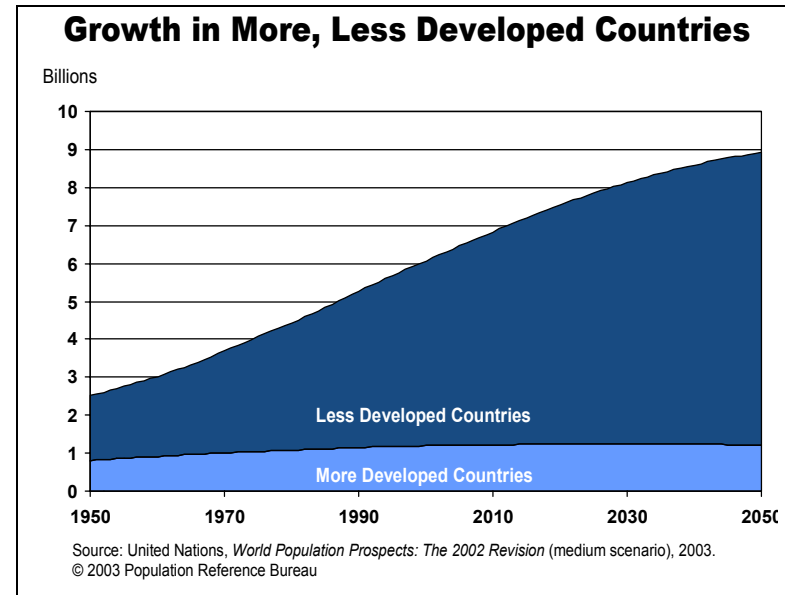
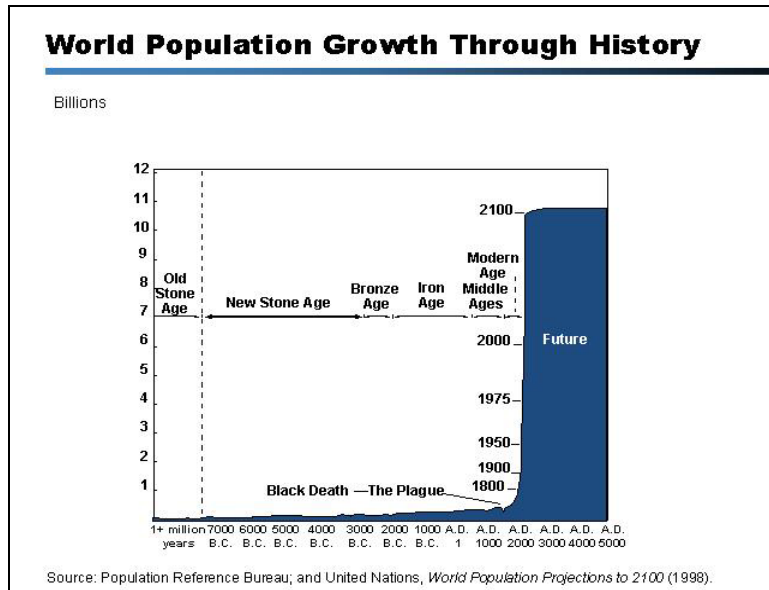
monitoring
we can
capacity.

ecological
nations
sustainable



Sustainability is the solution to overshoot. By our current rates of resource depletion and renewal, ensure that we live within the earth’s carrying capacity. The Ecological Footprint is a tool for measuring sustainability. Individuals can help decrease footprints by adopting sustainable practices, and may contribute by enforcing policies that encourage development.

