

# Food

## Hunger

## Nutrition



How is food produced?

# Plants

# Types of Food Production

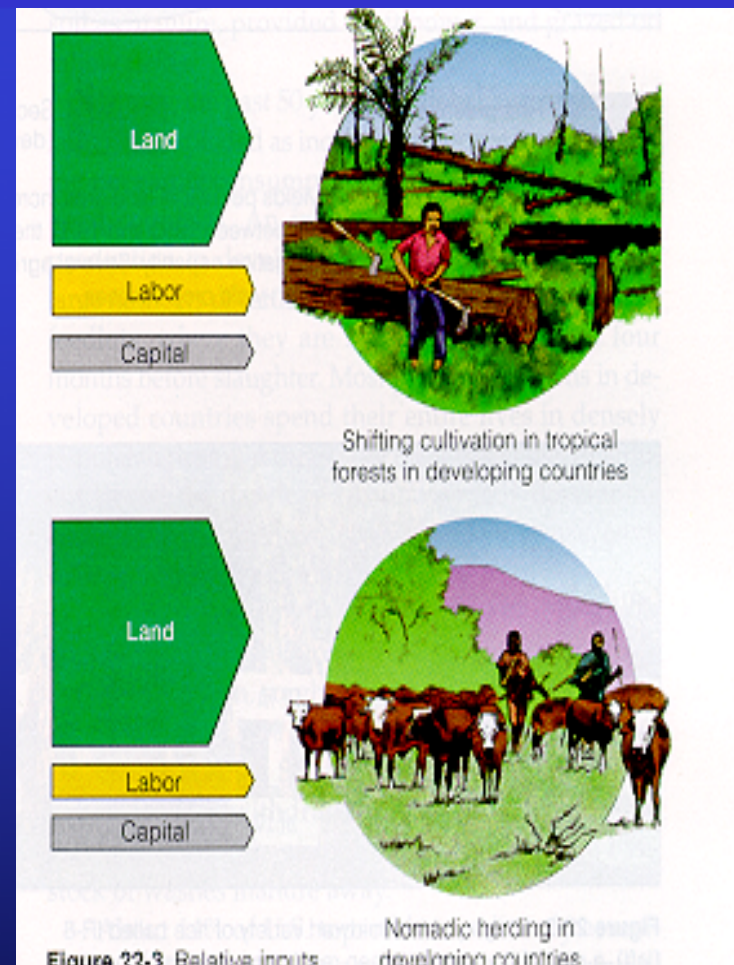
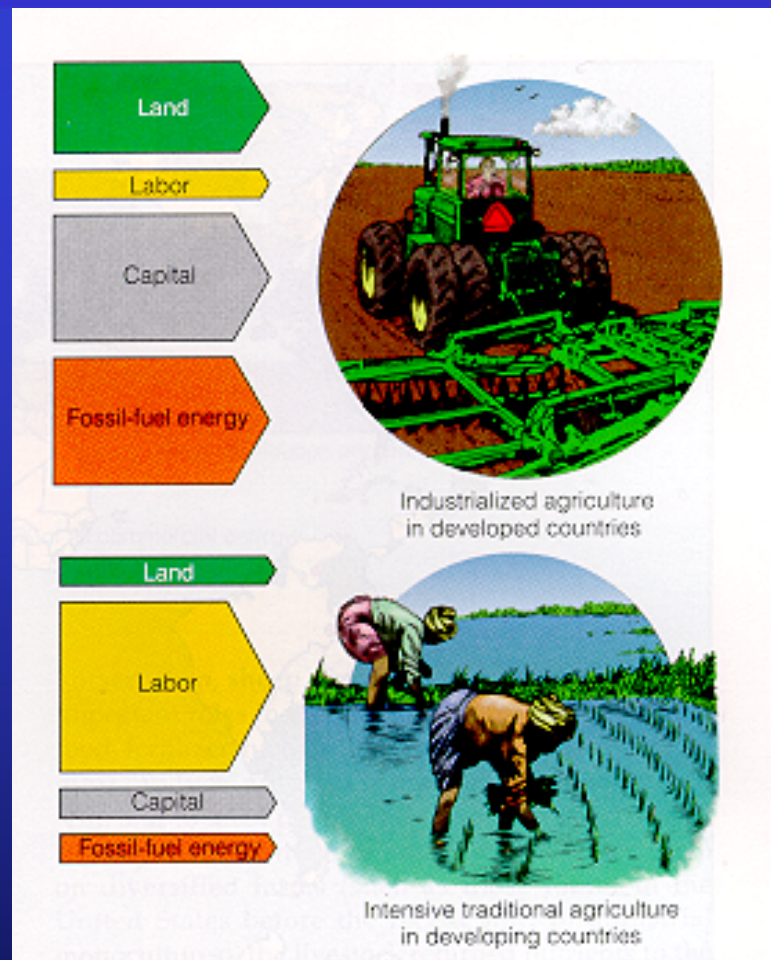
- Industrialized agriculture or high-input agriculture
  - uses fossil fuels, water, commercial fertilizers, and pesticides to produce monocultures
  - 25% of all cropland
  - mostly in developed nations; spread to some developing nations lately
- Plantation agriculture
  - industrialized agriculture in developing countries
  - crops (bananas, cacao, coffee) grown for export
- cash crops - grown to be sold in large market



