Chapter 10

AGRICULTURE

PPT by Abe Goldman
Modified: DKroegel

Economic Activities

- **Primary**
  - Raw Materials: Agriculture, mining, fishing, and forestry
- **Secondary**
  - Manufacturing: capital (for industry) and consumer goods
- **Tertiary**
  - *Consumer*: retail and personal services; entertainment
- **Quatrinary**
  - *Business/Producer services*: trade, insurance, banking, advertising, transportation and information services
- **Quinary**
  - Public (government) Services: health, education, research, transportation, tourism & recreation

These three levels are often subdivided within the economic activity group "tertiary" as services may be utilized by both consumers & producers.

Key Issue 1: Where Did Agriculture Originate?

- Origins Of Agriculture
  - Hunters And Gatherers
    - Contemporary Hunting And Gathering
  - Invention Of Agriculture
    - Two Types Of Cultivation
- Location Of Agricultural Hearths
  - Location Of First Vegetative Planting
  - Location Of First Seed Agriculture
    - Diffusion Of Seed Agriculture
- Classifying Agricultural Regions
  - Differences Between Subsistence And Commercial Agriculture
    - Purpose Of Farming
    - Percentage Of Farmers In The Labor Force
    - Use Of Machinery
    - Farm Size
    - Relationship Of Farming To Other Businesses
  - Mapping Agricultural Regions

Vocabulary

agriculture
crop
vegetative planting
seed agriculture
subsistence agriculture
commercial agriculture
prime agricultural land
agribusiness

Agricultural Origins and Regions

- **Origins of agriculture**
  - Hunters and gatherers
    - Before the invention of agriculture, all humans probably obtain the food they needed for survival by hunting for animals, fishing, or gathering plants (including berries, nuts, fruits, and roots). Hunters and gatherers lived in small groups, usually fewer than 50 persons, because a larger number would quickly exhaust the available resources within walking distance.
    - TODAY
      - Estimated 250,000 people living in isolated areas still live as hunter-gatherers
      - Arctic, and the interiors of Africa, South America and Australia
  - Invention of agriculture
    - **Agriculture** is the deliberate modification of Earth's surface through cultivation of plants and rearing of animals to obtain sustenance or economic gain.
    - Dates back some 10 to 12 thousand years

Location of Agricultural Hearths

- **Location of agricultural hearths**
  - **Vegetative planting**
    - (aka root cropping) is the reproduction of plants by direct cloning from existing plants, such as cutting stems and dividing roots [Cassava (manioc or yucca), yams, sweet potatoes]

Vegetative Planting Hearths

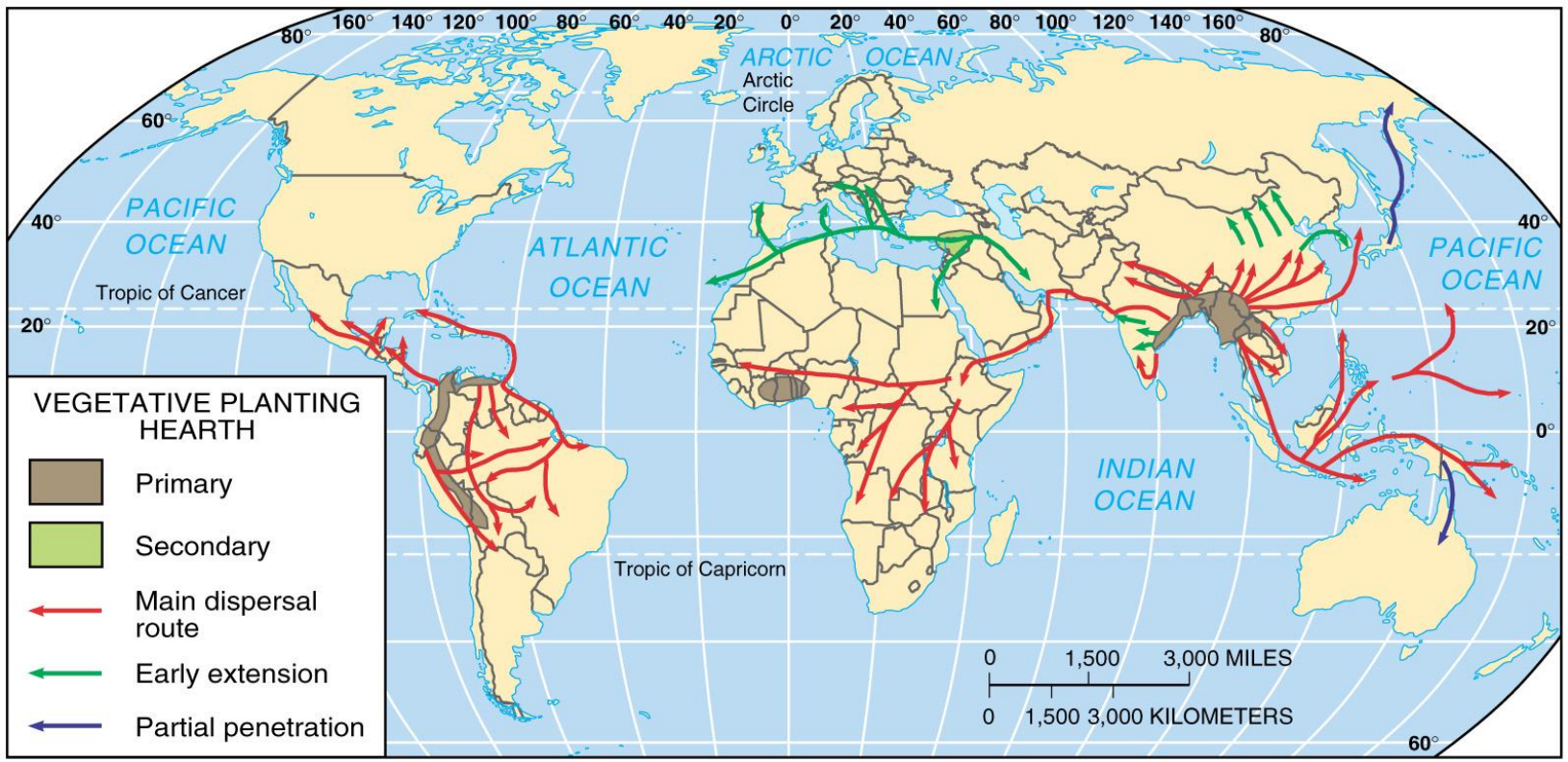


Fig. 10-1: There were several main hearths, or centers of origin, for vegetative crops (roots and tubers, etc.), from which the crops diffused to other areas.

Agricultural Origins and Regions

- **Location of agricultural hearths**
  - Seed agriculture
    - the reproduction of plants through annual planting of seeds that result from sexual fertilization


millet


rice


sorghum


flax


barley


wheat

Seed Agriculture Hearths

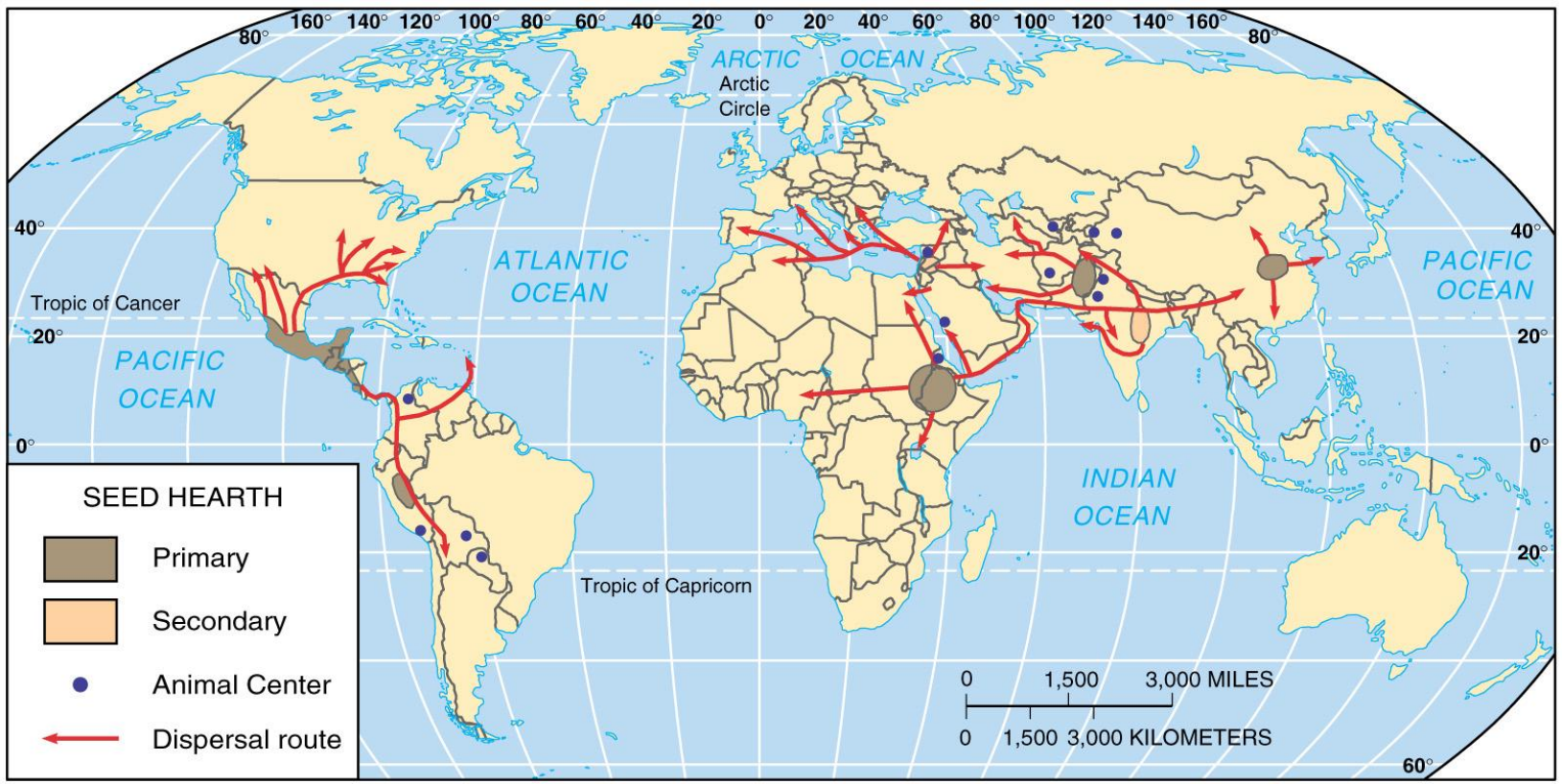


Fig. 10-2: Seed agriculture also originated in several hearths and diffused from those elsewhere.

