

Food Resources

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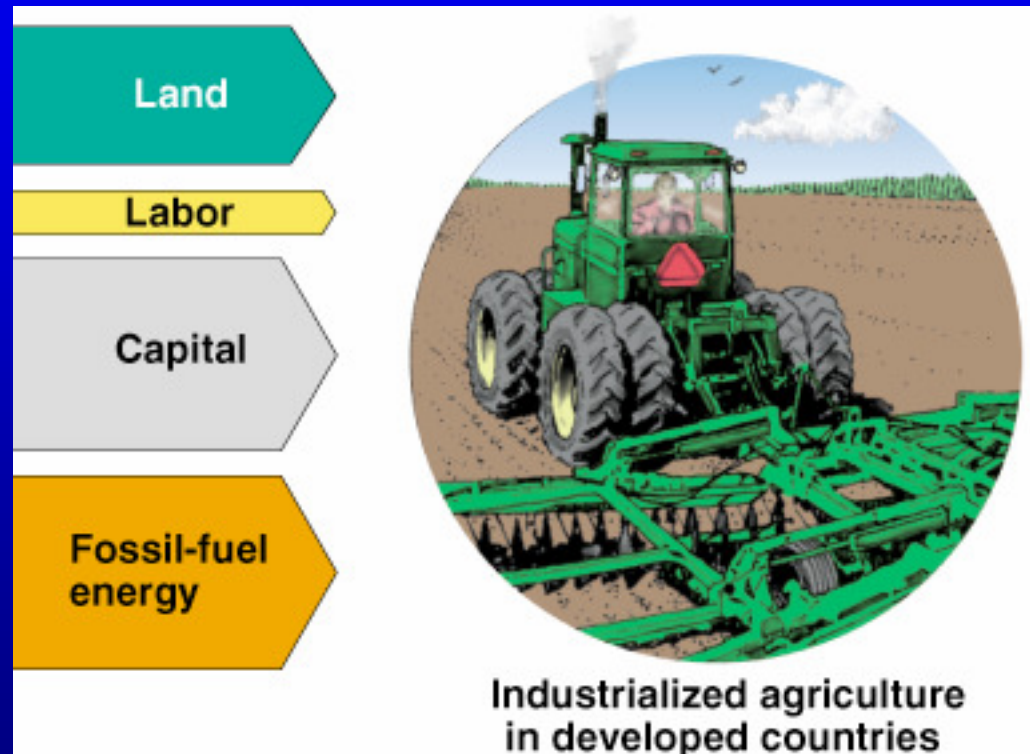
OUTLINE

1. Types of Food production
2. World food supply
3. Increasing food production
4. Environmental impacts
5. Sustainable agriculture
6. Turning to the oceans

1. Types of Food Production

Industrialized agriculture:

Uses large amounts of fossil fuel, water, commercial fertilizers, & pesticides to produce huge quantities of single crops or livestock.