# Types of Food Production

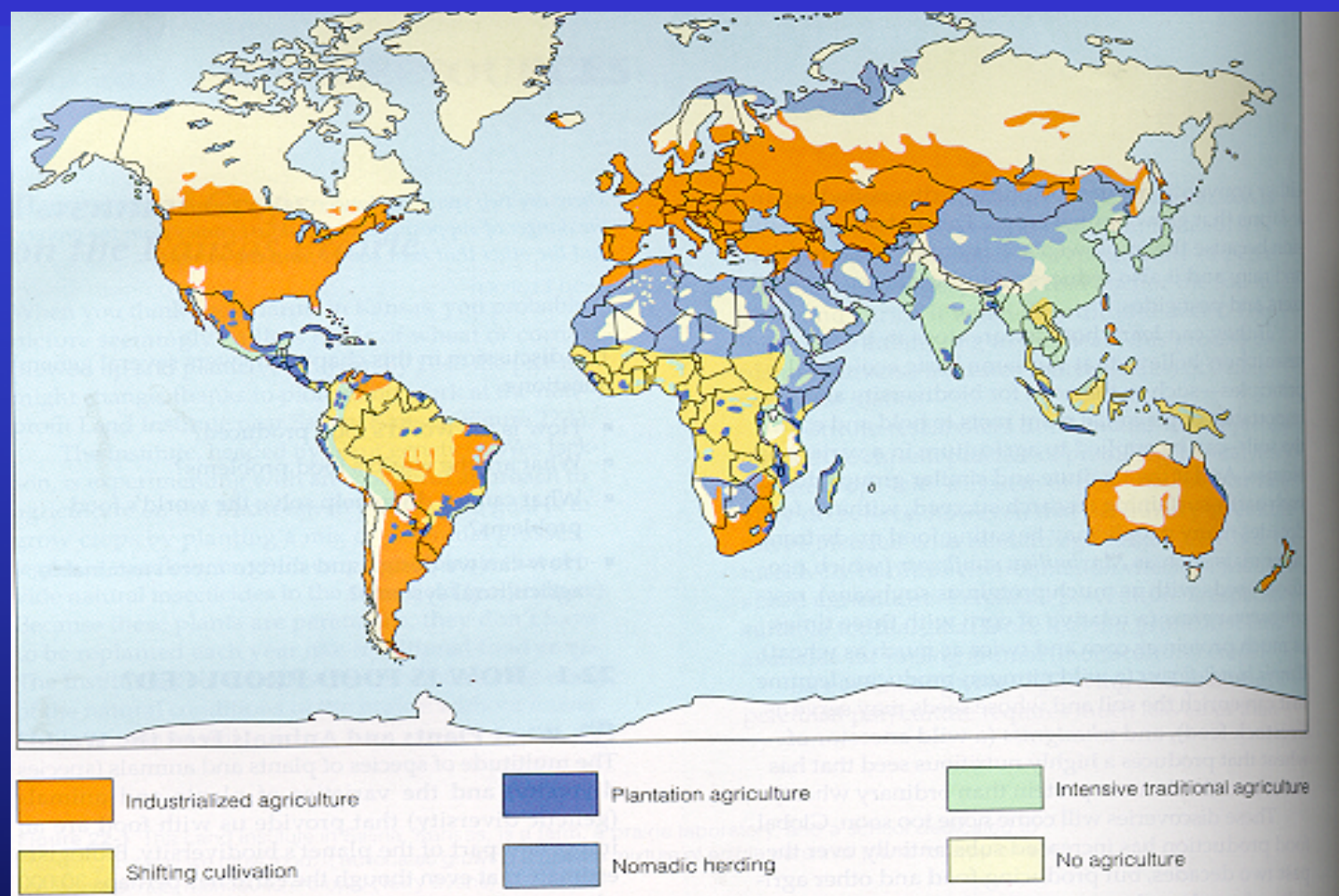
- Traditional agriculture - almost 1/2 of all people
  - Traditional subsistence agriculture
    - only enough crops produced for a single families survival
    - uses human labor and draft animals
    - ex. nomadic herding or shifting cultivation in tropics
    - subsistence crops - used by the grower or sold locally
  - Traditional intensive agriculture
    - increased inputs of human, draft effort and fertilizer and water increases yield
    - allows surplus to sell
    - cash crops