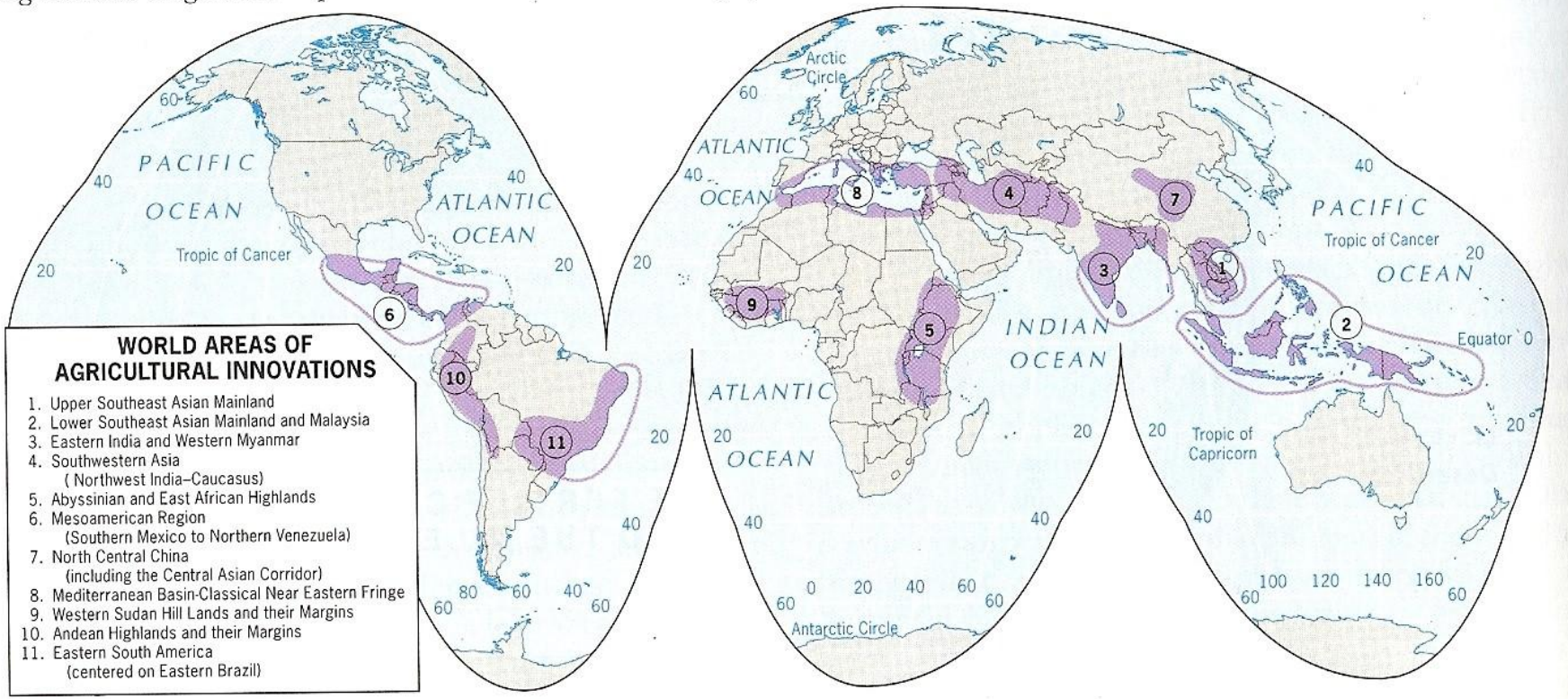
Carl Sauer: Location of Agricultural Hearths

- Agriculture probably did not originate in one location, but began in multiple, independent hearths, or points of origin. From these hearths agricultural practices diffused across Earth's surface.
  - Vegetative planting
    - Southeast Asia (mainland) diffused to China, Japan, India and Southwest Asia, Africa and the Mediterranean
    - West Africa
    - northwestern South America diffused to Central America and eastern South America
  - Seed agriculture
    - western India (Pakistan/Indus River)
    - Northern China
    - Ethiopia

Carl Sauer: 11 areas of agriculture innovations

Figure 11.4

World Areas of Agricultural Innovations. Cultural geographer Carl Sauer identified 11 areas where agricultural innovations occurred. *Adapted with permission from*: C. O. Sauer, *Agricultural Origins and Dispersals*. New York: American Geographical Society, 1952, p. 24.



Agriculture probably did not originate in one location, but began in multiple, independent hearths, or points of origin. From these hearths agricultural practices diffused across Earth's surface.

TABLE 11.1

Chief Source Regions of Important Crop Plant Domestications. ***Adapted with permission from*: J. E. Spencer and W. L. Thomas, *Introducing Cultural Geography*, 1978, John Wiley & Sons, Inc.**

A. Primary Regions of Domestications

1. The Upper Southeast Asian Mainlands

Citrus Fruits*	Bamboos*	Yams*	Rices*	Eugenias*	Lichi	Teas	Ramie
Bananas*	Taros*	Cabbages*	Beans*	Job's tears	Longan	Tung oils	Water chestnut

2. Lower Southeast Asian Mainland and Malaysia (including New Guinea)

Citrus fruits*	Taros*	Pandanuses	Breadfruits	Lanzones	Vine peppers*	Nutmeg	Areca
Bananas*	Yams*	Cucumbers*	Jackfruits	Durian	Gingers*	Clove	Abaca
Bamboos*	Almonds*	Sugarcanes	Coconuts	Rambutan	Brinjals*	Cardamom	

3. Eastern India and Western Burma

Bananas*	Beans*	Millets*	Grams	Vine peppers*	Mangoes	Safflower	Lotus
Yams*	Rices*	Sorghums*	Eggplants	Gingers*	Kapok*	Jute	Turmeric
Taros*	Amaranths*	Peas*	Brinjals*	Palms*	Indigo	Sunn Hemp	

4. Southwestern Asia (Northwest India-Caucasus)

Soft wheats*	Peas*	Rye*	Beets*	Hemp	Soft Pears*	Pomegranates	Walnuts
Barleys*	Oil seeds*	Onions	Spinach	Apples	Cherries*	Grapes*	Melons
Lentils*	Poppies	Carrots*	Sesames	Almonds*	Plums*	Jujubes*	Tamarind
Beans*	Oats*	Turnips	Flax	Peaches*	Figs	Pistachio	Alfalfa

5. Ethiopian and East African Highlands

Hard wheats*	Sorghums*	Barleys	Beans*	Oil seeds*	Melons*	Coffees	Okras
Millets*	Rices*	Peas*	Vetches	Cucumbers*	Gourds*	Castor beans	Cottons*

6. Meso-American Region (Southern Mexico to Northern Venezuela)

Maizes	Taros*	Tomatoes*	Avocados	Muskmelons	Cottons*
Amaranths*	Sweet potatoes	Chili peppers	Sapotes	Palms*	Agaves
Beans*	Squashes	Custard apples	Plums*	Manioc	Kapok

B. Secondary Regions of Domestications

7. North-Central China (including the Central Asian corridor)

Millets*	Soybeans	Naked oat*	Mulberries	Bush cherries*	Peaches*
Barleys*	Cabbages*	Mustards	Persimmons	Hard pears*	Jujubes*
Buckwheats	Radishes*	Rhubarb	Plums*	Apricots	

8. Mediterranean Basin—Classical near eastern Fringe

Barleys*	Lentils*	Grapes*	Dates	Parsnips	Lettuces	Carrots*	Sugar beet
Oats*	Peas*	Olives	Carobs	Asparagus	Celeries	Garlic	Leek

9. Western Sudan Hill Lands and Their Margins

Sorghums*	Rices*	Yams*	Peas*	Melons*	Oil palms	Kola nut
Millets*	Fonio	Beans*	Oil seeds*	Gourds*	Tamarind*	

10. Andean Highlands and Their Margins

White potatoes	Tomatoes*	Beans*	Quinoa	Cubio	Ulluco
Pumpkins	Strawberries	Papayas	Oca	Arrocacha	

11. Eastern South America (centered on Eastern Brazil)

Taros*	Peanuts	Cashew nut	Cacao	Cottons*
Beans*	Pineapples	Brazil nut	Passion fruits	Tobaccos

Animal Domestication

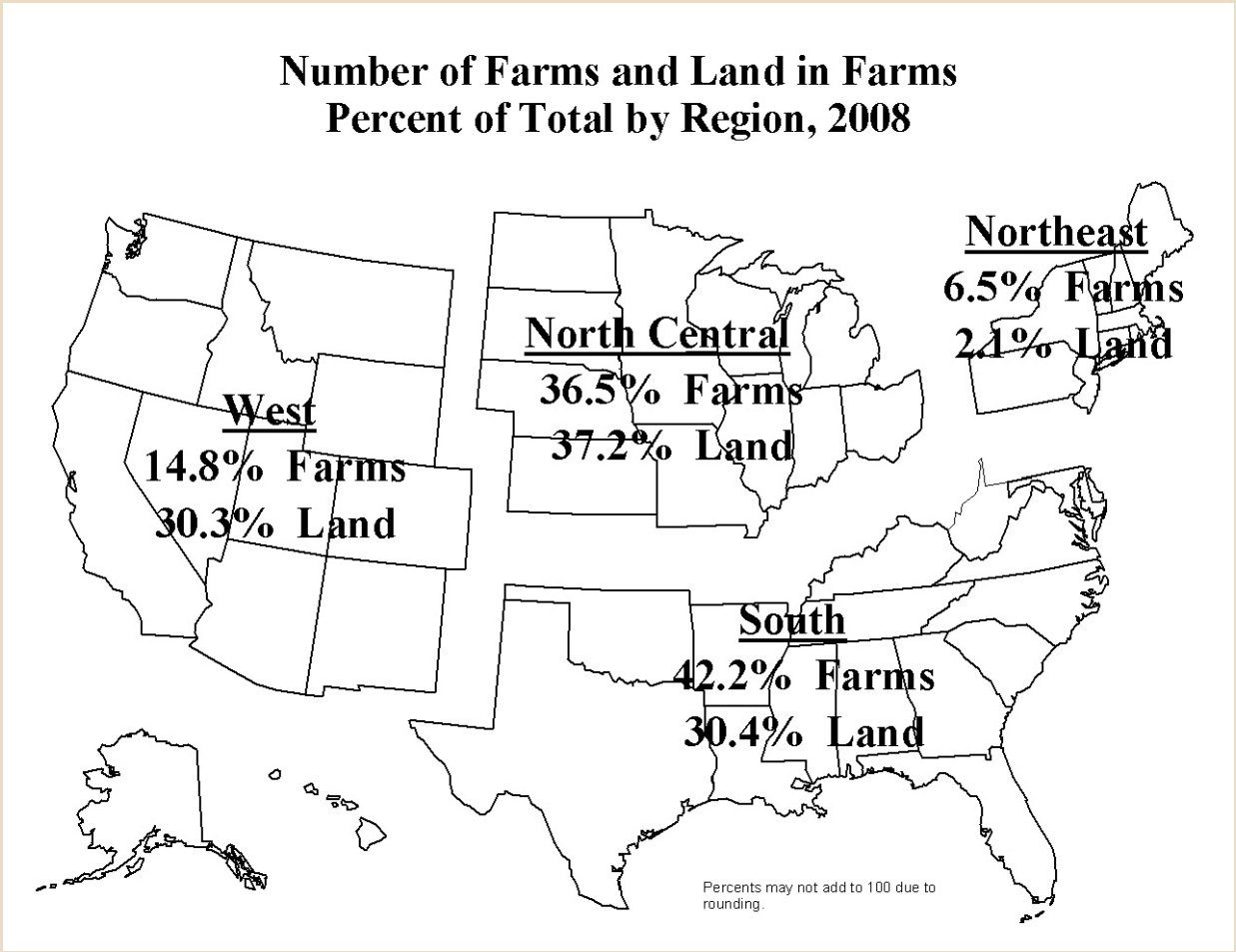
- The best animals to farm are large, plant eating mammals. Over the years, humans have probably tried to domesticate all of them, usually without success. Despite repeated efforts, Africans have never domesticated the elephant.
- Animals which make suitable candidates for domestication have the following characteristics:
  - start giving birth in their first or second years
  - have one or two offspring a year (so their productivity is high)
  - behaviorally they need to be social animals (males, females and the young live together as a group)
  - get along with humans
  - internal social hierarchy

  which means that if humans can control the leader, they will also gain control of the whole herd.
- Diamond counted 148 different species of wild, plant eating, terrestrial animals that weigh over 100 pounds. Of those, **we have only successfully farmed for any length of time –just 14. They are: goats, sheep, pigs, cows, horses, donkeys, Bactrian camels, Arabian camels, water buffalos, llamas, reindeers, yaks, mithans and Bali cattle.** All but one [llamas of South America] of these animals are *native* to Asia, North Africa and Europe.
- The Big Four livestock animals: cows, pigs, sheep and goats were native to the Middle East.