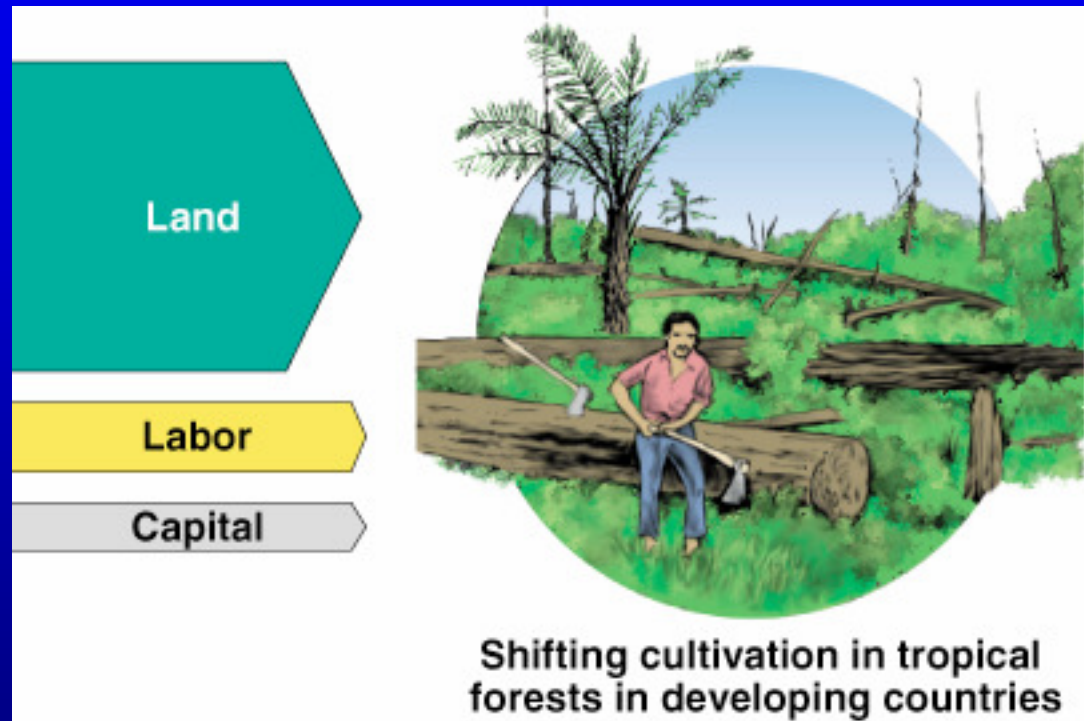


Farming Video: http://www.thefutureschannel.com/dockets/realworld/trends_agriculture

Traditional Agriculture:

1) Traditional subsistence:

Uses primarily human labor & draft animals to produce enough crops or livestock for a family's survival.



TS Video: http://video.nationalgeographic.com/video/player/places/countries-places/tanzania/tanzania_ricefarmer.html

Traditional Agriculture:

2) Traditional intensive:

Increased inputs of labor, fertilizer, & water to achieve higher yields for sale.