# Inputs into Agriculture Systems





# Pattern of Food Production Methods

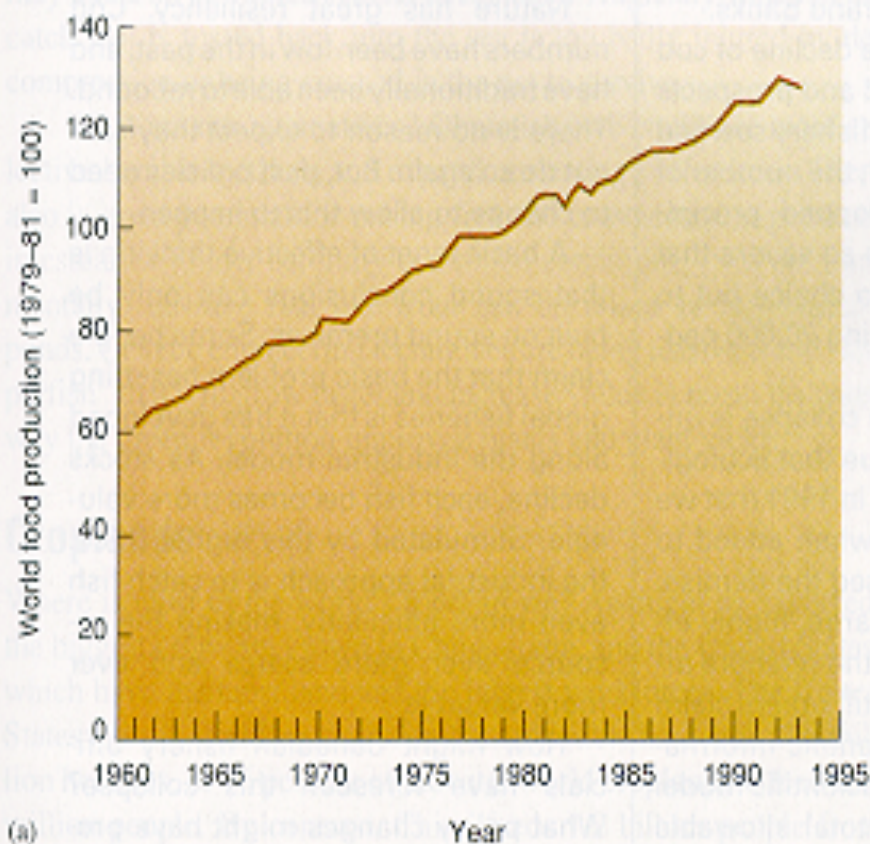


# What is the Green Revolution?

- The green revolution is the increase in crop yield that has occurred since 1960.
- 3 steps
  - developing monoculture
  - excess water, pesticides and fertilizer
  - increasing frequency of cropping
- 1st green rev. - 1950--1970 in dev'd countries
- 2nd green rev. - since 1967 - new varieties were introduced to tropics with yields 2-5x normal
  - due to new genetically engineered strains of rice and wheat