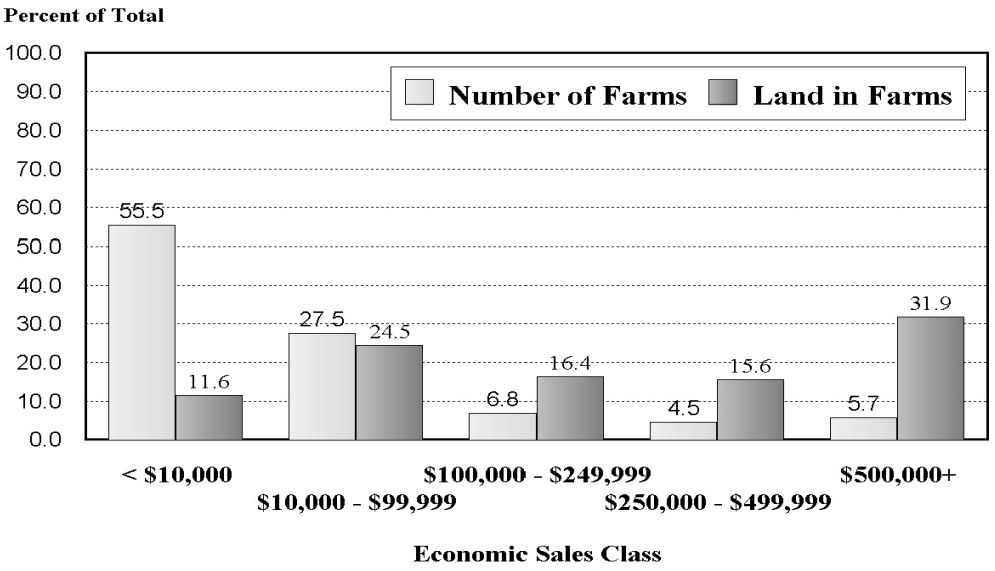
U.S. Farms by Region

The number of farms in the United States in 2008 is estimated at 2.2 million, 0.2 percent fewer than in 2007.
Total land in farms, at 919.9 million acres, decreased 1.56 million acres, or 0.2 percent, from 2007.
The average farm size was 418 acres, unchanged from the previous year. The decline in the number of farms and land in farms reflects a continuing consolidation in farming operations and diversion of agricultural land to nonagricultural uses.

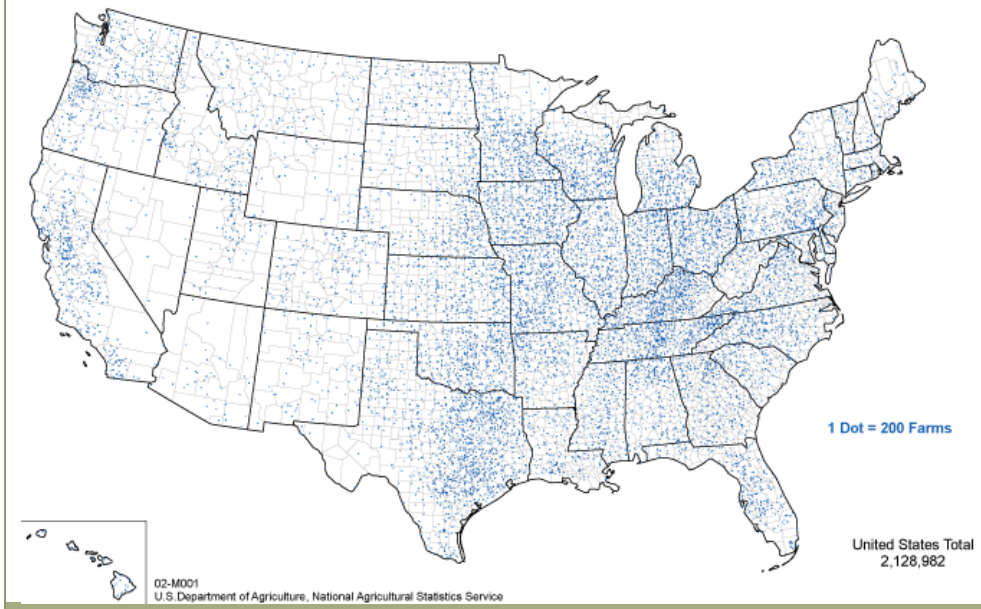
USDA 2008 Report



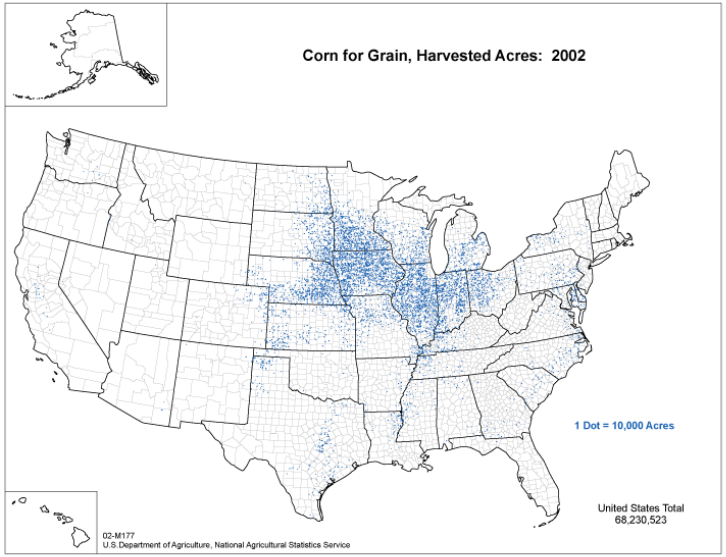
U.S. Number of Farms and Land in Farms
Percent of Total by Economic Sales Class, 2008

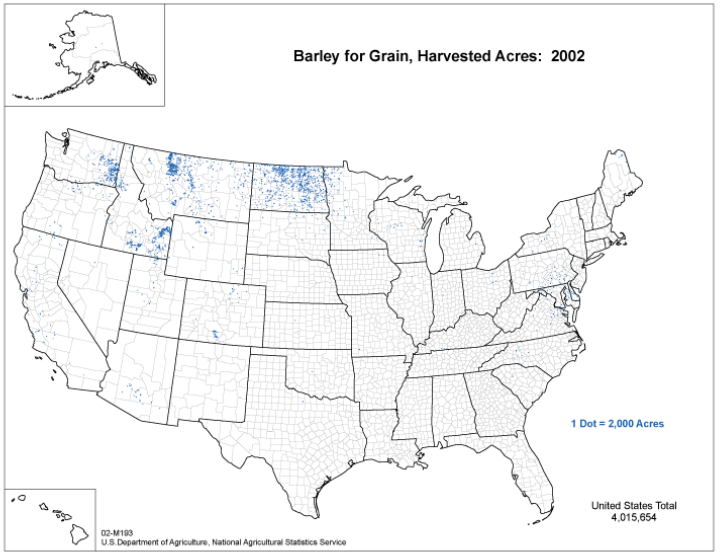


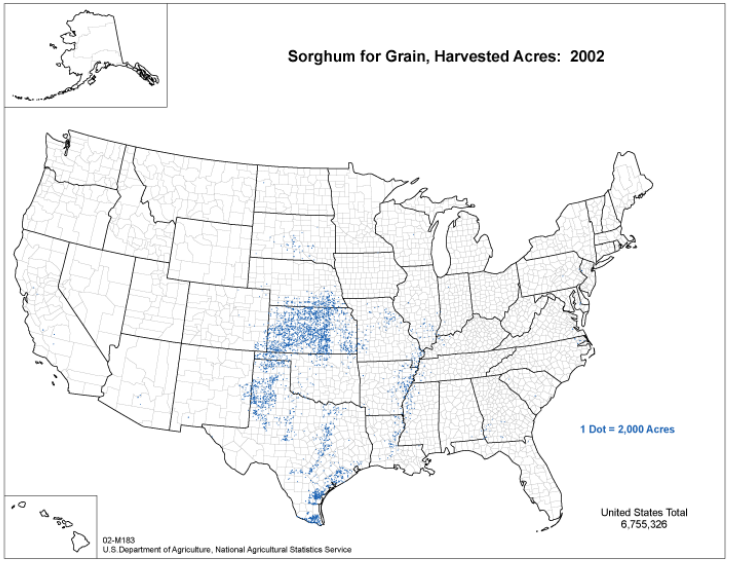
Number of Farms: 2002

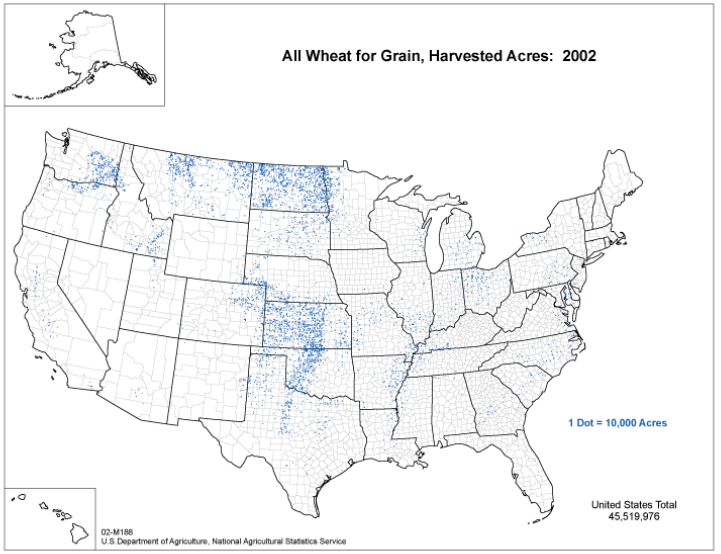


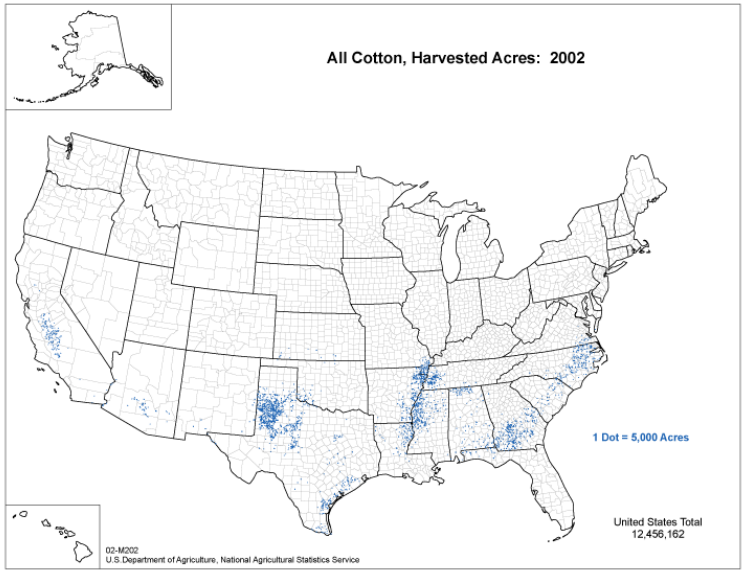
NOTE: Map at left from 2002 but change in farms from 2002 to 2008 would show little visible change on the map.

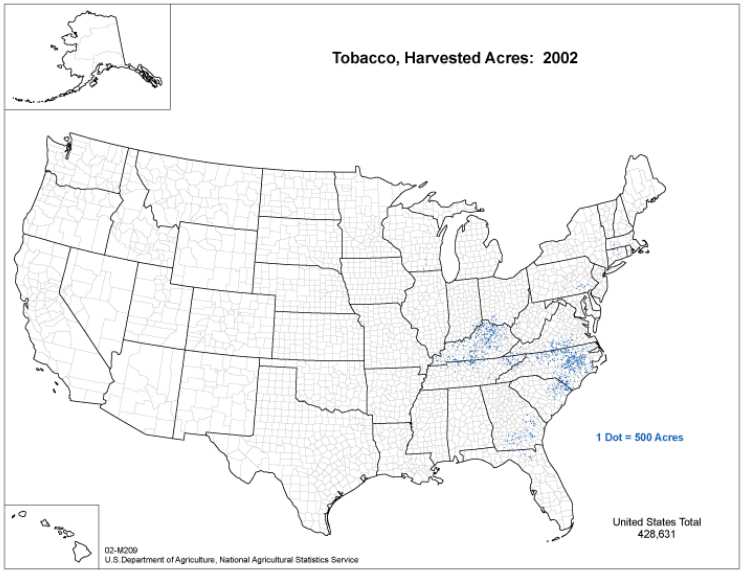

Corn for Grain, Harvested Acres: 2002
1 Dot = 10,000 Acres
United States Total
68,230,523
02-M177
U.S.Department of Agriculture, National Agricultural Statistics Service