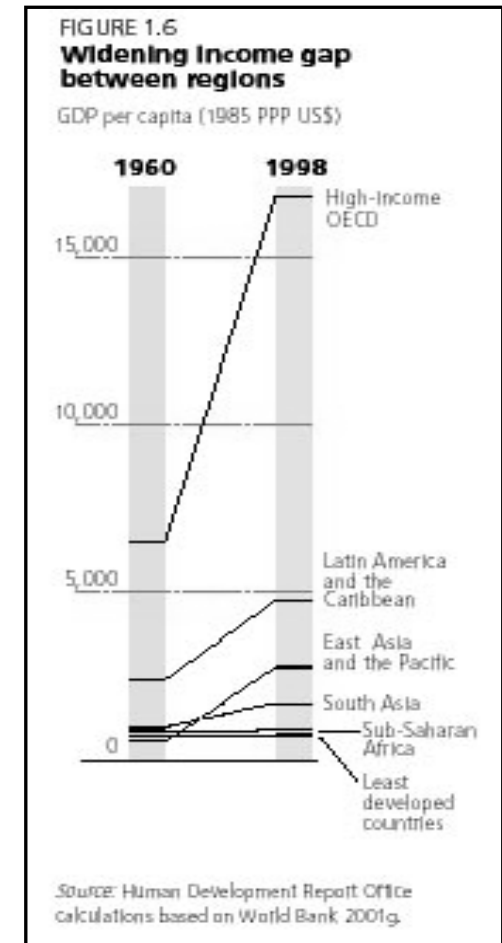
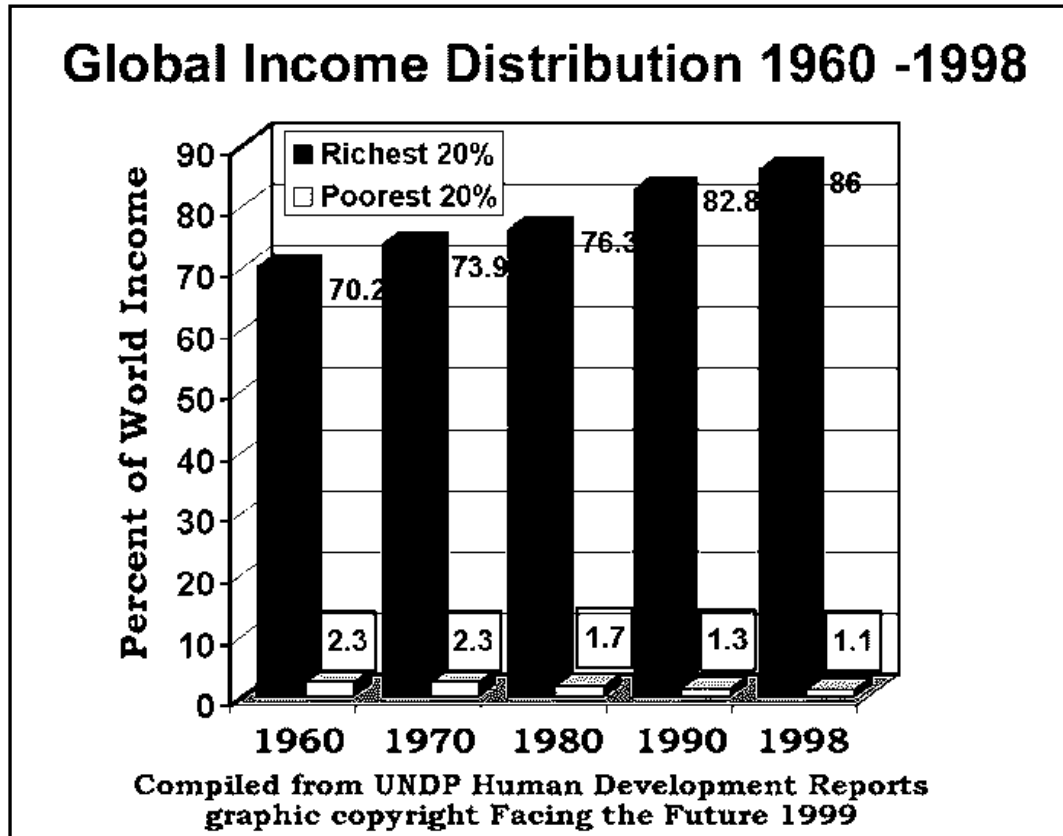
POPULATION TRENDS



Source: UN Population Division, Department of Economics and Social Affairs, 2001.