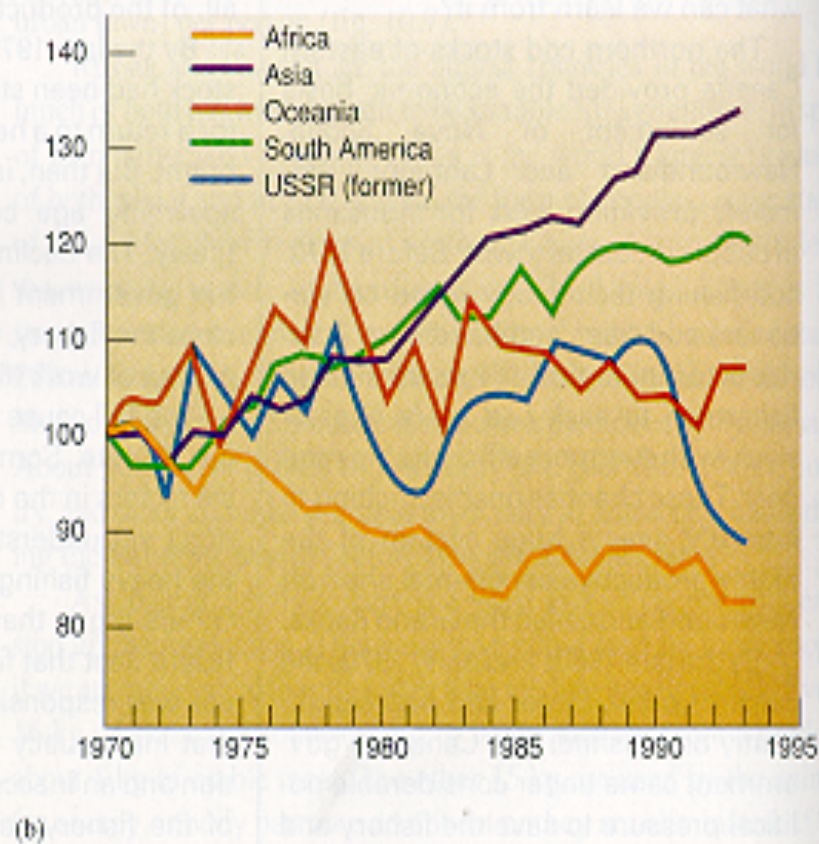


# The Green Revolution



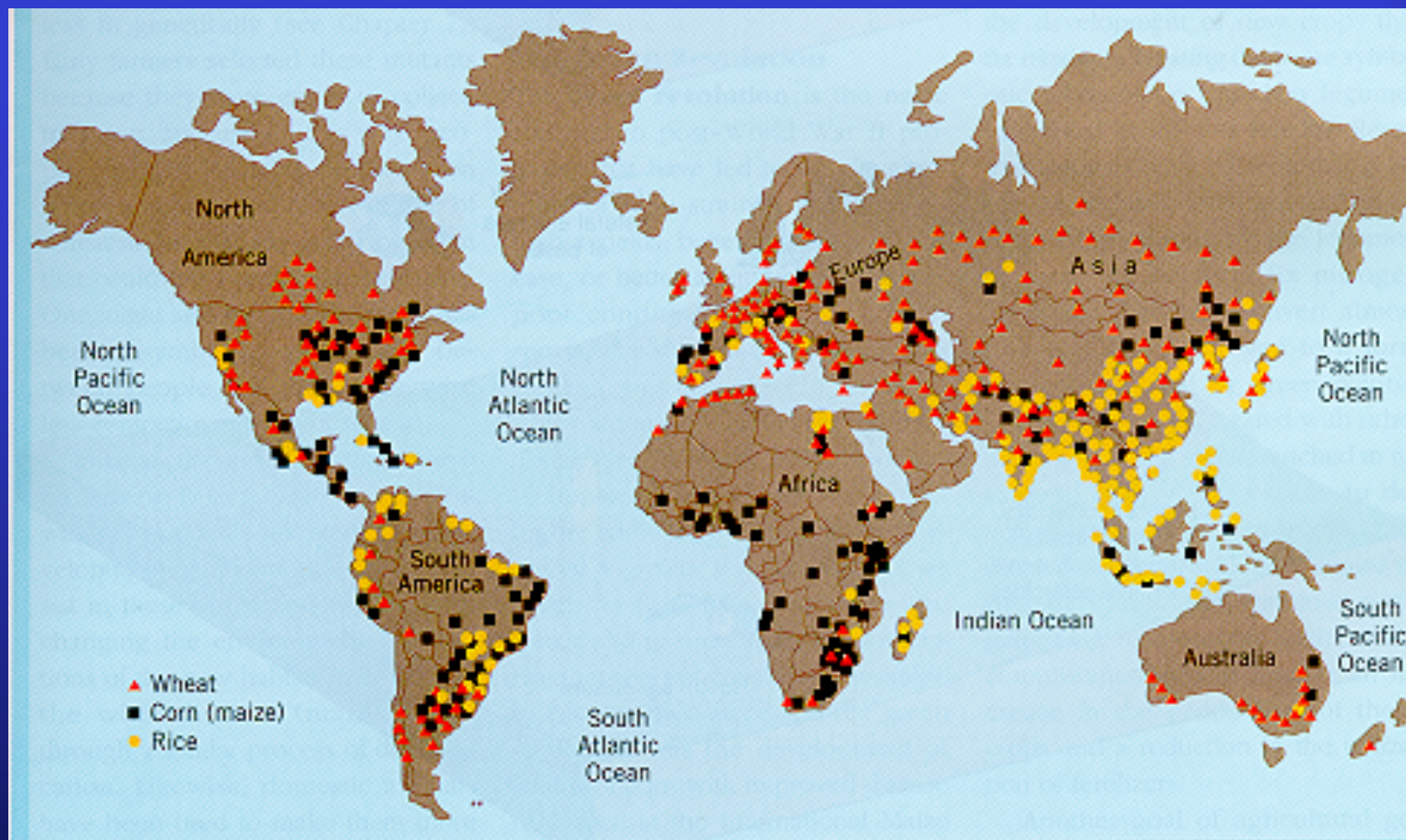
(a)

Figure 10.8



(b)

# World Distribution of Crops





# Consequences of Food Production

## -biodiversity loss



### **Biodiversity Loss**

Loss and degradation of habitat