Food Resources

Food in the World

- 30,000 plant species with parts people can eat
- 15 plants and 8 animals supply 90% of our food
- Wheat, rice, and corn are half the calories people eat
- 66% of people eat mainly rice, wheat, and corn (grains)
- The top third of the economic chain eats primarily meat.

Types of Food Production

- Industrialized agriculture
- Traditional agriculture

Industrialized Agriculture

- Industrialized agriculture-Use large amounts of fossil fuel energy, water, commercial fertilizers and pesticides to produce huge quantities of single crops or livestock animals for sale.

Traditional Agriculture

- Traditional agriculture-practiced by 2.7 people on earth
  - Traditonal subsistence agriculture-produce enough food to stay alive
  - Traditional Intensive agriculture-farmers increase inputs of human and draft labor, fertilizer and water to get a higher yield per area of cultivated land to produce enough food for families, and their income

Green Revolution

- Involves 3 steps
- 1. Developing and planting monocultures of selectively bred or genetically engingeered high yeid varieties of key crops
- 2. Lavishing fertilizer, pesticides, and water on crops to produce high yeilds
- 3. Often increasing the intensity and frequency of cropping

Food Production in the U.S.

- Since 1940, food production in the U.S. has more than doubled crop production
- 9% of population is involved in the U.S. agricultural system.
- Generates 18% of countries GNP

Livestock Production

- Meat products are sources of quality protein.
- Between 1950 and 1996, world meat production increased fourfold and per capita meat production rose by 29%.
- 14% of U.S. topsoil is associated with livestock grazing.
- Cattle belch out 12-15% of all the methane released into the atmosphere
- Some say if Americans cut their grain intake by 16%, this would save enough grain to provide a subsistence diet for nearly 900 million people.

Interplanting

- Polyvarietal cultivation-Where plot is planted with several varieties of the same crop
- Intercropping-two or more different crops grown at same time on a plot
- Agroforestry- Crops and trees are planted together
- Polyculture-Many different plants mature at various times, and are planted together.

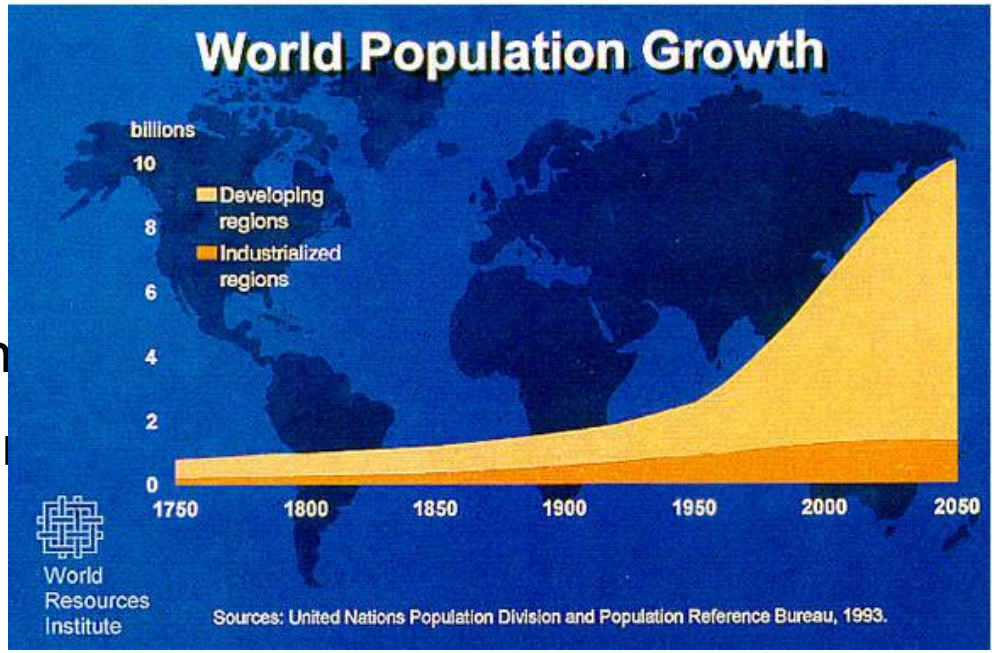
Meat, Milk, and Seafood

- Milk and meat are highly prized, but their distribution is inequitable. Developed countries make up 20% of world population, but consume 80% of meat and milk production. Less developed countries produce 60% of world's milk and meat.
- About **90%** of the grain grown in North America is used to feed cattle, hogs, poultry, and other animals!
- Seafood is an important protein source in many countries. This food source is threatened by over-harvesting and habitat destruction.