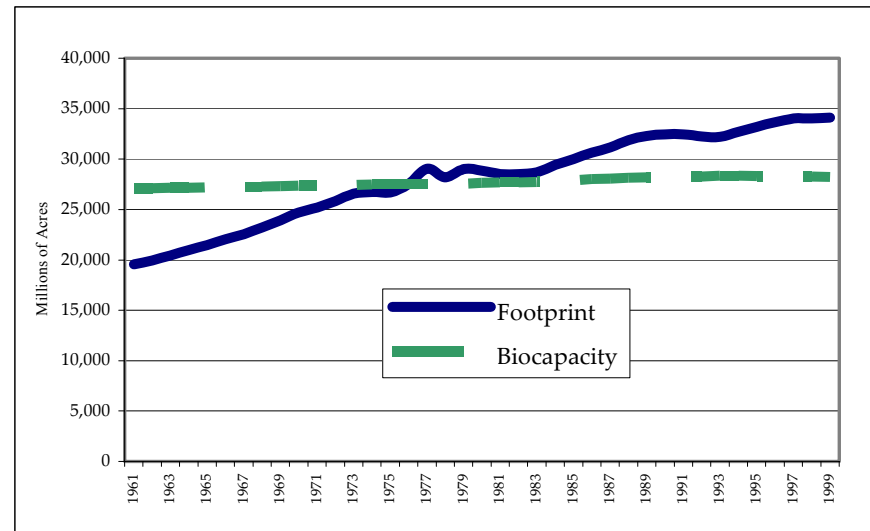
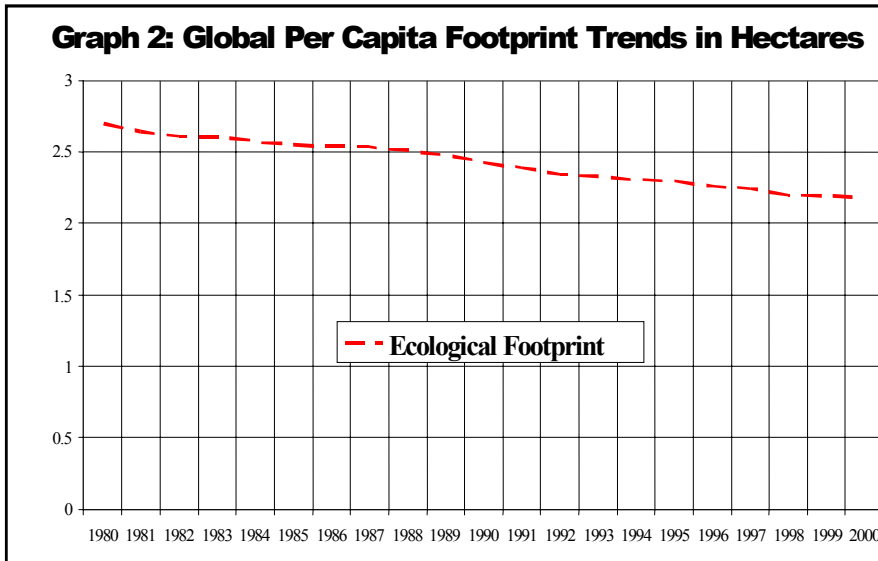
GLOBAL DISTRIBUTION OF INCOME



CRITICAL THINKING GRAPHS:

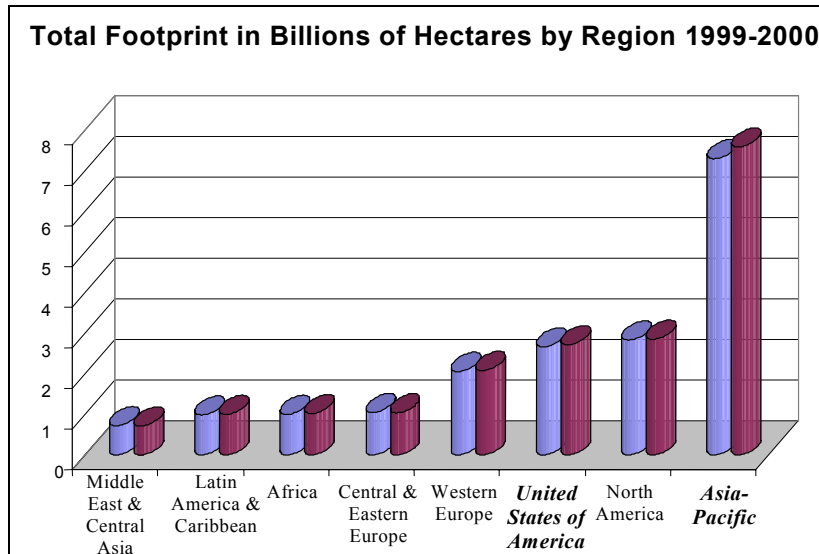
How can the contrasting trends in these graphs be explained?