from clearing grasslands and forests and draining wetlands

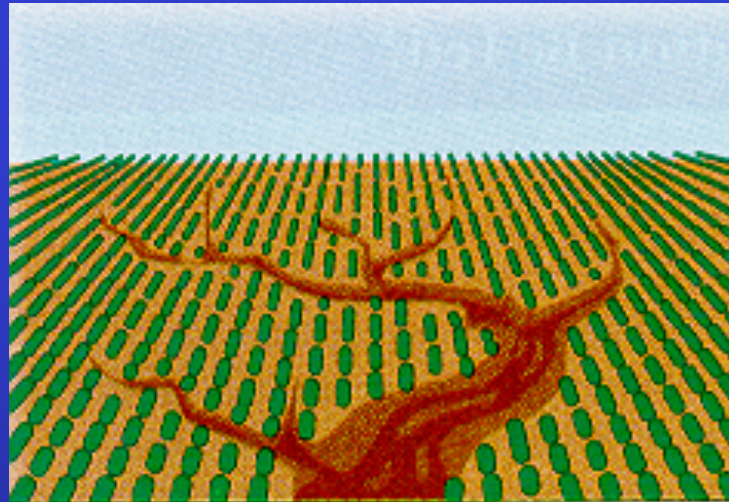
Fish kills from pesticide runoff

Killing of wild predators to protect livestock

Loss of genetic diversity from replacing thousands of wild crop strains with a few monoculture strains