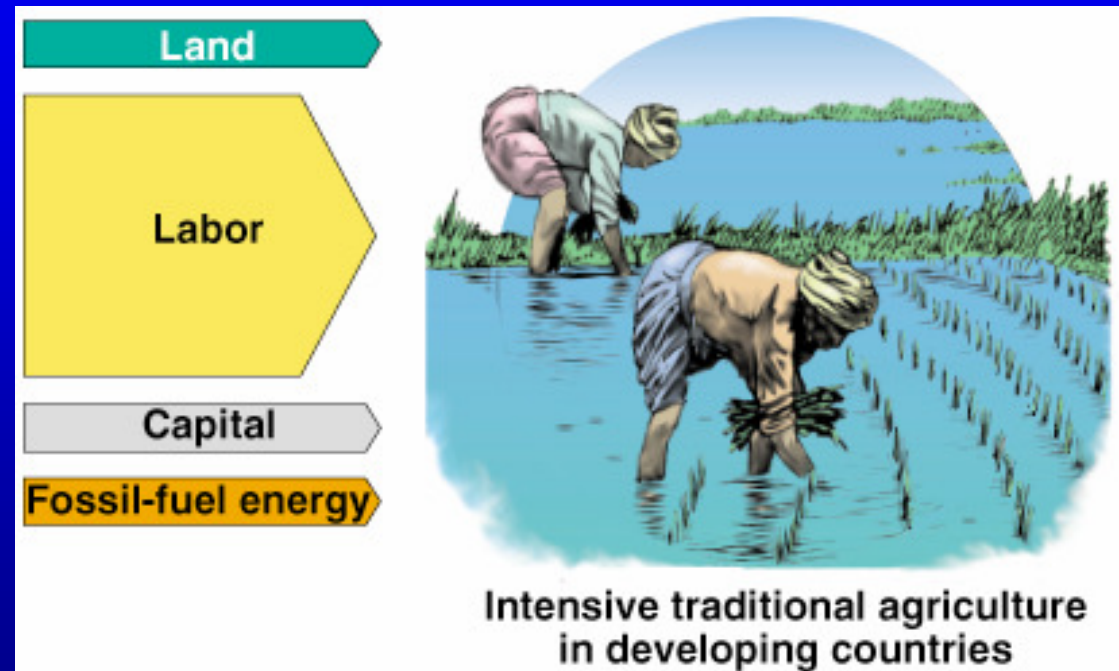


Fig. 12–3b

Generalized Map of Food Production

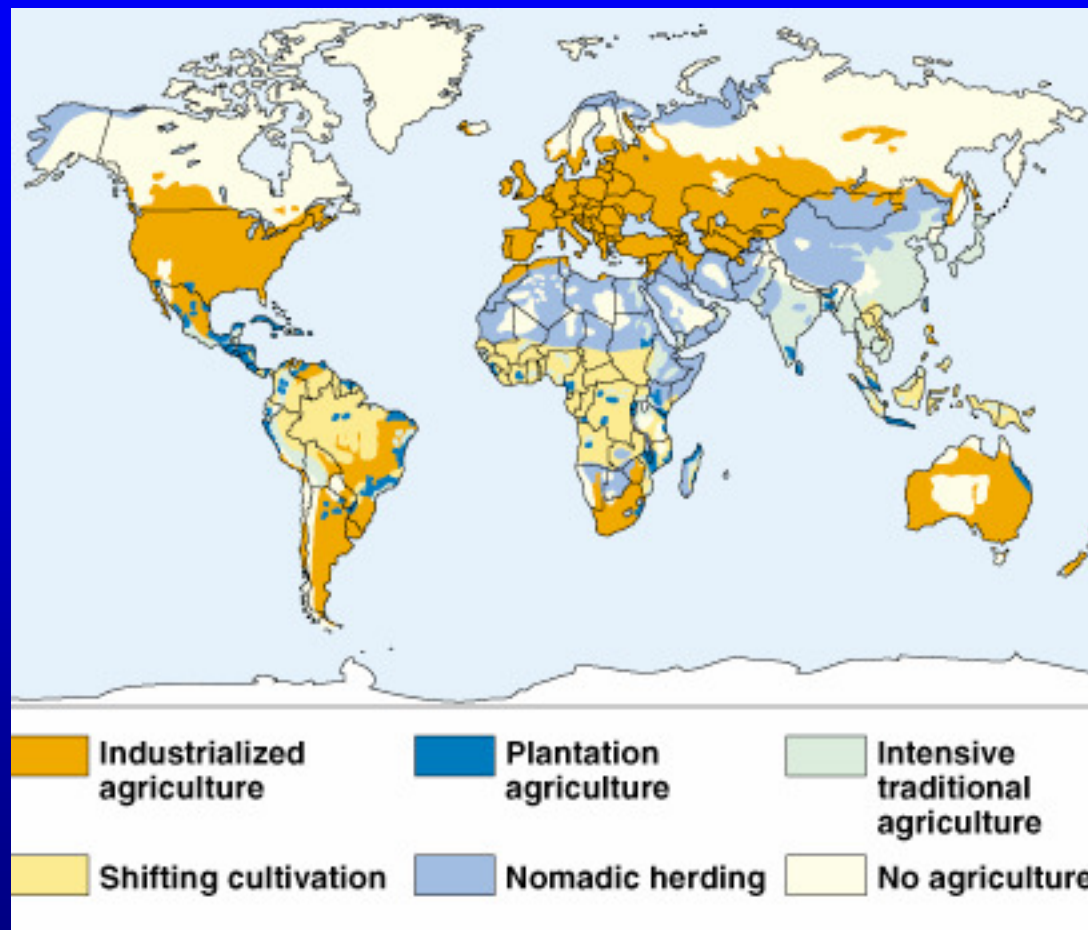


Fig. 12-2

The Green Revolution

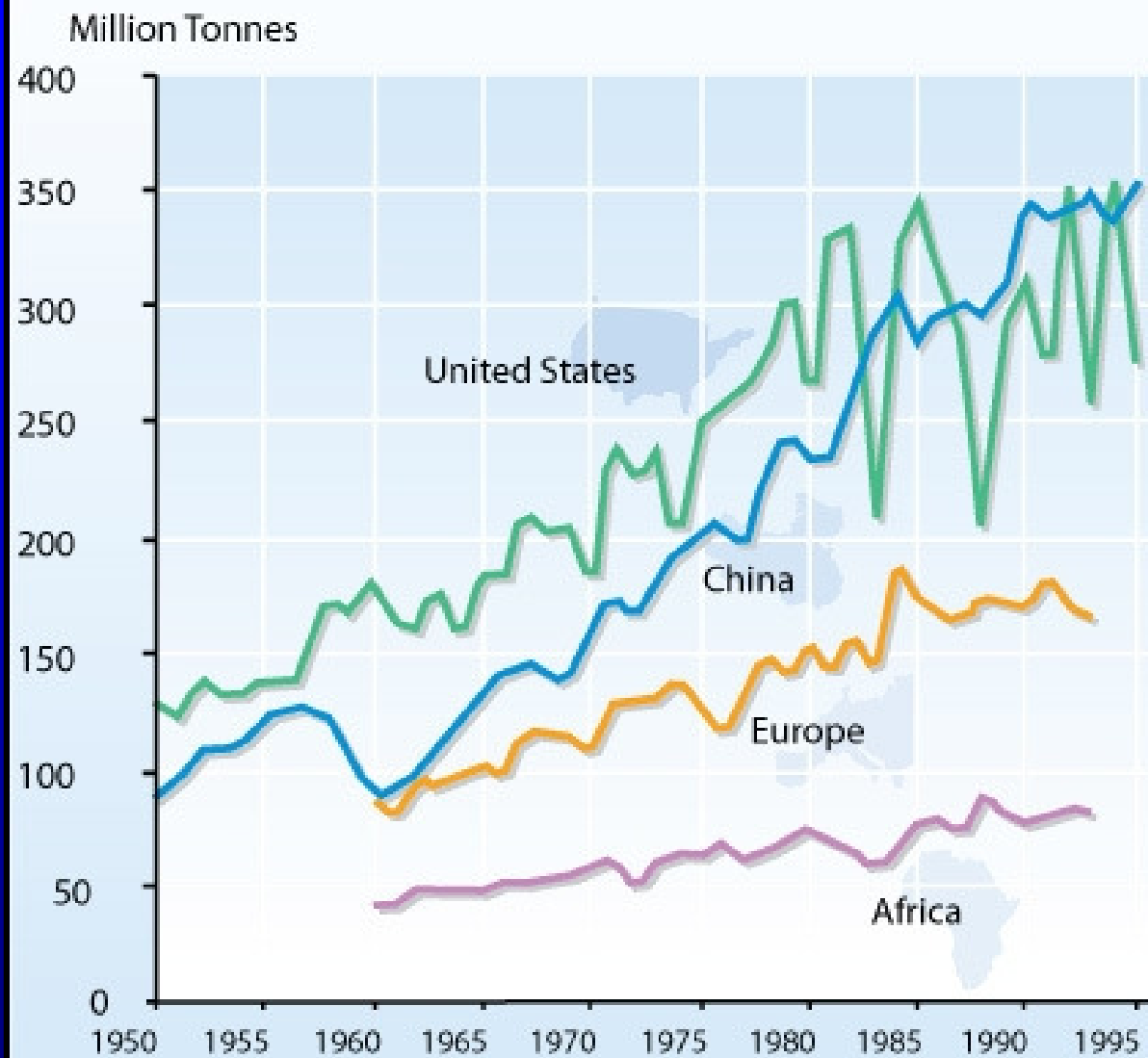
An agricultural system that produces more food on less land (increased yields per unit area of cropland). This system has three main components:

- 1) developing & planting monocultures of genetically engineered, high-yield varieties of crops;
- 2) growing & protecting crops with large inputs of fertilizer, pesticides, & water;
- 3) increasing the intensity & frequency of cropping.



Grain Production For Selected Countries

Source : USDA



2. World Food Supply

Do we produce enough food to feed the world?

- There is currently enough food produced to feed all people, but it is unevenly distributed.
- Many people in developing countries are undernourished or malnourished & many people in developed countries are overnourished & waste large amounts of food.

World Food Supply

Carrying capacity of the earth

The number of people the earth can support is dependent upon the following:

- the cultural carrying capacity per person;
- the sustainability of future food production;
- the percentage of the population eating meat.

World Food Supply

Food production per capita slowing

- world population increasing;
- increasing demand for food, especially meat;
- degradation & loss of cropland;
- water supply for irrigation limited;
- declining fertilizer use.