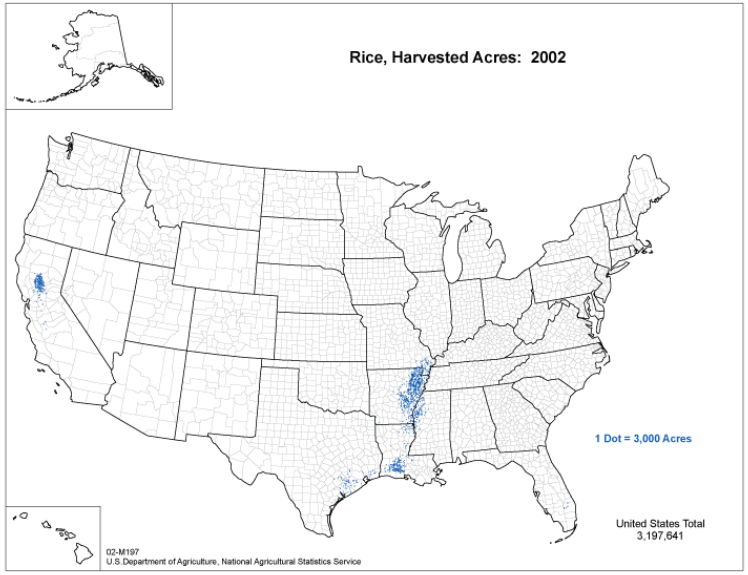

Barley for Grain, Harvested Acres: 2002
1 Dot = 2,000 Acres
United States Total
4,015,654
02-M193
U.S.Department of Agriculture, National Agricultural Statistics Service

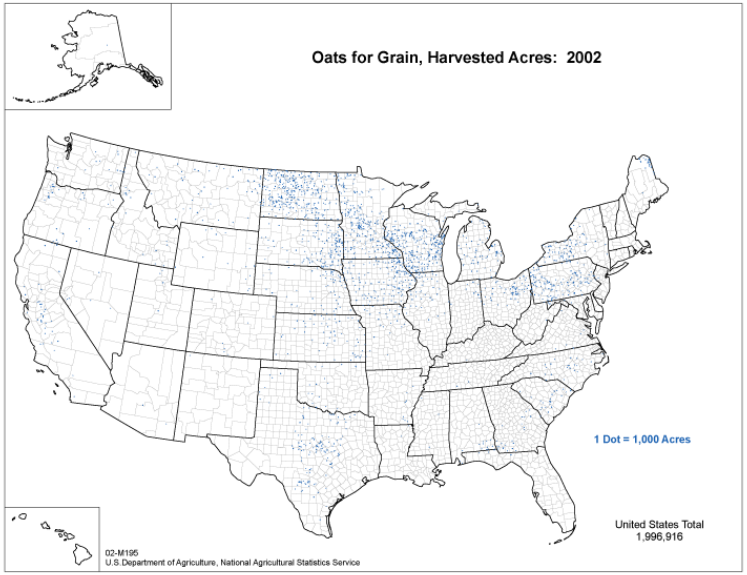

Sorghum for Grain, Harvested Acres: 2002
1 Dot = 2,000 Acres
United States Total
6,755,326
02-M183
U.S.Department of Agriculture, National Agricultural Statistics Service


All Wheat for Grain, Harvested Acres: 2002
1 Dot = 10,000 Acres
United States Total
45,519,976
02-M188
U.S.Department of Agriculture, National Agricultural Statistics Service


All Cotton, Harvested Acres: 2002
1 Dot = 5,000 Acres
United States Total
12,456,162
02-M202
U.S.Department of Agriculture, National Agricultural Statistics Service


Tobacco, Harvested Acres: 2002
1 Dot = 500 Acres
United States Total
428,631
02-M209
U.S.Department of Agriculture, National Agricultural Statistics Service


Rice, Harvested Acres: 2002
1 Dot = 3,000 Acres
United States Total
3,197,641
02-M197
U.S.Department of Agriculture, National Agricultural Statistics Service


Oats for Grain, Harvested Acres: 2002
1 Dot = 1,000 Acres
United States Total
1,996,916
02-M195
U.S.Department of Agriculture, National Agricultural Statistics Service

Classifying Agricultural Regions

LDCs = subsistence agriculture

MDCs = commercial agriculture

- Subsistence vs. commercial agriculture
  - **Subsistence agriculture** is the production of food primarily for consumption by the farmer's family
  - **Commercial agriculture** is the production of food primarily for sale off the farm

Practice	Area	Purpose	Labor force	Machinery	Farm size	Off farm contact
Subsistence agriculture	**LDCs**	Personal consumption	On average 55% of workforce engaged in farming	Human and animal powered tools	Very small	Occasional surplus sold
Commercial agriculture	**MDCs**	Grow crops and raise animals primarily for sale off the farm for profit	On average 5% of workforce engaged in farming	Mechanized farm machines, computer technology and science	Large [US average in 2008 = 418 acres]	*agribusiness* – farms one part of a large food production industry including food processing, packaging, sorting, distributing, and retailing

Labor Force in Agriculture

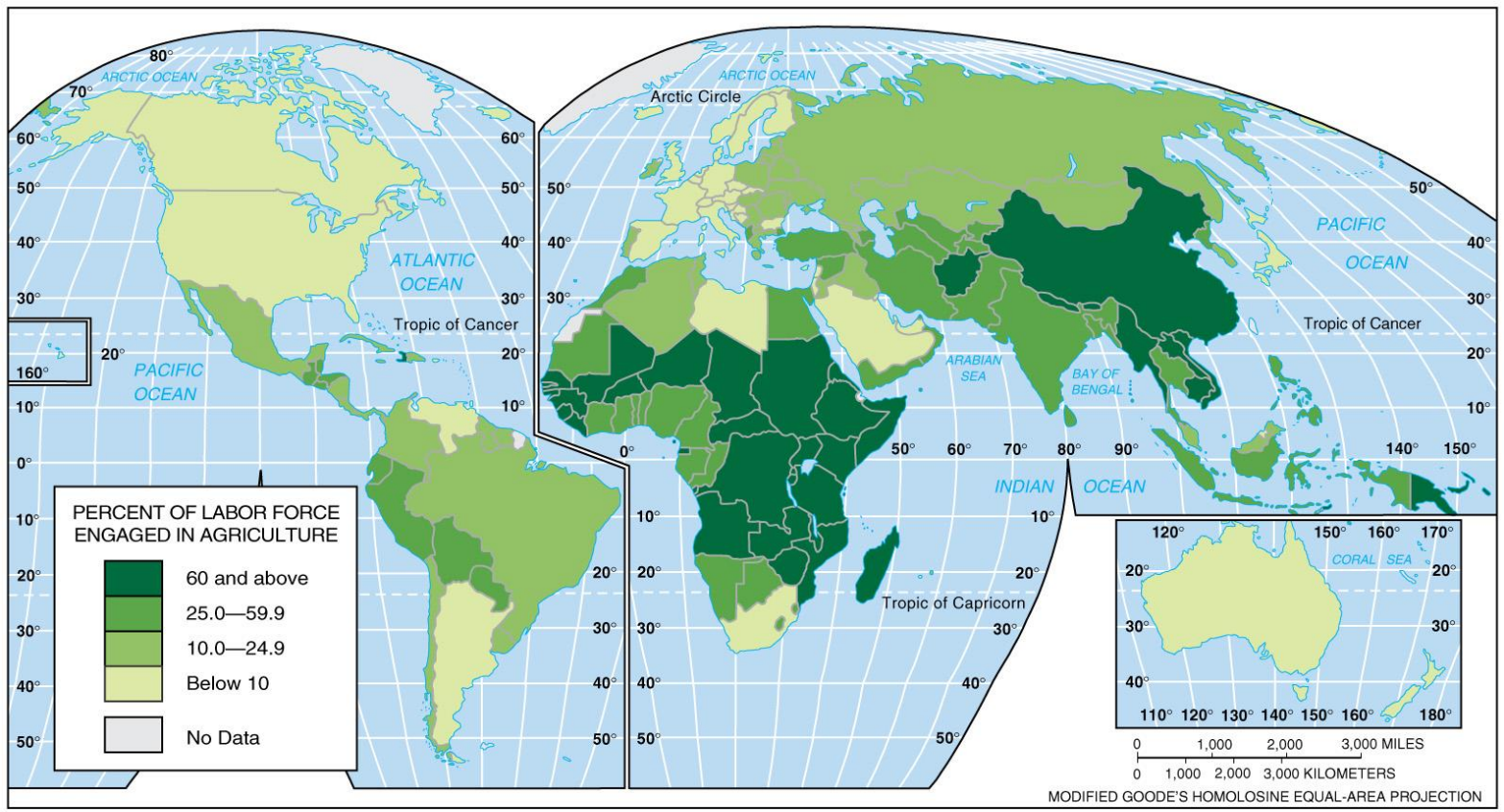


Fig. 10-3: A large proportion of workers in most LDCs are in agriculture, while only a small percentage of workers in MDCs are engaged in agriculture.