- Every 16 kg of grain and soybeans fed to beef cattle in feedlots produce 1 kg of edible beef.
  - If we ate grain directly, we would obtain twenty-one times more calories and eight times more protein than we get eating the beef.

World Food Problems

- Reasons for problems:
  - Population growth
  - Increasing affluence
  - Degradation and loss of cropland
  - Little growth in irrigation
  - Decline in global fertilizer



Undernutrition

- Undernutrition- Consuming insuffiecient food to meet one's minimum daily energy requirement for a long enough time to cause harmful effects

Malnutrition & Over nutrition

- Malnutrition-Faulty nutrition. Caused by a diet that does not supply a persons with enough protein, essential fats, vitamins, minerals, and other nutrients.
- Over nutrition-an excessive intake of food, especially fats

Good News!

- Between 1970 and 1995, worldwide proportion of people suffering from undernutrition went from 36% to 14%.
- Number of malnourished people fell from 940 million in 1970 to 850 million in 1995.
- We produce more than enough food to meet the basic nutritional needs of every person on earth today

Famines are characterized by large-scale food shortages, massive starvation, social disruption, and economic chaos. Some causes are:

- Environmental conditions - drought, insects, natural disasters
- National politics - corruption, oppression
- Armed conflict
- Economics - price gouging, poverty, landlessness

Essential Nutrients

- **Malnourishment -** a nutritional imbalance caused by a lack of specific dietary components or an inability to utilize essential nutrients
- Starchy foods like corn and polished rice tend to be low in several essential nutrients.
- Protein deficiency diseases **- kwashiorkor, marasmus** (see next slide).
- Iron deficiency (**anemia) -** is the most common dietary deficiency in the world and is most severe in India.
- Iodine deficiency - causes goiter, hyperthyroidism

Protein Deficiency Diseases

- **Kwashiorkor** - "Displaced Child" - Occurs mainly in children whose diet lacks high-quality protein.

•**Marasmus** - "To Waste Away" – of muscles Caused by a diet low in both protein

Environmental Effects of Producing Food

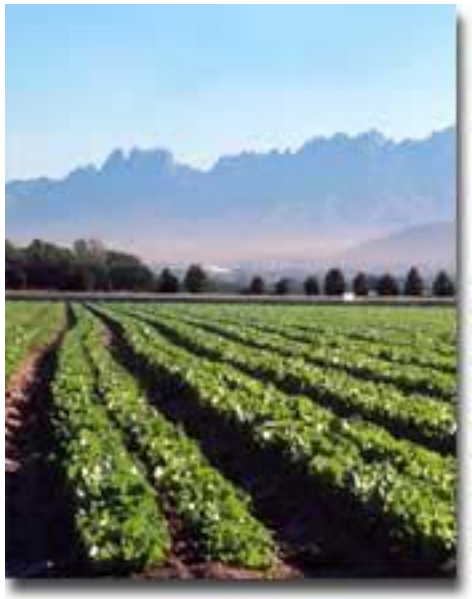
- Agriculture has a greater harmful impact on air, soil, water, and biodiversity resources than any other human activity.

Increasing Crop Yields

- Agricultraul experts expect most future increases in food yields per hectare on existing cropland to result from improved strains of plants and from expansion of green revolution technology

Cultivation of Land

- 36% of the world's land is devoted to raising crops.
- Some think that cultivating more land is a possible solution to the food crisis.



Food Growth in Urban Areas

- Urban gardens provide 15% of world's food.
- If people grew more food in their backyards, they could live more sustainable and save money.