Humanity's Footprint vs. Earth's Biocapacity

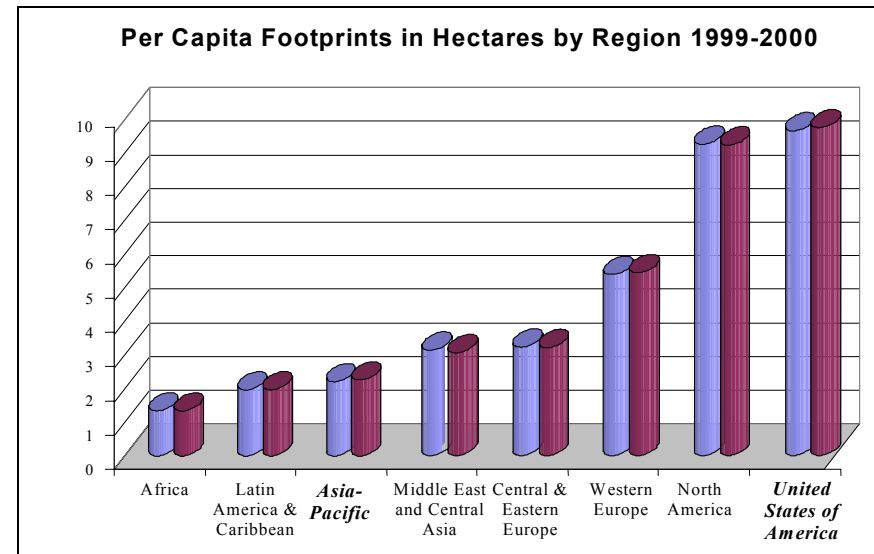


FACTORS AFFECTING THE EF

Within a region, the average **per capita footprint** is multiplied by the **number of people** to create a **total regional footprint**.



Because of sheer population size, the Asia-Pacific region has the largest **regional** footprint even though the **per capita** impact of its consumption and technology is relatively small.



Because of large consumption rates and advanced technology (such as cars), industrialized regions create large per capita footprints despite relatively small populations.