Tractors, per Population

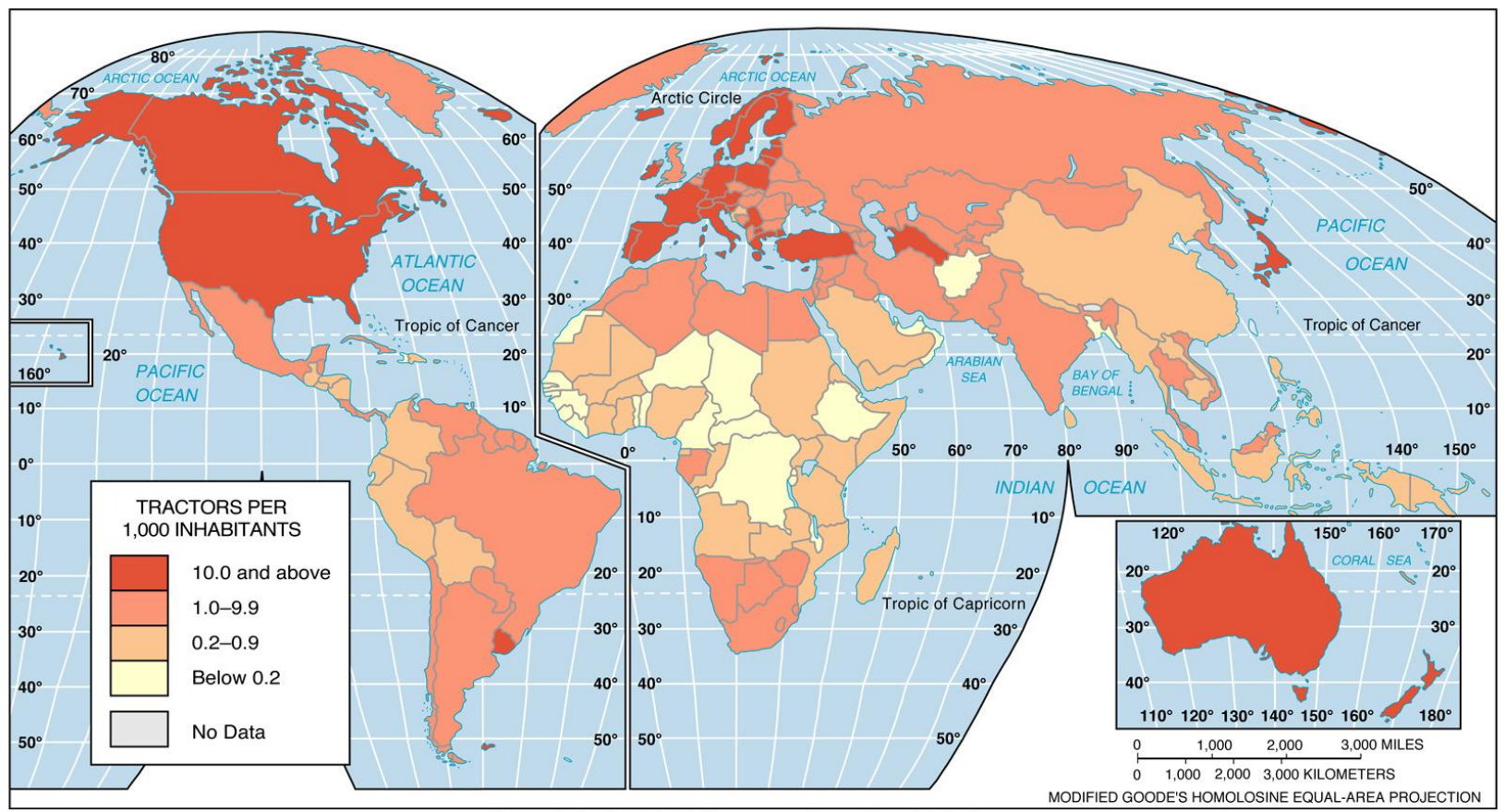


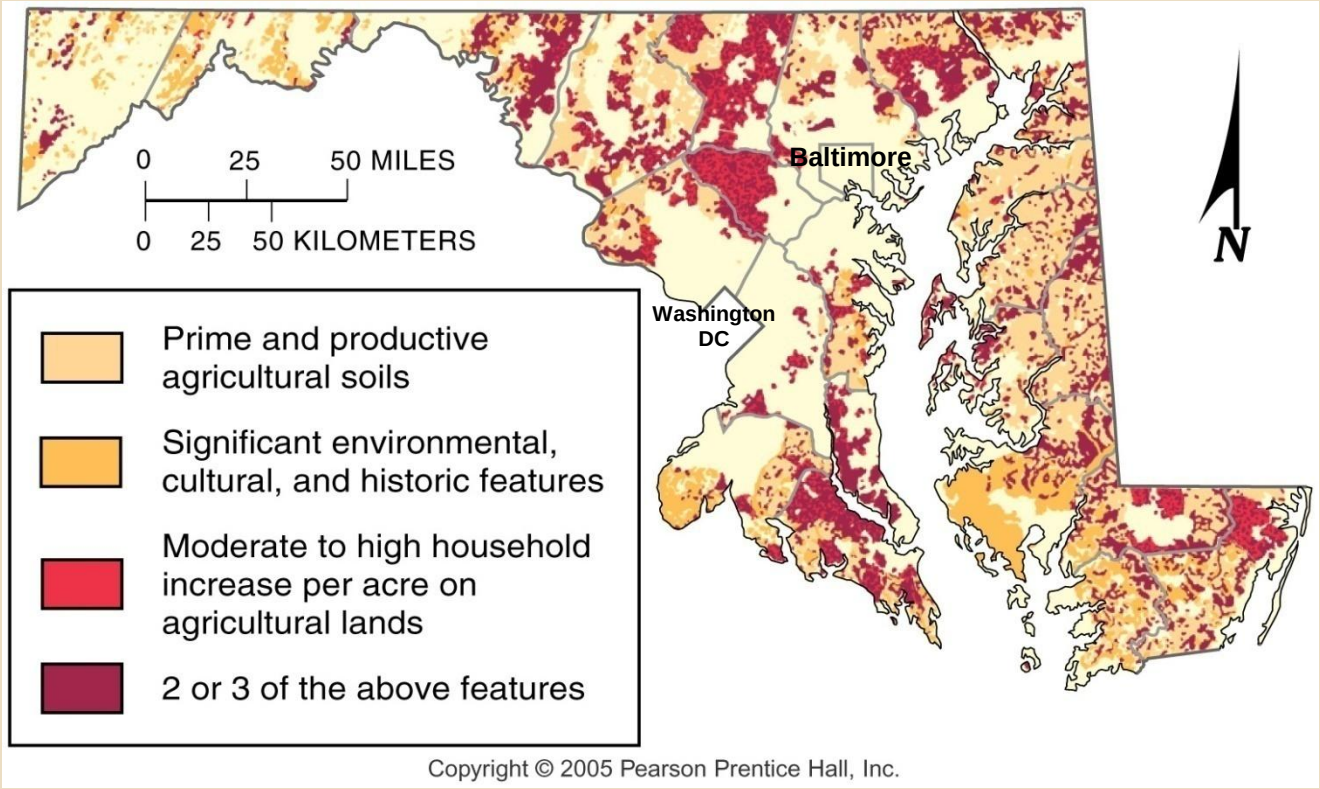
Fig. 10-4: Tractors per 1,000 people. Use of machinery is extensive in most MDC agriculture, but it is much less common in LDCs.

Farmland Loss in Maryland

Fig. 10-1-1:

Overlaps of soil quality, environmental and cultural features, and population growth may show areas of greatest threat of farmland loss in Maryland.

Baltimore and Washington DC population concentrations have merged over time.



A serious problem in the United States has been the loss of the most productive farmland, known as **prime agricultural land**, as urban areas sprawl into the surrounding countryside.

Classifying Agricultural Regions

- Mapping agricultural regions
- World Agricultural Regions: Derwent Whittlesey, 1936
  - 11 main agricultural regions
    - 5 important to LDCs
    - 6 important to MDCs
  - Climate influences the crop that is grown and/or animals raised
  - Relationship exists between climate and agriculture
    - Dry climate often equates to livestock ranching rather than farming
  - Culture influences agriculture
    - Hog (pig/swine) production low to nonexistent in predominantly Muslim (and Jewish) regions due to religious taboo on pork.

World Agriculture Regions

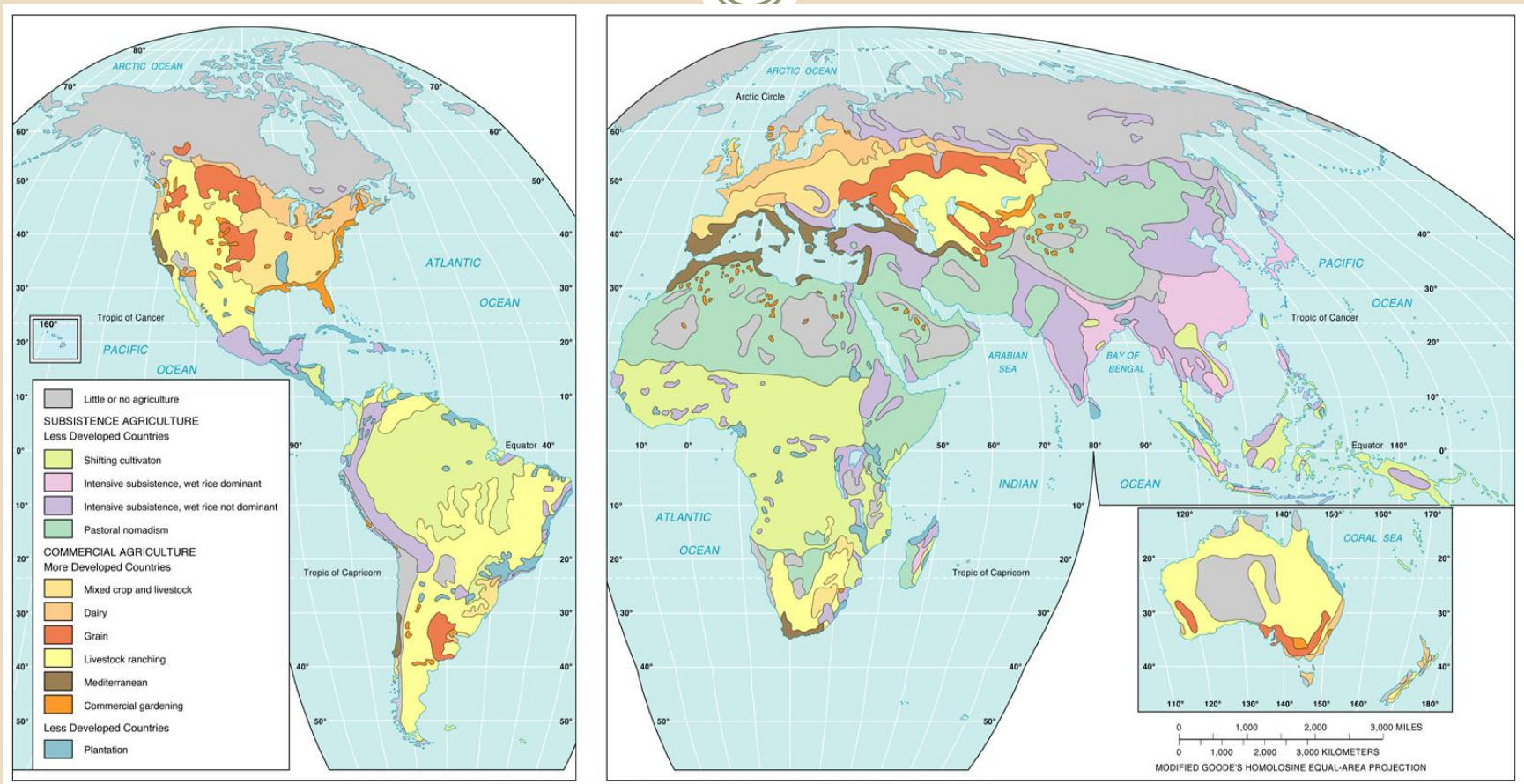


Fig. 10-5a: Locations of the major types of subsistence and commercial agriculture.