Fishing

- 3rd major food producing system consists of fisheries
- 99% of fish caught in ocean is from the coastal waters
- Between 1950 and 1996, fish catch increased 4.9 fold

Problems With Fishing

- Overfishing-Taking of so many fish that too little breeding stock is left to maintain numbers
- Commercial extinction-reduction of a species to the point at which it's no longer profitable to hunt for them

Aquaculture

- Aquaculture-where fish and shellfish are raised for food
- Supplies 20% of world's commercial food harvest
- Increased 3.3 fold between 1984 and 1996

Methods to Increase Food Supply

- Improved irrigation and utilization of water
  - Drip irrigation
- Increasing arable land(land for growing crops)
  - Difficult because of precipitation and temperature

Methods to Increase Food Supply

- Food distribution modification
  - Today distribution of food is a major problem in Africa/Asia
  - Best solution: teach locals how to best utilize their land with appropriate technology so they can attempt to support themselves and not rely on others.

Gov. assistance to farmers and consumers

- Keep food prices low
- Give farmers subsidies to keep them in business and to encourage them to increase food production
- Eliminate most or all price controls and subsidies
- Continue Agricultural research

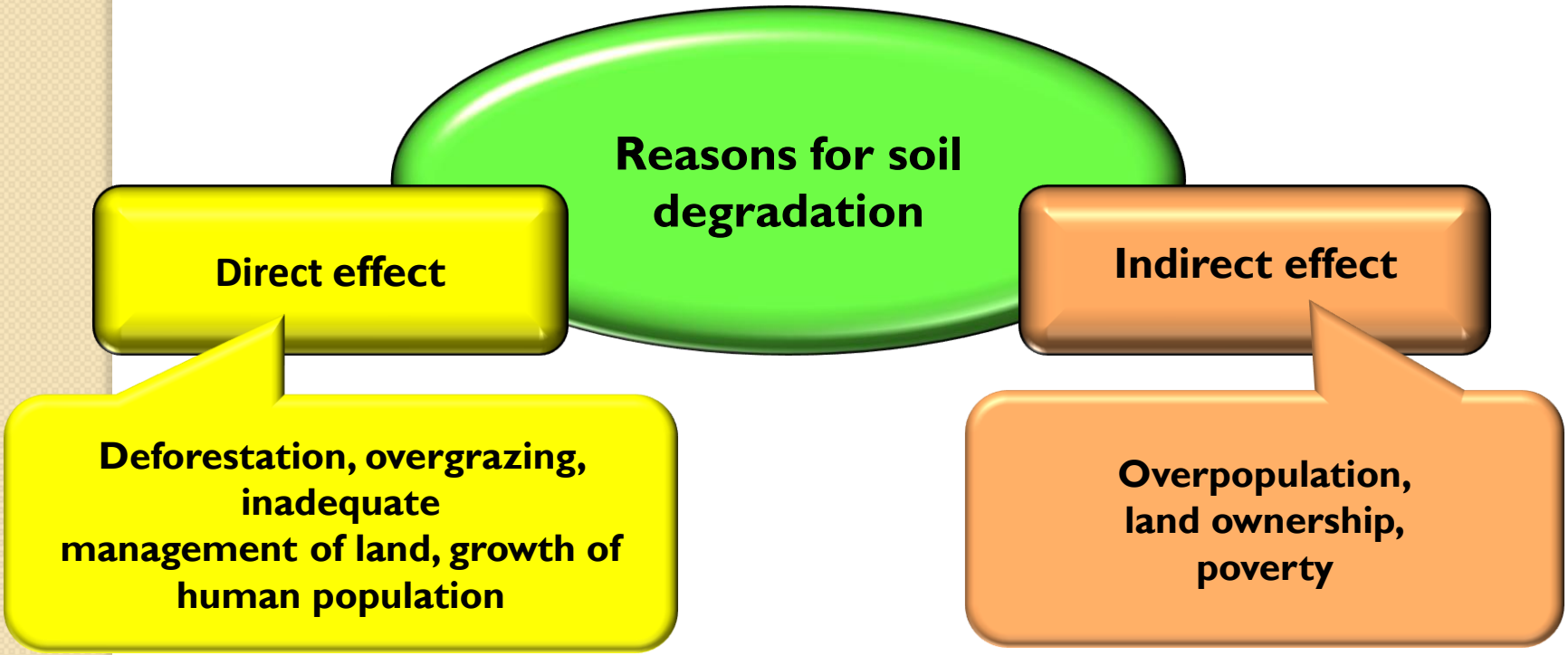
Sustainable Agricultural

- Sustainable Agricultural- Method of growing crops and raising livestock based on organic fertilizers, soil conservation, water conservation, biological control of pests, and minimal use of nonrenewable fossil fuel energy

Soil resources

One of the most important renewable natural resources is soil – the biologically active upper layer of land with a unique property – fertility.

To provide the world's population with food, it is imperative that land degradation be reduced.



Soil resources

Desertification is a loss of natural vegetation which causes a rapid decrease in soil fertility and an eventual total extinction of the soil cover due to soil erosion.
This process involves changes in the soil moisture regimen, and soil gets salinised and compacted.

Desertification

Water erosion

Soil Conservation

- - land management, ground cover, climate, soil type and tillage system are important elements in soil conservation.

Ways to Manage Topography

- Contour - Plowing and planting across (with the contour) slope to slow flow of water (left).
- Strip-farming - Planting different crops in alternating strips along land contours (left).
- Terracing - Shaping land to create level shelves of earth again with the slope to hold water and soil (see next slide).
- Planting perennial (plants that live >2 years) species