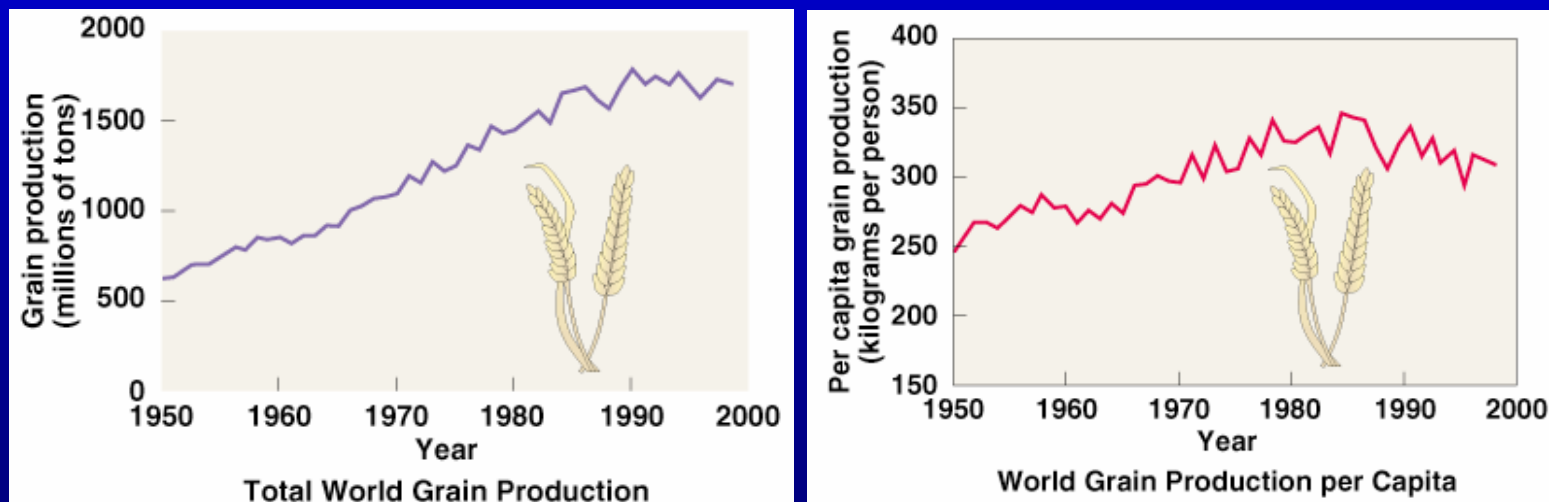


Fig. 12-8

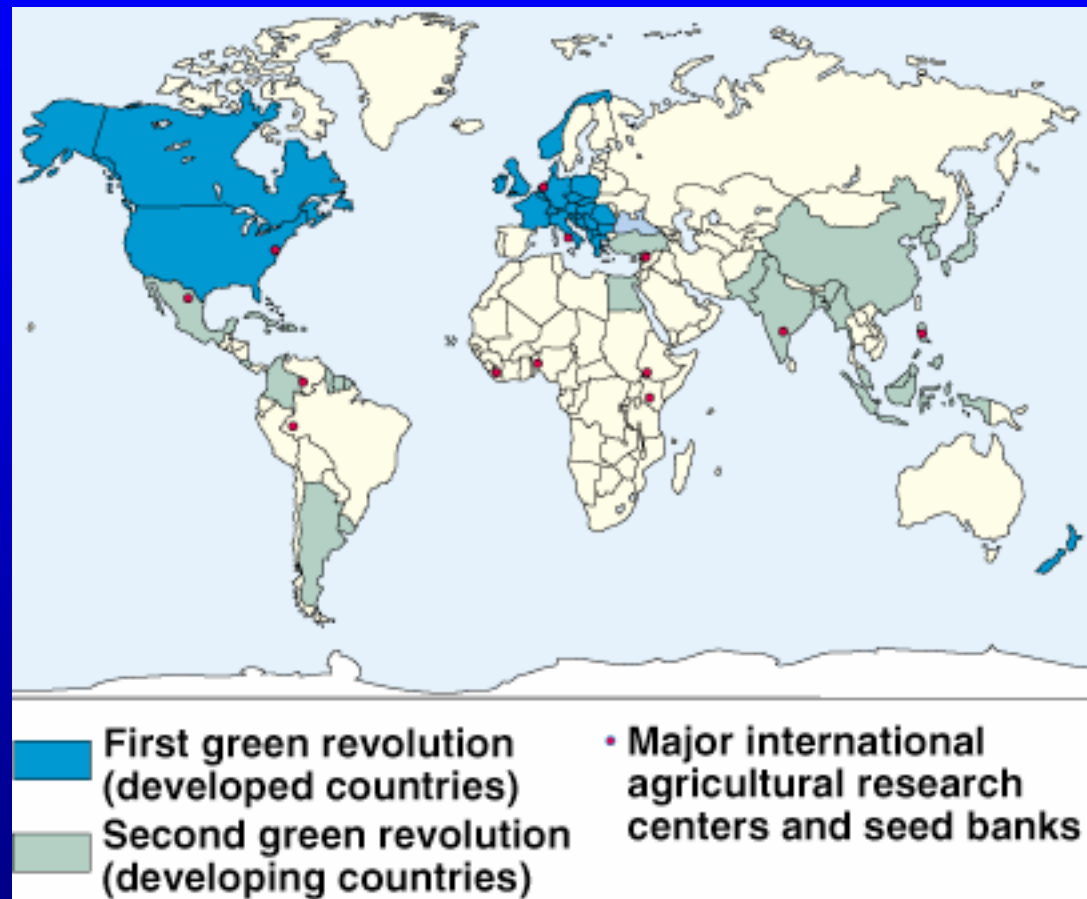
3. Increasing Food Production

Increasing crop yields

- increase inputs of water, fertilizer, & pesticides
 - eventually these additions produce no additional increase in crop yields.
- genetic engineering
 - raise the share of photosynthetic product in the seed;