World Climate Regions

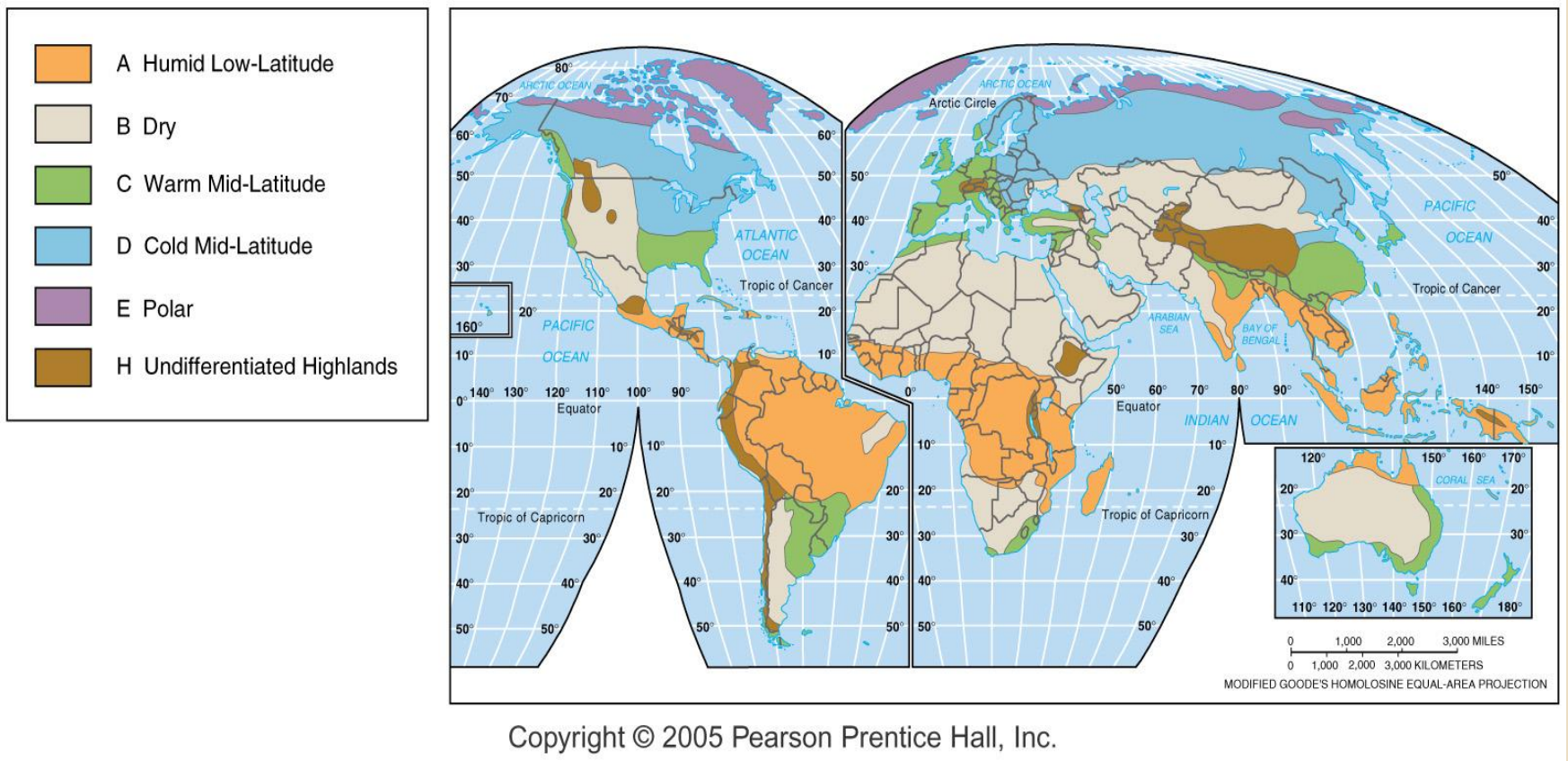


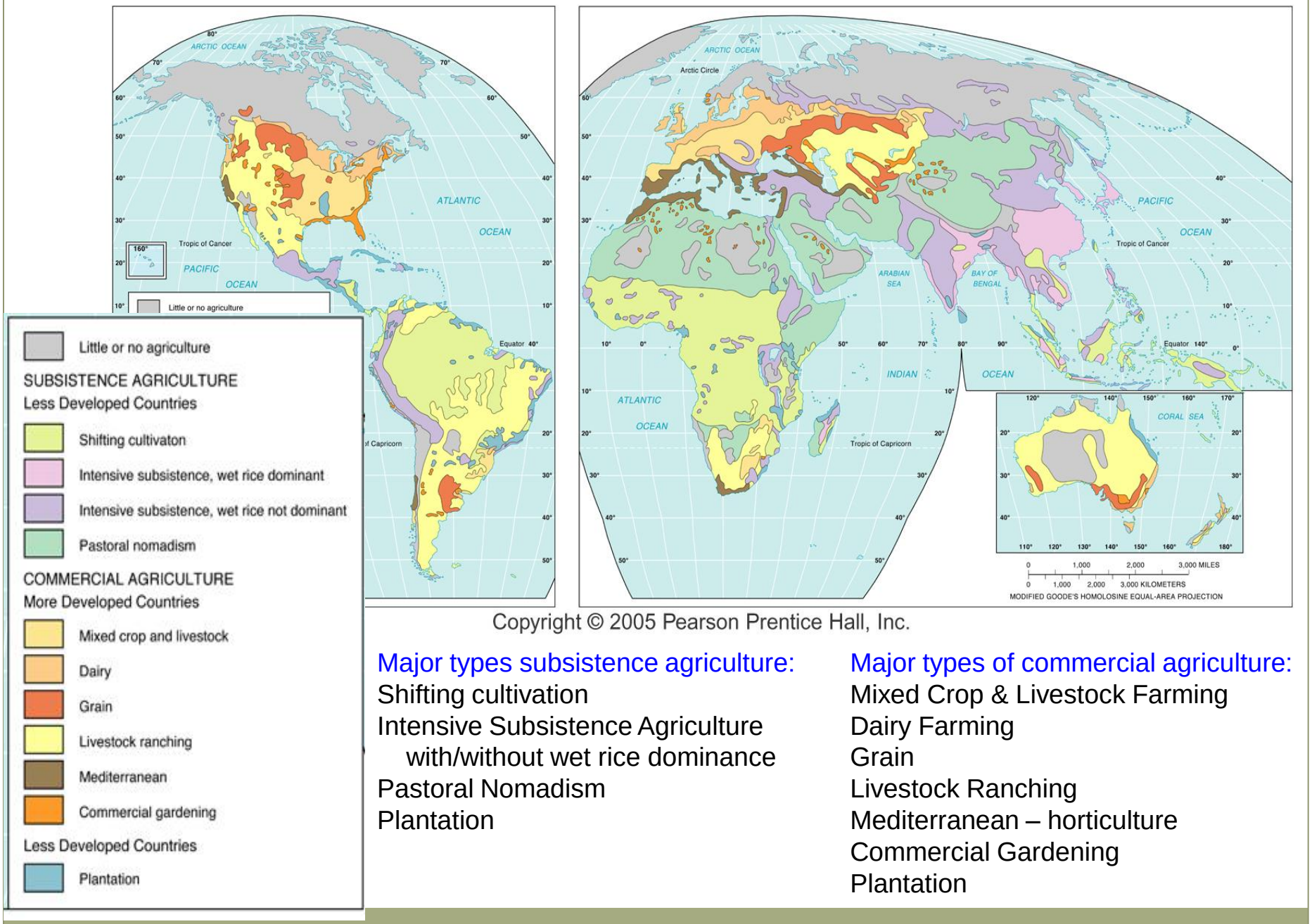
Fig. 10-5b: Simplified map of the main world climate regions *(see also Fig. 2.2).*

Key Issue 2: Where Are Agricultural Regions in LDCs?

- Shifting Cultivation
  - Characteristics Of Shifting Cultivation
    - The Process Of Shifting Cultivation
    - Crops Of Shifting Cultivation
    - Ownership In Use Of Land In Shifting Cultivation
  - Future Of Shifting Cultivation
- Pastor Nomadism
  - Characteristics Of Pastoral Nomadism
    - Choice Of Animals
    - Movements Of Pastoral Nomads
  - The Future Of Pastoral Nomadism
- Intensive Subsistence Agriculture
  - Intensive Subsistence With Wet Rice Dominant
  - Intensive Subsistence With Wet Rice Not Dominant

Vocabulary

shifting cultivation
slash-and-burn agriculture
swidden
pastoral nomadism
transhumance
pasture
intensive subsistence agriculture
sawah
paddy
chaff
threshed
winnowed
hull
wet rice
double cropping
crop rotation



Major types subsistence agriculture:

Shifting cultivation
Intensive Subsistence Agriculture
with/without wet rice dominance
Pastoral Nomadism
Plantation

Major types of commercial agriculture:

Mixed Crop & Livestock Farming
Dairy Farming
Grain
Livestock Ranching
Mediterranean – horticulture
Commercial Gardening
Plantation

World Per Capita GDP

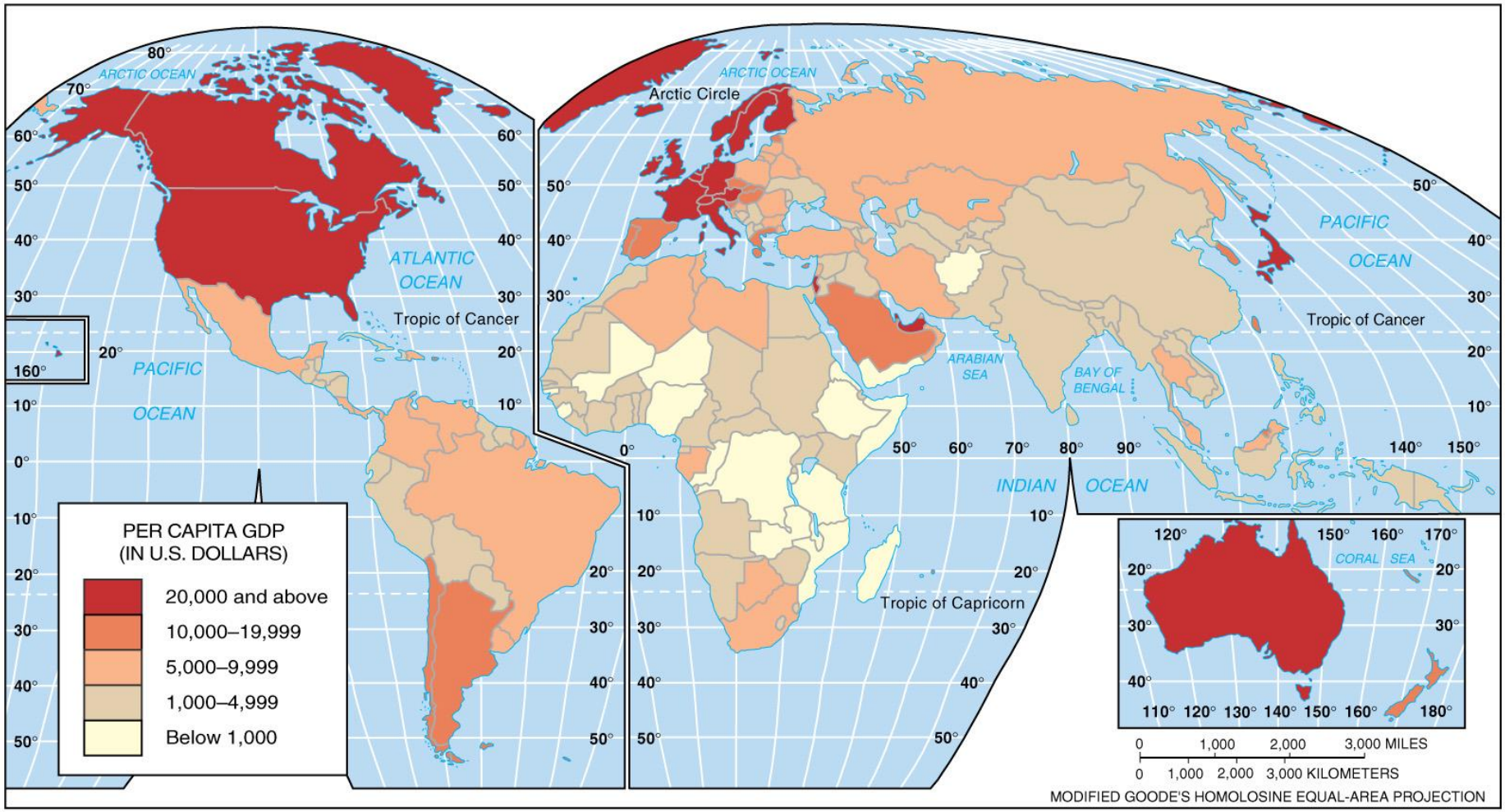


Fig 9.2 (TBp301)

Agriculture in Less Developed Countries

- Shifting cultivation

cultivation vs. agriculture = small scale vs. large scale

- Characteristics of shifting cultivation
  - Clear (slash-and-burn agriculture) vegetation from land
    - Cleared land = swidden
    - Potash (potassium) = fertilizer from burned debris
  - Plant crops for a few years then leave fallow
    - Land fertile for 3 or less years
    - Native vegetation returns; soil recovery slow takes years
  - Villages may expand or move due to depletion of soil
  - Crops vary by local custom and taste and mostly subsistence agriculture
    - Southeast Asia: rice; South America: maize, manioc; Africa: millet, sorghum
    - Varied crops planted for use by one family or community
  - Land often owned by community rather than individuals
    - Requires more land per person
    - ¼ of world's land area cultivated by 5% of population

Agriculture in Less Developed Countries

- Future of shifting cultivation
  - Replaced by cash crops, ranching and logging
  - Eliminating difficult as farming part of culture
  - Pressure on rain forest countries to curb use

Agriculture in Less Developed Countries

- Pastoral nomadism

  form of subsistence agriculture based on the herding of domesticated animals
  - Arid/semiarid regions of Africa and SW Asia and Central Asia
  - 15 million people on 20% of land area

  - Characteristics of pastoral nomadism
    - Milk, skin/hair for clothing or tents
    - Still eat mostly grains
      - part community farms or trade animal product
    - Often in conjunction with agriculture
  - Choice of animals: cultural and practical

Animal	Numbers	Pros	Cons
Camel	10 – 25	Infrequent watering, heavy loads, fast	Attracts flies, sleeping sickness, long gestation period
Goat	25 – 60	Tough, agile, eats any vegetation	More water than camel
Sheep	25 – 60	wool	Slow moving, affected by climate change

Agriculture in Less Developed Countries

- Movements of Pastoral Nomads
  - Territorial
  - Intimate knowledge of the terrain
  - Climate and political instability alter routes
  - Transhumance (seasonally migratory)
- Future of pastoral nomadism
  - Declining practice… once considered the cultural stage between hunting/gathering and farming settlement
  - Now… Offshoot of sedentary agriculture
  - Practical method for drier climates
  - Communication technology eliminates some of their power/usefulness
  - Low population density practice
  - Forced end by “progress”… population, space and lifestyle changes

Agriculture in Less Developed Countries

- Intensive subsistence agriculture
  - ¾ of world population lives in LDCs
  - East, South and Southeast Asia
    - China – efficient and very small lots
    - Labor intensive (no $ for machines)
    - Efficient land use
  - Intensive subsistence with wet rice dominant
  - Intensive subsistence with wet rice not dominant