Contour Plowing

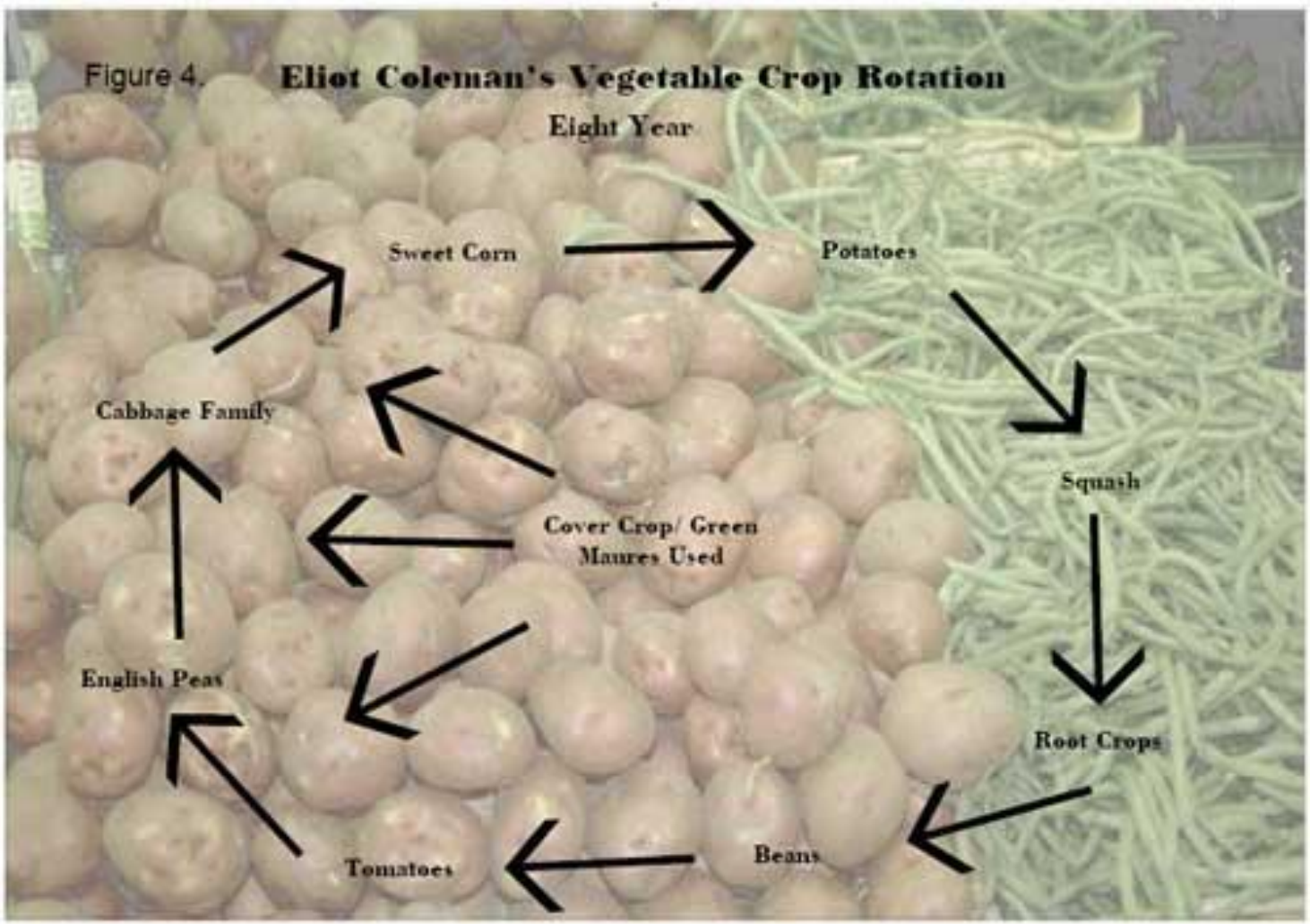
plowing fields along curves of slopes

Conservation Plowing

dead weeds and stalks are left in the ground from year to year

Crop Rotation

plant different crops in a field from year to year



Windbreak

trees planted along the edge of a field

Terracing

- Prevents erosion from heavy rains on steep hills

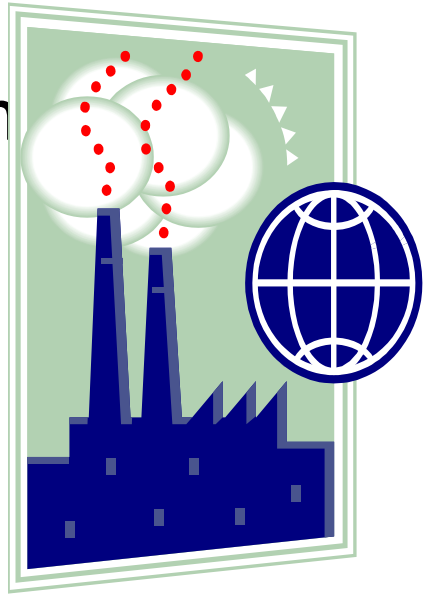
Methods Used to Reduce Bare Ground Erosion

- Providing Ground Cover
  - Leave crop residue after harvest.
  - Plant cover crops after harvest.
  - Add protective ground cover such as manure, wood chips, straw, leaves, etc. (mulch).
- Reduced Tillage(preparation of soil)

- Often farmers using conservation tillage must depend relatively heavily on pesticides.

Threats to Natural Resources

- Urbanisation and Industrialisation
- Overpopulation
- Overconsumption and irrespon
- Deforestation
- Erosion
- Habitat Destruction
- Natural Hazards
- No proper access to resources such as water



What are we doing to save our resources?

- The Government of India has undertaken many measures for the conservation of the resources
  - Regulations and reforms for proper housing and infrastructure development to avoid land acquisition problems
  - Mass media public service messages to educate the people on the importance of conservation of resources
  - Increase the wildlife and forest reserves in the country
  - Schemes to do a proper inventory of the resources and monitor changes in the environment.
  - Various projects and schemes that promote conservation of resources.

Our Proposed Action Plan

Problems	Solutions
Overpopulation	Develop population control measures and educate people on the advantages of a small family.
Overconsumption and irresponsible use	Educate people on the importance of conservation of resources using mass media. Develop partnerships with advocacy groups and environmental NGOs for spreading the message.
No proper access to resources	Privatization of the some of the resource management function will help in better developing the delivery mechanism
Deforestation and Habitat destruction	Have stringent regulations for the protection of the resources and ensure that the defaulters are punished
Natural Hazards	Develop and employ tools for monitoring the possibility of natural hazards and providing preventive measures