# Consequences of Food Production

## - soil



### Soil

Erosion

Loss of fertility

Salinization

Waterlogging

Desertification



# Consequences of Food Production

## - air pollution



### **Air Pollution**

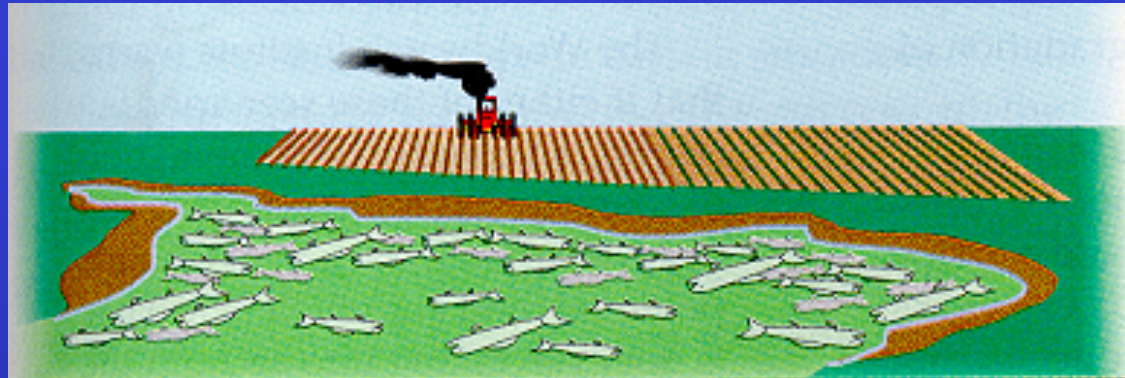
Greenhouse gas emissions from fossil fuel use

Other air pollutants from fossil fuel use

Pollution from pesticide sprays

# Consequences of Food Production

## - water



### Water

Aquifer depletion

Increased runoff and flooding from land cleared to grow crops

Sediment pollution from erosion

Fish kills from pesticide runoff

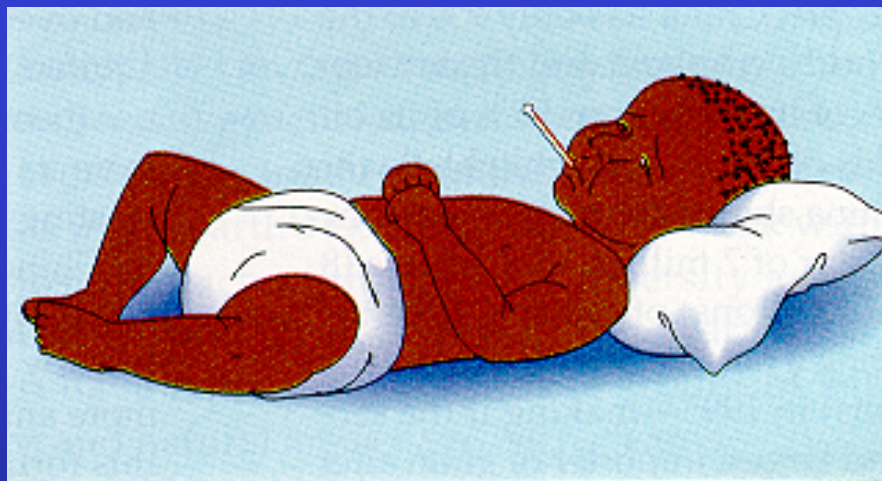
Surface and groundwater pollution from pesticides and fertilizers

Overfertilization of lakes and slow-moving rivers from runoff of nitrates and phosphates from fertilizers, livestock wastes, and food processing wastes