 - develop strains of plants that are resistant to disease, insects, & drought.

New types of food

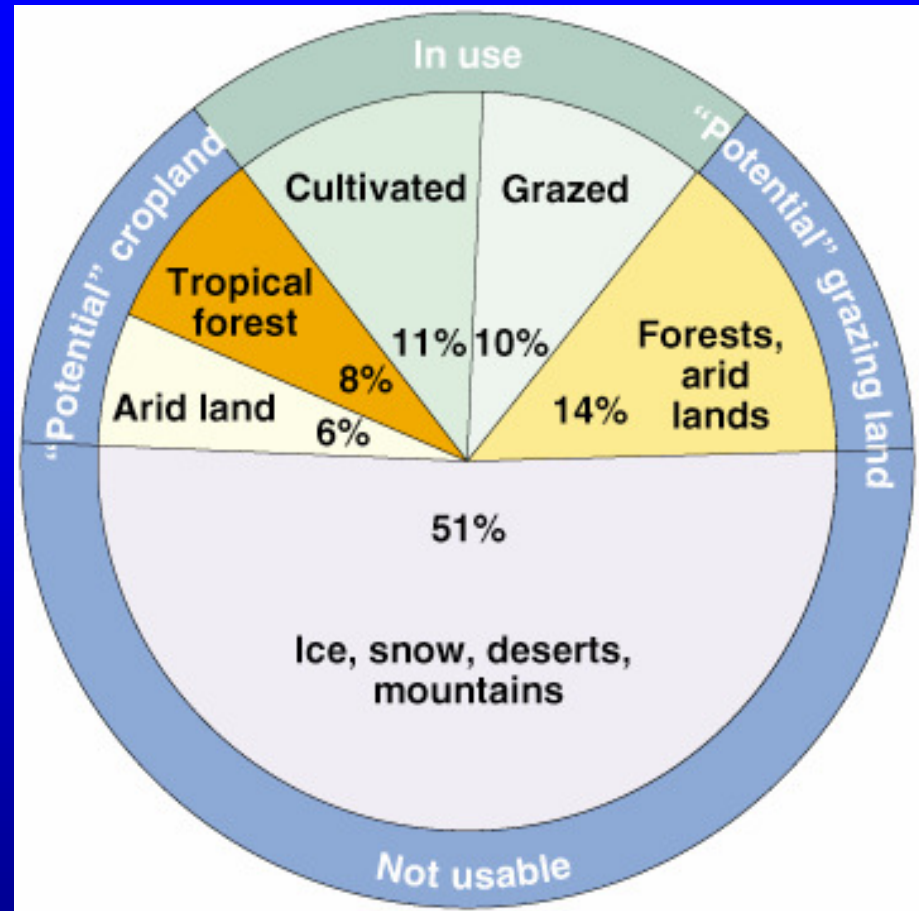
- cultivation of less widely known plants;
- cultivation of perennial plants reduce inputs of water, fertilizer, & energy – reduce soil erosion;
- yummy insects.