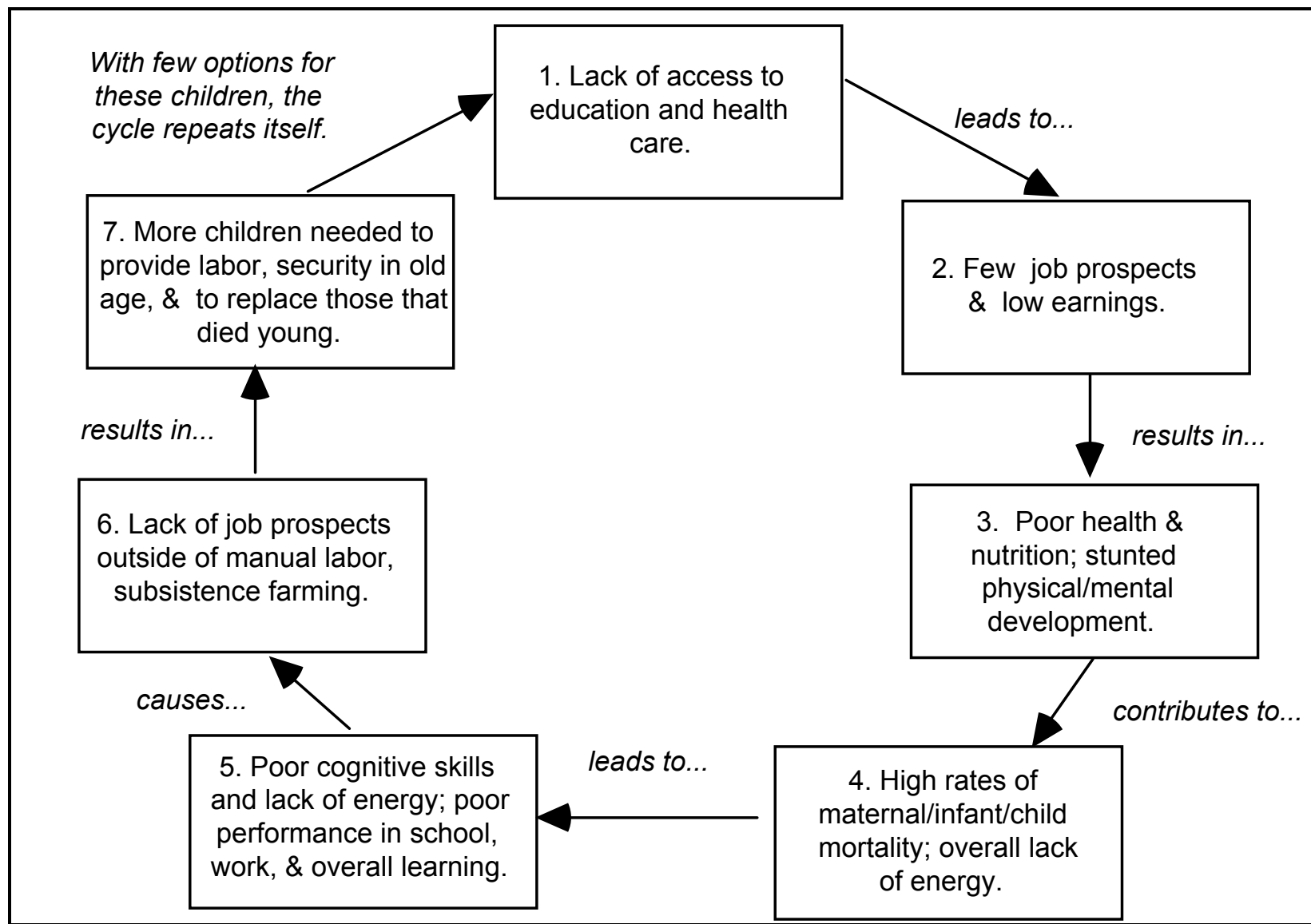
IMPACT = POPULATION * AFFLUENCE * TECHNOLOGY

Reducing the global footprint will thus require a combination of

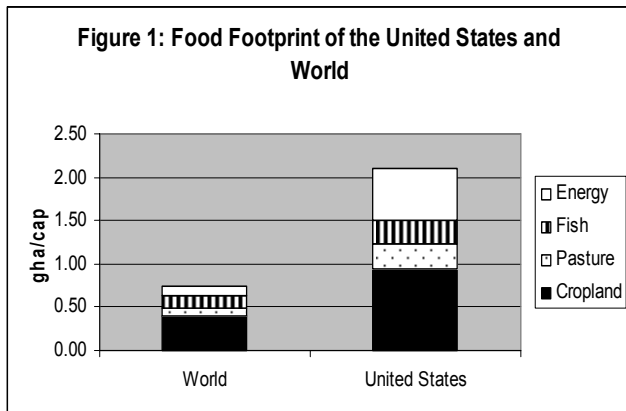
- Population stabilization
- Reductions in consumption and waste levels, which can be facilitated by
 - The development of lower-impact technologies



What is the relationship between poverty and population growth?



MODERN AGRICULTURE FOOTPRINTS



CROPLAND

The amount of cropland grew by less than 10% over the last 40 years. However, footprints increased due to

- Soil erosion
- Water shortages and runoff
- Nutrient loading

PASTURE

- 1/3 of the world's harvested cropland grows feed and forage for animals.

FISHERIES

- Most operate near or over capacity and have experienced declines or collapses in populations

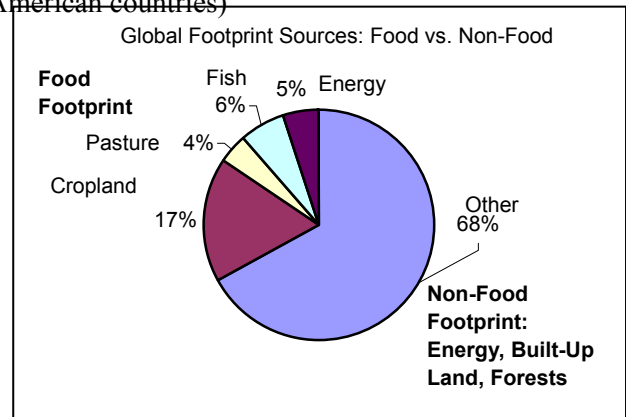
ENERGY

The global food system relies on a high usage of fossil fuel consumption for fertilizers, fuels, and pesticides.