# Consequences of Food Production

## - human health



### 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

# Livestock



# Animal Farming

- More than 50% of the world's cropland is used to produce food for animals
- livestock consume 38% of world's grain (70% in U.S.!!)
- 14% of topsoil loss is due to grazing
- 50% of annual water goes toward livestock
- Cattle produce 12-15% of all methane
- Livestock produce 21x more waste than humans
- Much energy is lost in the food chain

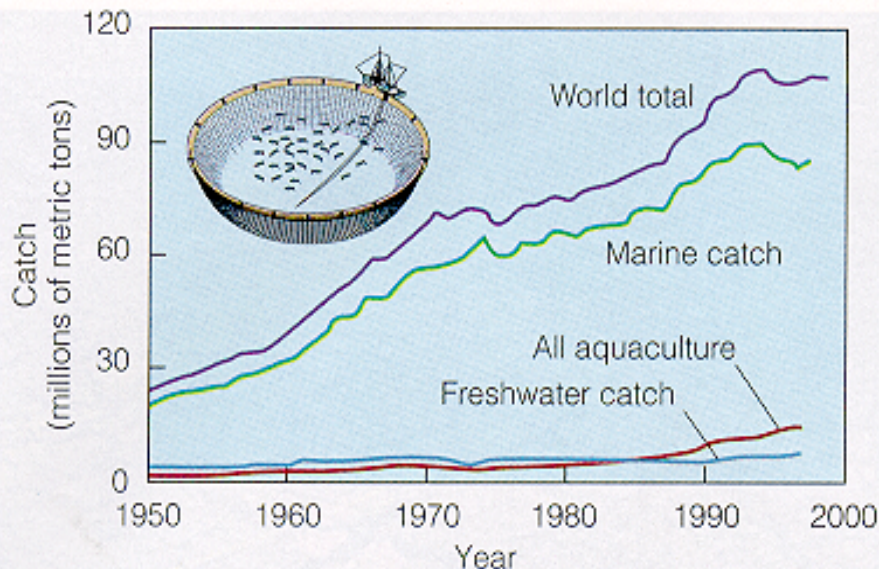
# Fishing

# Where fish are caught

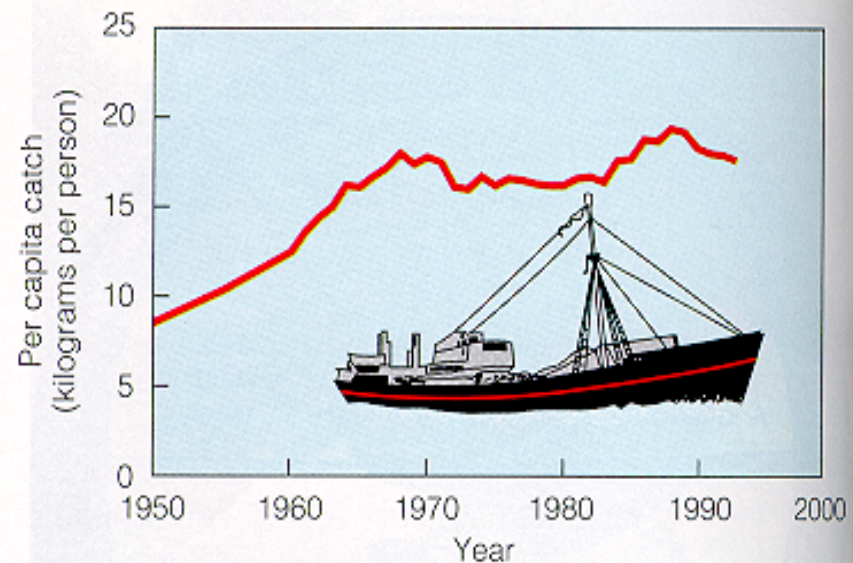
- fisheries - concentration of species suitable for harvesting
  - 78% of catch comes from ocean
    - 99% of this taken from coasts
  - 16% aquaculture
  - 10% lakes and rivers
  - (numbers don't add to 100?)