World Rice Production

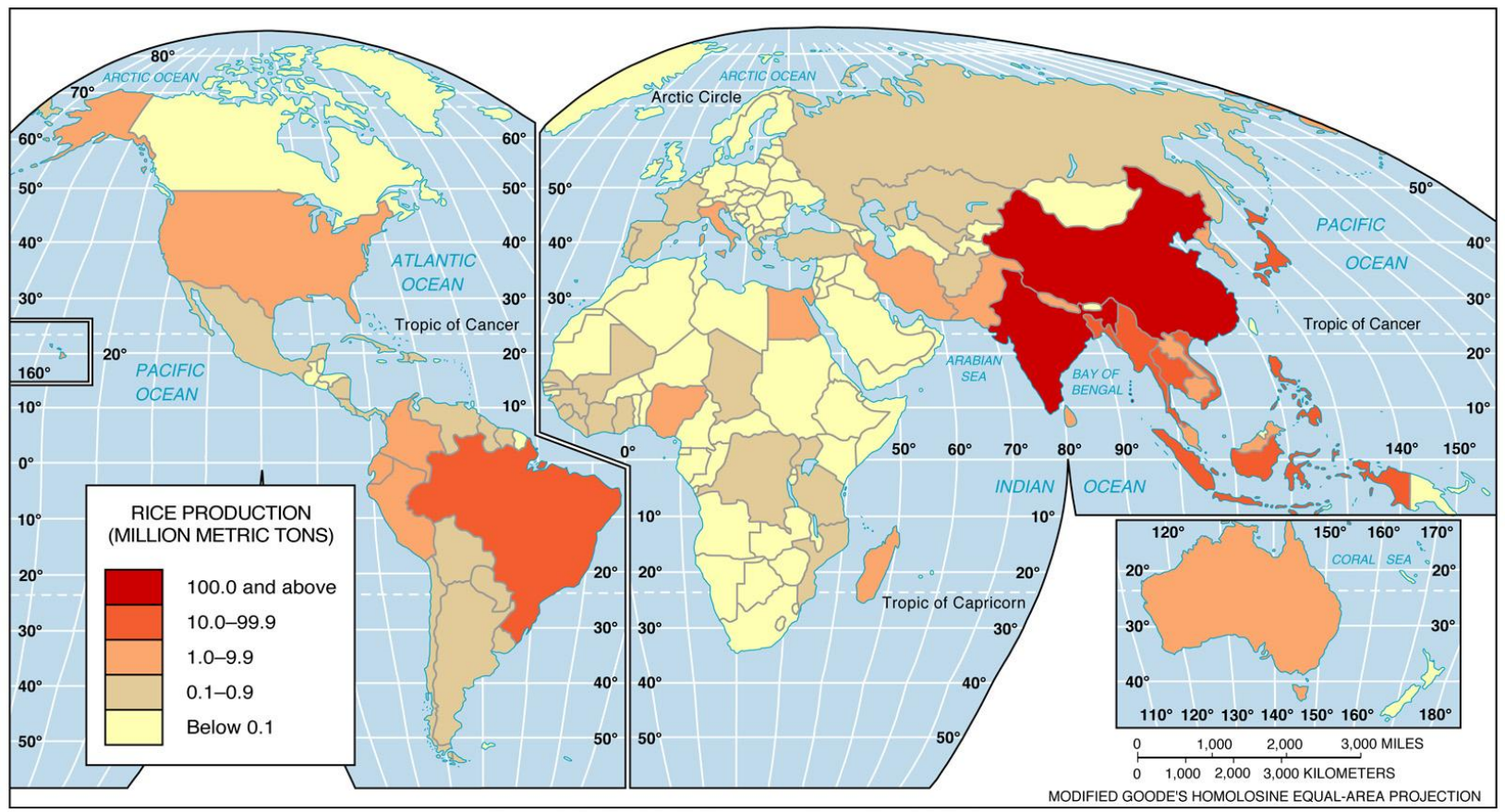


Fig. 10-6: Asian farmers grow over 90% of the world's rice. India and China alone account for over half of world rice production.

Key Issue 3: Where Are Agricultural Regions in MDCs?

- Mixed Crop And Livestock Farming
  - Characteristics Of Mixed Crop And Livestock Farming
    - Crop Rotation Systems
  - Choice Of Crops
- Dairy Farming
  - Why Dairy Farms Locate Near Urban Areas
  - Regional Differences In Dairy Products
  - Problems For Dairy Farmers
- Grain Farming
  - Grain-Farming Regions
  - Importance Of Wheat
- Livestock Ranching
  - Cattle Ranching In U.S. Popular Culture
    - Beginning Of U.S. Cattle Ranching
    - Transporting Cattle To Market
  - Fixed Location Ranching
    - Range Wars
    - Changes In Cattle Breeding
  - Ranching Outside The United States
- Mediterranean Agriculture
  - Mediterranean Crops
- Commercial Gardening And Fruit Farming
- Plantation Farming

Vocabulary

cereal grain
milkshed
grain
winter wheat
spring wheat
reaper
combine
ranching
horticulture
truck farming
plantation

Mixed Crop and Livestock Farming

- **Characteristics Of Mixed Crop And Livestock Farming**
  - Most common form of commercial agriculture in the United States Great Plains
  - Integration of crops and livestock
  - Crops fed to animals (little sold); Manure used to fertilize crops
  - ¾ income derived from animal products – these, milk and eggs
  - Crop seasonal labor – livestock year round
- **Crop Rotation Systems**
  - 2 or more crops rotated with one round fallow
  - Maintains field fertility mutrients one crop takes another will replace

		Field A	Field B	Field C	Field D	Result
Two fields	Year 1	Cereal grain	fallow	n/a	n/a	3 crops per field over 6 years
	Year 2	Fallow	Cereal grain			
Three fields	Year 1	Winter cereal	Spring cereal	Fallow	n/a	4 crops per field over 6 years
	Year 2	Spring cereal	Fallow	Winter cereal		
	Year 3	Fallow	Winter cereal	Spring cereal		
Four fields	Year 1	Root crop	Cereal	"rest" crop	cereal	3 crops per field over 4 years
	Year 2	Cereal	"rest" crop	Cereal	Root crop	
	Year 3	"rest" crop	Cereal	Root crop	Cereal	
	Year 4	Cereal	Root crop	Cereal	"rest" crop	

- **Choice Of Crops**
  - Corn Belt – Ohio to the Dakotas
    - Corn (most common) used for livestock feed, or human consuption including oil, margarine, etc.
  - Soybean (2nd choice)
    - Tofu (Japan and China), processed food additive and animal feed

World Corn (Maize) Production

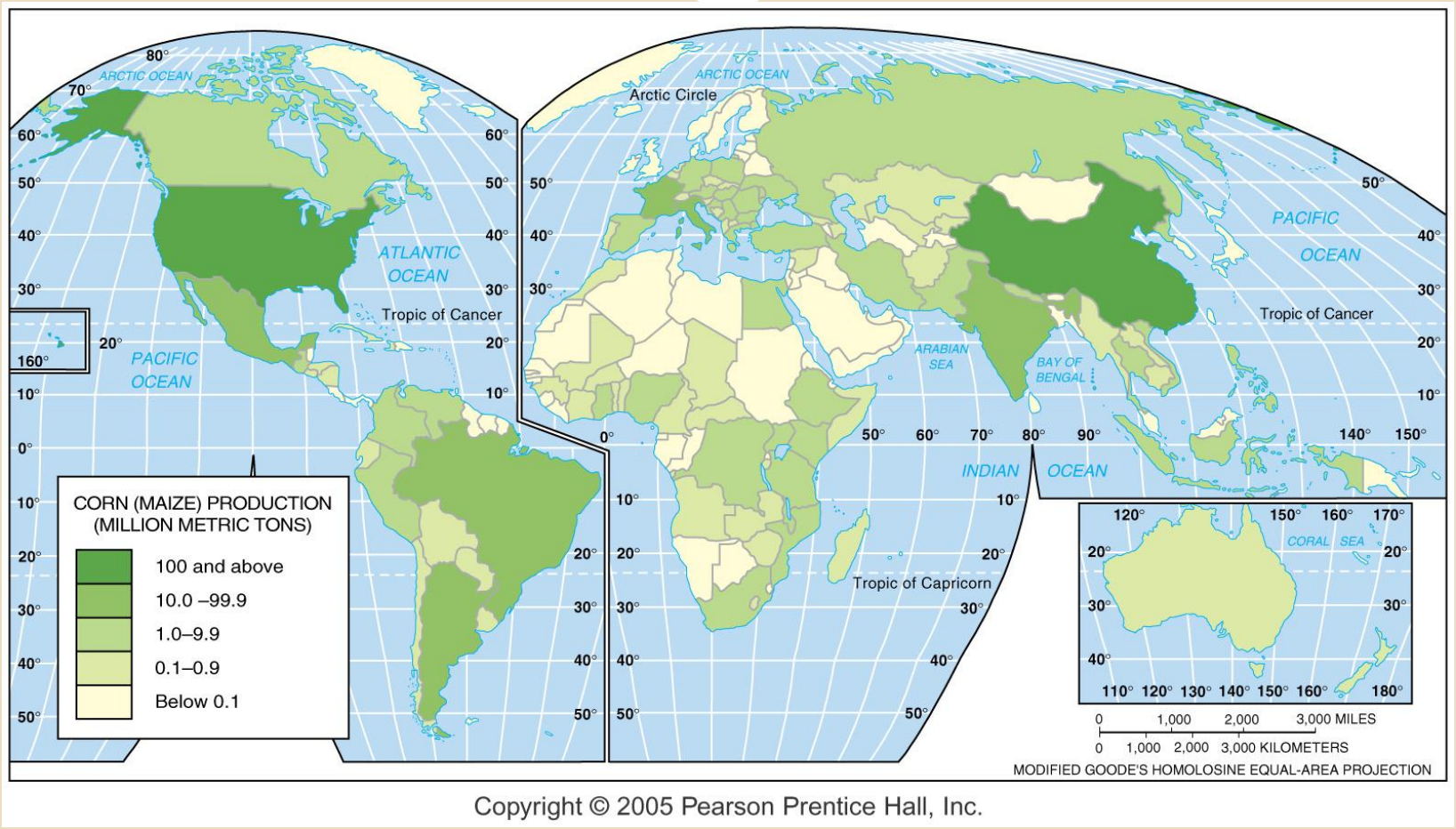


Fig. 10-7: The U.S. and China are the leading producers of corn (maize) in the world. Much of the corn in both countries is used for animal feed.

World Milk Production

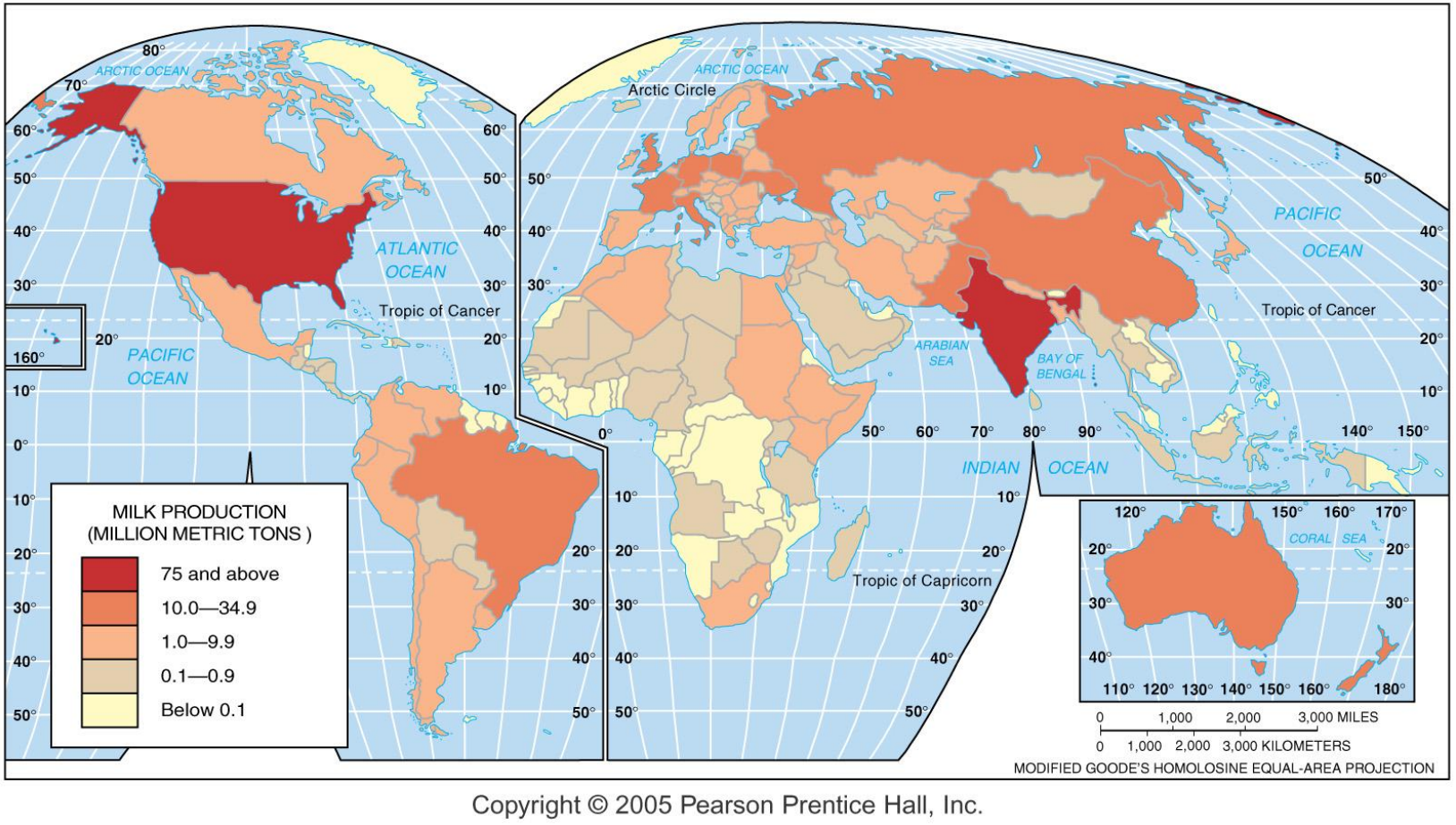


Fig 10-8: Milk production reflects wealth, culture, and environment. It is usually high in MDCs, especially production per capita, and varies considerably in LDCs.