Insect video: http://video.nationalgeographic.com/video/player/places/culture-places/food/us_insects.html

Cultivating more land

- clear tropical forests
 - nutrient-poor soils will likely make agriculture unsustainable;
 - removal of valuable carbon sink;
 - loss of biodiversity.
- irrigate arid lands
 - expensive dams;
 - depletion of groundwater supplies.

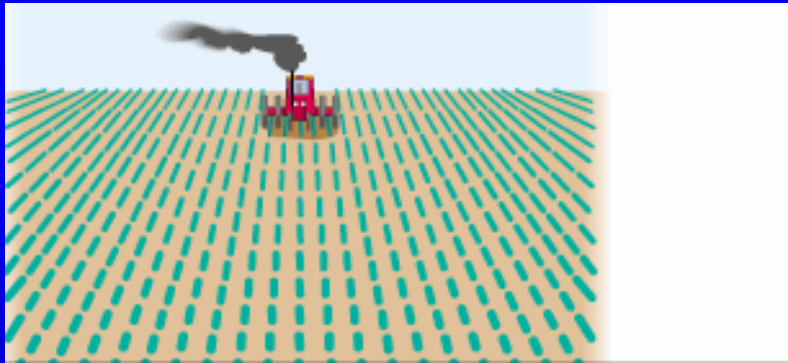


A major economically profitable & environmentally sustainable expansion of cropland is unlikely over the next few decades.

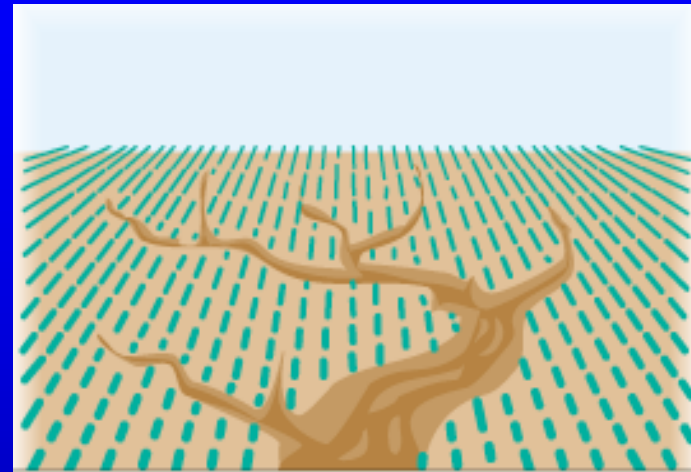
4. Environmental Impacts

General Considerations

- world population increase will demand greater food production;
- further application of green revolution techniques will increase food production, but these techniques have limitations & environmental consequences;
- industrialized agriculture has a greater harmful impact on air, soil, water, & biodiversity resources than any other human activity.