# How many are caught?

- Between 1950 and 1989 the catch increased five-fold coming mostly from an increase in marine catch
- since 1989, total catch has leveled off, so per capita catch has decreased because of pop growth



Total World Fish Catch



World Fish Catch per Person



# Are we causing overfishing?

- Fish are a renewable resource as long as the annual yield leaves enough fish to replace the loss - sustainable yield
- prolonged over fishing leads to commercial extinction - not enough fish to make it profitable
- 15 of 17 major fisheries have been fished at or above sust. Yield since 1993
- 70% of world's fish stocks are exploited, over fished or recovering
- decline is also due to loss of habitat - estuaries are major hatcheries

# What about aquaculture?

- Amounts to 16% of harvest annually
- farming - fish are grown in controlled env
- ranching - fish are grown and then released and caught in the wild
- most production of shrimp, salmon & oysters in world
- BLUE REVOLUTION - aquaculture may cause same increase as with green rev.

# Agricultural Policy and Food Aid

# Agricultural Policy

- Farming is an uncertain business because of weather, infestations etc.
- In order to keep food production and farmers going in spite of bad times, most governments help farmers financially
- Subsidizing - too much, too little, how much?
  - You want to keep farmers going, but in a good year, you can have too much produced



# Food Aid

- Food aid has been done since the 60's in order to help others in other parts of the country
- Problems
  - not a permanent solution (teach to fish)
  - increases populations where there is no food to support it
  - makes countries dependent
  - decreases domestic production
  - drives food prices down
- Food aid should be done locally, not globally

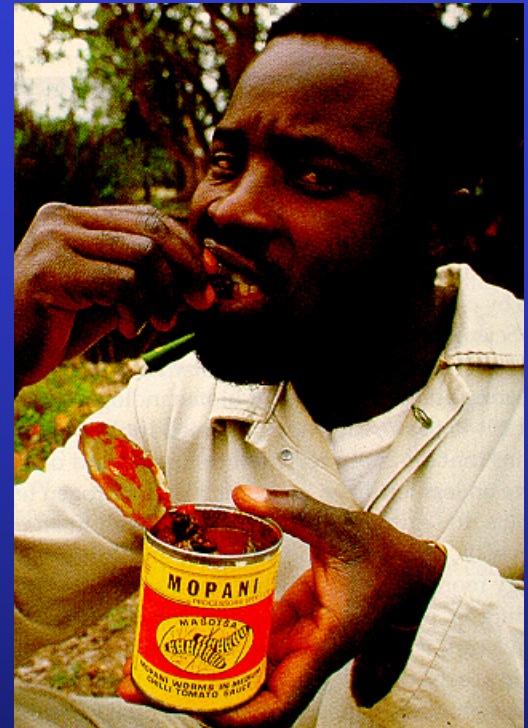
# Alternative Food Sources

# New food is being produced due to genetic engineering

- Wheat
- rice
- tomatoes

# Foods traditionally grown in local areas are being adapted for global use

- Winged bean
- insects
- soy beans





# Nutrition

# Nutritional Needs

- 2000-6000 calories per day
- 40-100g protein (essential amino acids)
- carbos and fats
- minerals (calcium, iron, iodine)
- vitamins ( B1, B2, B3, B6, B12, folic acid, C, A, D, E, K)

# Lack of food

- Undernourishment (undernutrition) - receive less than 90% of minimum daily intake over long period
- Malnourishment (malnutrition) - lack of specific dietary requirements
- effects are generally greatest in children
- most are reversible



# Diseases caused by malnourishment

- Marasmus -  
energy and protein  
deficiency



- Kwashiorkor -  
protein  
deficiency



# Diseases caused by malnourishment

- Anemia - insufficient iron, causes weakness
- Goiter and hyperthyroidism - insufficient iodine, causes low metabolism



# Diseases caused by malnourishment

- Others:
  - scurvy (C)
  - pellagra (niacin)
  - rickets (D)
  - etc.



# Famines

- Acute shortages of food for many people, resulting in a large-scale loss of life
- characterized by mass migrations to refugee camps
- recovery takes a long time