- Eating fresh, locally-grown foods reduces the energy needed for transportation.
- An average food item in the US travels 1500 miles.
- 90% of vegetables are grown in the San Joaquin Valley in CA.
- Post-production (processing, packaging, transportation, storage, and retail) accounts for 80-90% of the food system's fuel usage, storage, distribution, and processing.

GLOBAL TRADE*

- Crops indigenous to a particular region are now eaten all over the world.
- Many countries that were former colonies are economically dependent on exports of food. (Ex. Agricultural products account for over 80% of exports from many Central American countries)
- In many developing countries, land that used to be used for local food consumption is turned over to "cash crops" for export. This creates a pattern in which food production and exports increase, while domestic consumption decreases. For example, in Kenya, between 1969-1999,
 - production of vegetables more than doubled, and
 - exports of vegetables increased 6-fold, but
 - per capita domestic consumption of vegetables decreased by 33%



* Sources: World Trade Organization and UN Food and Agriculture Organization, as cited in *The Penguin Atlas of Food*. E. Millstone and Tim Lang. New York: Penguin Books. 2003.

	GROWING AREA	ENERGY	NUTRIENT POLLUTION	BIODIVERSITY
CONVENTIONAL	Higher yield on average	Fuels, Fertilizers, Pesticides, packaging, and processing use energy	Nitrogen fertilizers damage aquatic ecosystems, change atmospheric composition	Eliminate wildlife habitats, GMOs threaten native crop varieties
SUSTAINABLE	Slightly lower yield but higher performance in stressful conditions	Integrated pest management reduces energy use; small scale farms require less operational energy; less energy spent post-production (no packaging and processing)	Increased nutrient use efficiency	Preserve biodiversity, Preserve water quality



WHERE DID FOOD COME FROM?

NEW WORLD		OLD WORLD	
North America		Europe	
Central America		Africa	
South America		Asia	



FOOD SYSTEM HISTORY

Different events in history have shaped what we eat and how we get our food today.

What events led to the development of the current food system?

The economic patterns of the current food system were established through colonialism beginning around the time of Columbus. Main traits include:

- 1) resources being extracted from the colonized country to the colonizers' countries
- 2) economic dependency on few commodities
- 3) unequal terms of trade
- 4) social hierarchies and inequality that were institutionalized through slavery.

All are still seen today in terms of wealth inequalities both between and within countries.

Examples of historical events that exhibit these traits are outlined on the “Significant Events in Food History” document. These events have contributed to global trade, population changes, and technological advances that shaped the food system today.

MODERN FOOD SYSTEM

Changing the footprint goes beyond individual actions and requires changes in structures, policies, economic practices, etc.

What will it take to switch to a more sustainable food system?

Practices such as eating locally can move the food system toward sustainability by:

- 1) reducing energy usage for processing and transportation
- 2) creating more direct ties between farmers and consumers (buying at farmer's markets)
- 3) supporting organic farming to reduce costs
- 4) reducing fertilizer and pesticide run-off in watersheds
- 5) maintaining or increasing biodiversity by eliminating mono-cropping

Policies and Practices to Promote Sustainable Agriculture

Community Supported Agriculture programs (CSAs):

C.S.A.'s are farm operations which sell 'shares' to customers in advance of the growing season. In this arrangement, the customer pays upfront and gets weekly portions of whatever is harvested that week. The 'subscription' lasts over the course of the growing season, which varies with each farm, and the consumer's bounty changes with the season. A week in August might yield corn, beans, cucumbers, tomatoes, and basil. As fall comes, the harvest shifts to include squashes and cool-tolerant greens.

For farmers, CSAs mean capital upfront, and a guaranteed investment for the season. Consumers share in the risks and benefits with the farmer, resulting in greater ties between the producer and the consumer. For this reason, the Japanese translation of CSA is 'food with the farmer's face.'