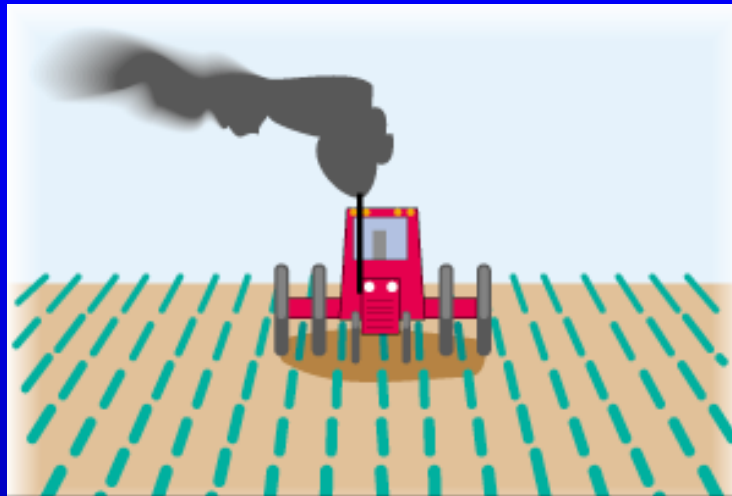


Biodiversity Loss
Loss and degradation of habitat from clearing grasslands and forests and draining wetlands
Fish kills from pesticide runoff
Killing of wild predators to protect livestock
Loss of genetic diversity from replacing thousands of wild crop strains with a few monoculture strains



Soil
Erosion
Loss of fertility
Salinization
Waterlogging
Desertification

Fig. 12–11 a & b

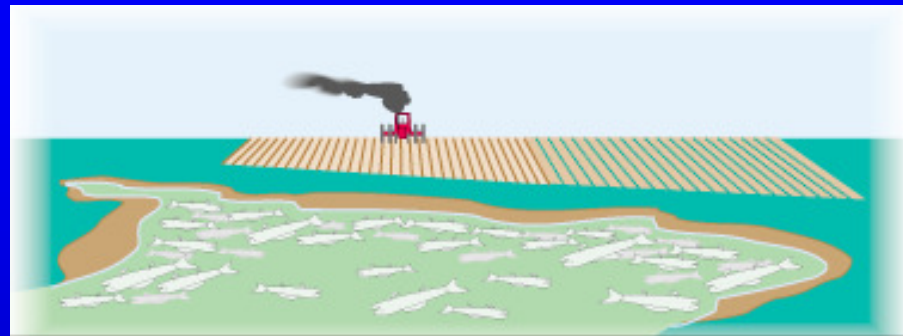


Air Pollution

Greenhouse gas emissions from fossil fuel use

Other air pollutants from fossil fuel use

Pollution from pesticide sprays



Water

Aquifer depletion

Increased runoff and flooding from land cleared to grow crops

Sediment pollution from erosion

Fish kills from

Surface and groundwater pollution from pesticides and fertilizers

Overfertilization of lakes and slow-moving rivers from runoff of nitrates and phosphates

Fig. 12–11 c & d



Human Health

Nitrates in drinking water

Pesticide residues in drinking water, food, and air

Contamination of drinking and swimming water with disease organisms from livestock wastes

Bacterial contamination of meat

Fig. 12–11 e

Environmental Impacts

Focus on meat

- more than 1/2 of the world's cropland is used to produce livestock feed;
- overgrazing is the major cause of desertification of arid & semi-arid lands;
- cattle produce methane (CH₄), a greenhouse gas;
- cattle crowded into feedlots require large doses of antibiotics.

5. Sustainable Agriculture

Some of the methods used in sustainable agriculture:

- reduce water waste in irrigation;
- increase use of organic fertilizers;
- emphasize biological pest control & integrated pest management;
- increase use of soil conservation techniques.

Organic Farming Video: http://thefutureschannel.com/dockets/hands-on_math/the_lundberg_farms

6. Turning to the Oceans

Fisheries & Fish Harvests

11 of the world's 15 major oceanic fishing areas have been fished at or beyond their estimated maximum sustainable yield for commercially valuable species & are in a state of decline.

Why?

- growing demand for seafood;
- efficient, large-scale industrial fishing fleets;
- degradation & destruction of coastal wetlands;
- pollution of coastal waters.

Video: <http://video.nationalgeographic.com/video/player/environment/habitats-environment/oceans/declining-fish.html>

Turning to the Oceans

Aquaculture – the blue revolution

fish farming & fish ranching

- produce high yields in a small volume of water;
- increase yields by crossbreeding & genetic engineering.

Aquaculture – the limitations

- conversion of coastal wetlands to fish farms;
- genetic pollution of natural fish populations by escapees;
- contamination of nearby waters with waste & chemicals.

Aquaculture Video: http://www.thefutureschannel.com/dockets/realworld/fish_farming/