There are now more than 1,700 C.S.A.'s, according to the nonprofit group Rodale Institute (www.newfarm.org). This is consistent with a growth in very small farms, those from 10 to 49 acres. The number of such farms actually increased to 563,772 in 2002 from 530,902 in 1997, according to the latest farm census by the Department of Agriculture. <http://www.nytimes.com/2004/09/21/>

Increasing marketing opportunities for small farms

State governments are beginning to see small family farms as an asset capable to generate jobs and slowing suburban sprawl. To help such farms stay viable, some states are providing grants and other support. In Massachusetts, for instance, the Farm Viability Enhancement Program has helped 139 family farms stay in business by making grants to farms for new marketing projects.

Support for small farms comes from university-based programs as well. For example, The Small Farm Program at the University of California, Davis provides production and marketing information to small-scale, family-owned or managed farms or markets, often with limited resources. The program also work closely with farmers' market organizations to ensure alternative and profitable market access for small- and moderate-sized producers. http://www.sfc.ucdavis.edu/docs/about_sfp.html

Fair Trade



It's impossible to get locally-grown coffee if you live in the continental US. But it is possible to get coffee that has been grown in ways that protect the environment while providing a fair wage to growers. The concept is called Fair Trade. While approaches vary, fair trade crops are typically grown on farms that involve third-party certification for environmental and social standards.

The importer also deals directly with a grower's association or cooperative. The means farmers earn more and keep more of the profits, enabling them to invest in education and health care for their families, as well as their farming operation.

To become Fair Trade certified, an importer must meet stringent international criteria, including paying a minimum price per pound, providing credit to farmers, and providing technical assistance such as help transitioning to organic farming.

Fair Trade is drifting into the mainstream. Northfield-based Kraft Foods recently entered into an agreement with the Rainforest Alliance, an international not-for-profit agency. As part of a

multiyear arrangement, Kraft has agreed to purchase more than 5 million pounds of coffee in the first year from farms in Brazil, Colombia, Mexico and Central America that have been certified by the alliance as sustainably managed. Under pressure from consumer groups, chains such as Starbucks are beginning to offer Fair Trade coffee.

sources: Chicago Tribune, January 21, 2004;
<http://www.globalexchange.org/campaigns/fairtrade/coffee/>
<http://www.coffeeresearch.org/politics/Starbucks%20Fairtrade.htm>

Cuba provides an example of an entire country can make the transition to a more sustainable

During the Cold War, Cuba received substantial support from the USSR, including favorable deals on oil and petrochemicals such as fertilizers. From 1959 to 1989, well over 80% of Cuba's trade was with the USSR.

With the fall of the Soviet Union in 1989, Soviet imports to Cuba dropped overall by 2/3 and favorable deal on petroleum dropped by over 1/2. That, along with the trade embargo imposed by the United States, meant that Cuba had no practical access to agricultural chemicals and the machinery necessary to provide the food needed.

These conditions have led Cuba to make organic farming a national priority. On an emergency basis, Cuba has turned to farming much of its land organically, with some amazing and well documented successes. Today, sustainable organic methods of cultivation are bringing back domestic food production and making better use of the country's limited resources.

Large tracts of land have been converted from cash crops for export to food crops for local consumption. Government incentives encourage people in urban centers to till the land for their own benefit. Oxen have been bred and trained in large numbers to replace tractors--for which there is no fuel or oil. These animals are also used to plow and transport crops to processing facilities and markets. Organic methods such as integrated pest management, crop rotation, and community scale composting are being implemented. Hundreds of bio-pesticide production facilities have been set up and are run mostly by local people.

Land reform plays a role, too. Huge state farms are being parceled out to local coops and individual farmers. In the cities, much of the unused land has been made available for individual cultivation, creating a vast system of organic urban gardens. The more than 8,000 gardens in Havana alone produced a reported 500,000 tons of food in 1998.

Cuba's research and development at the university level and its local extension agencies have advanced organic farming methods on a large scale. The National Institute for Basic Research in Tropical Agriculture (Instituto Nacional de Investigación de Viandas Tropicales - INIFAT) has research centers around the country that specialize in answering the specific problems of their area. Today, scientists and policymakers from around the world visit Cuba to learn from its methods.

Source: Institute for Food and Development Policy