Dairy & Grain Farming

Dairying most important commercial agriculture near large urban areas (20% of agriculture $$ output)

- **Why Dairy Farms Locate Near Urban Areas**
  - Milkshed close to market due to perishability of milk products
  - Proximity to market less important now due to transportation options
- **Regional Differences In Dairy Products**
  - Farmers far from urban centers usually sell to diary product (cheese, butter, etc) processors
  - NE USA milk sold to urban center consumers; farther west (Wisconsin) milk is all processed
- **Problems For Dairy Farmers**
  - Declining revenues and rising costs
  - Labor intensive, cows milked twice daily
  - Winter feed expenses

- **Grain Farming**
  - Some form of grain major on most farms – wheat most important
  - Meant for human consumption (unlike integrated farming)
- **Grain-Farming Regions**
  - US largest grain producers; other large scale: Canada, Australia, Argentina, France and the UK
  - Winter wheat Belt: Kansas, Colorado and Oklahoma
  - Spring wheat Belt: the Dakotas, Montana and southern Saskatchewan (Canada)s
  - Palouse in Washington State
  - Heavily mechanized planting and harvesting (combine) crop

2/3 of US wheat

- **Importance Of Wheat**
  - World's leading export crop
  - North American prairies the "Breadbasket" producing ½ world exports of wheat
  - Economic and political strength for the US

Dairy Production in the U.S.

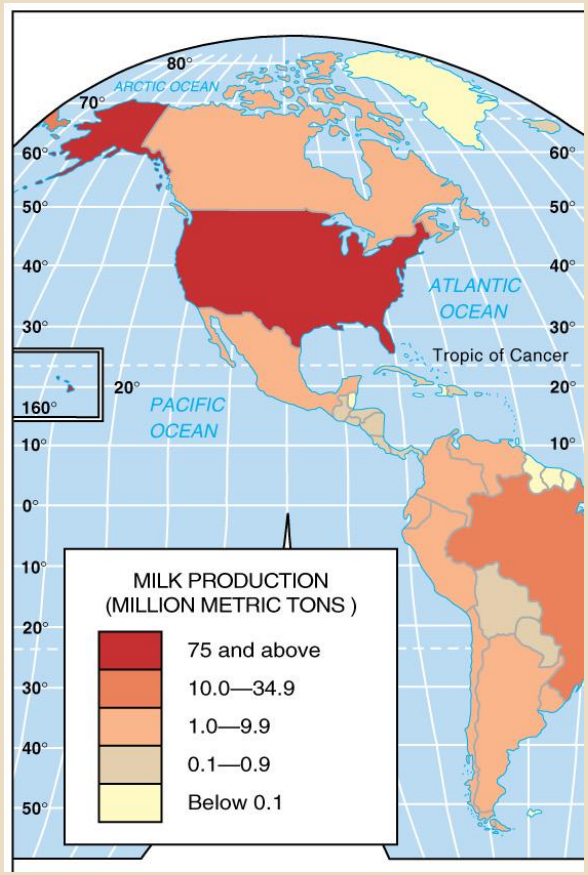
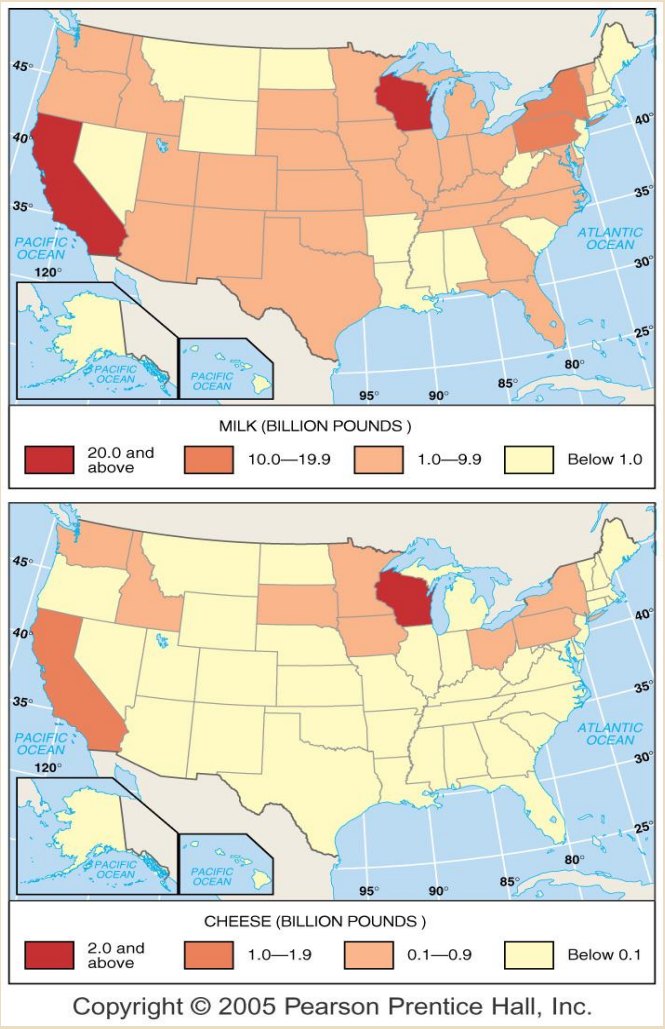


Fig. 10-9:
Milk production (top right) is widely dispersed because of its perishability, though there are areas with greater production.
As a whole the US produces tons of milk (left).

Cheese production (bottom right) is far more concentrated.



World Wheat Production

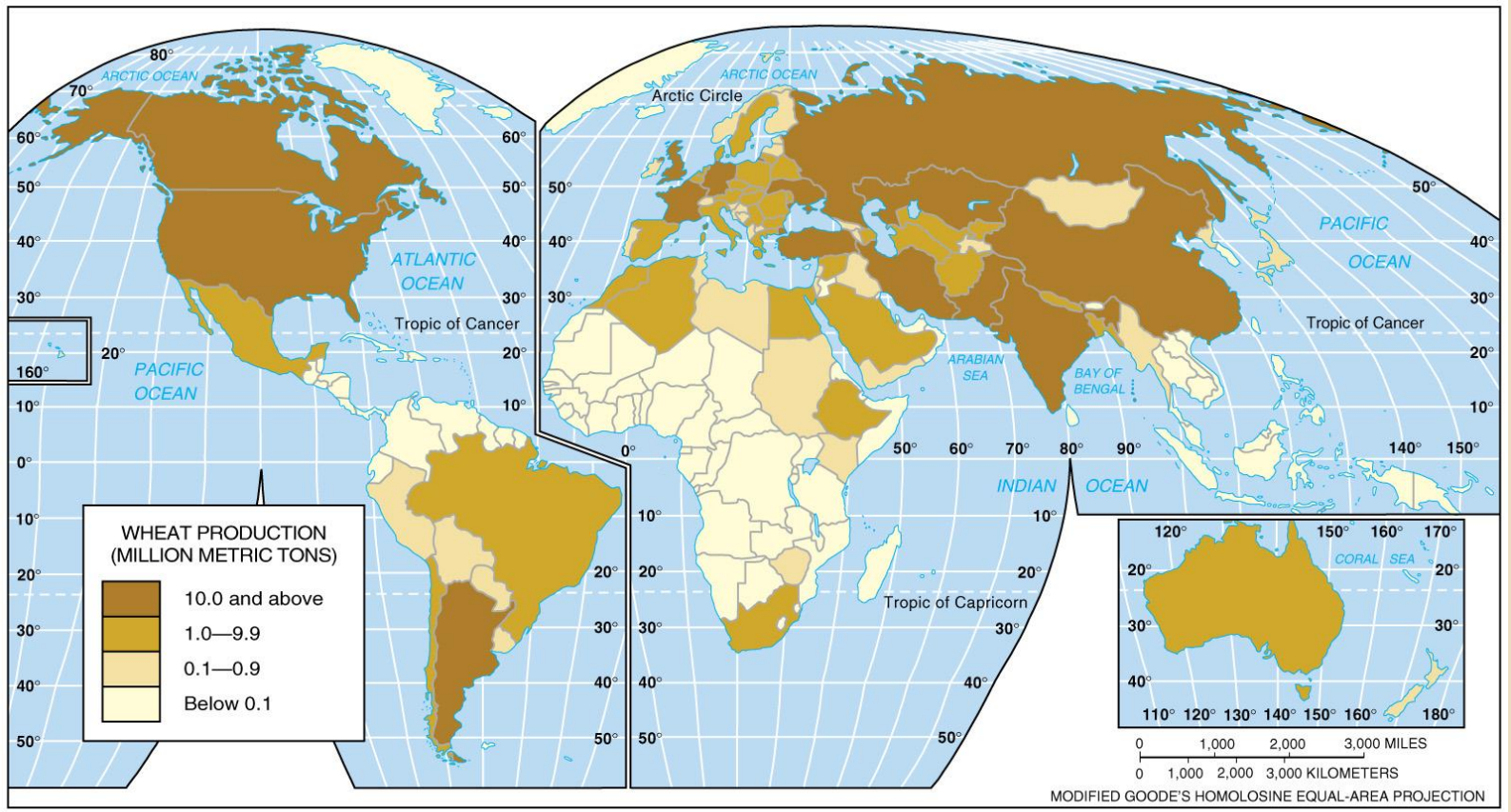


Fig. 10-10: China is the world's leading wheat producer, but the U.S. and Canada account for about half of world wheat exports.

Livestock Ranching

- **Livestock Ranching**
  - Adapted to semi-arid or arid lands of MDCs
  - Cattle Ranching In U.S. Popular Culture
    - Taught to us in cowboy films
    - Beginning Of U.S. Cattle Ranching
      - First brought to the Americas by Columbus on his second voyage
      - Cattle ranching migrated west with the settlers
    - Transporting Cattle To Market
      - Best market prices in Chicago – birth of the cattle drive
      - Cattle transported "on the hoof" to railroad along the Chisholm Trail then to slaughter houses
      - Major cattle ranching center in Texas
  - Fixed Location Ranching
    - Conflict between ranchers and farmers over range rights
    - Early cattle ranchers in the West owned cattle but little land
    - Range Wars
      - US government sold land to farmers who put up fences which angered ranchers
      - Ranchers were compelled to buy or lease land
      - Today 60% of cattle grazing occurs on land leased from the US government
    - Changes In Cattle Breeding
      - Switch from Longhorn (sturdy for cattle drives but poor meat quality) to Hereford (superior meat but not suited to long-range drives) cattle
      - Change in cattle breed ended trail drives
      - Livestock fattening farms/feed lots are stop before slaughter housess

Fig. 10-11: The Chisholm Trail became famous as the main route for cattle drives from Texas to the railheads in Kansas.

Meat Production on Ranches

- **Ranching outside of the US**

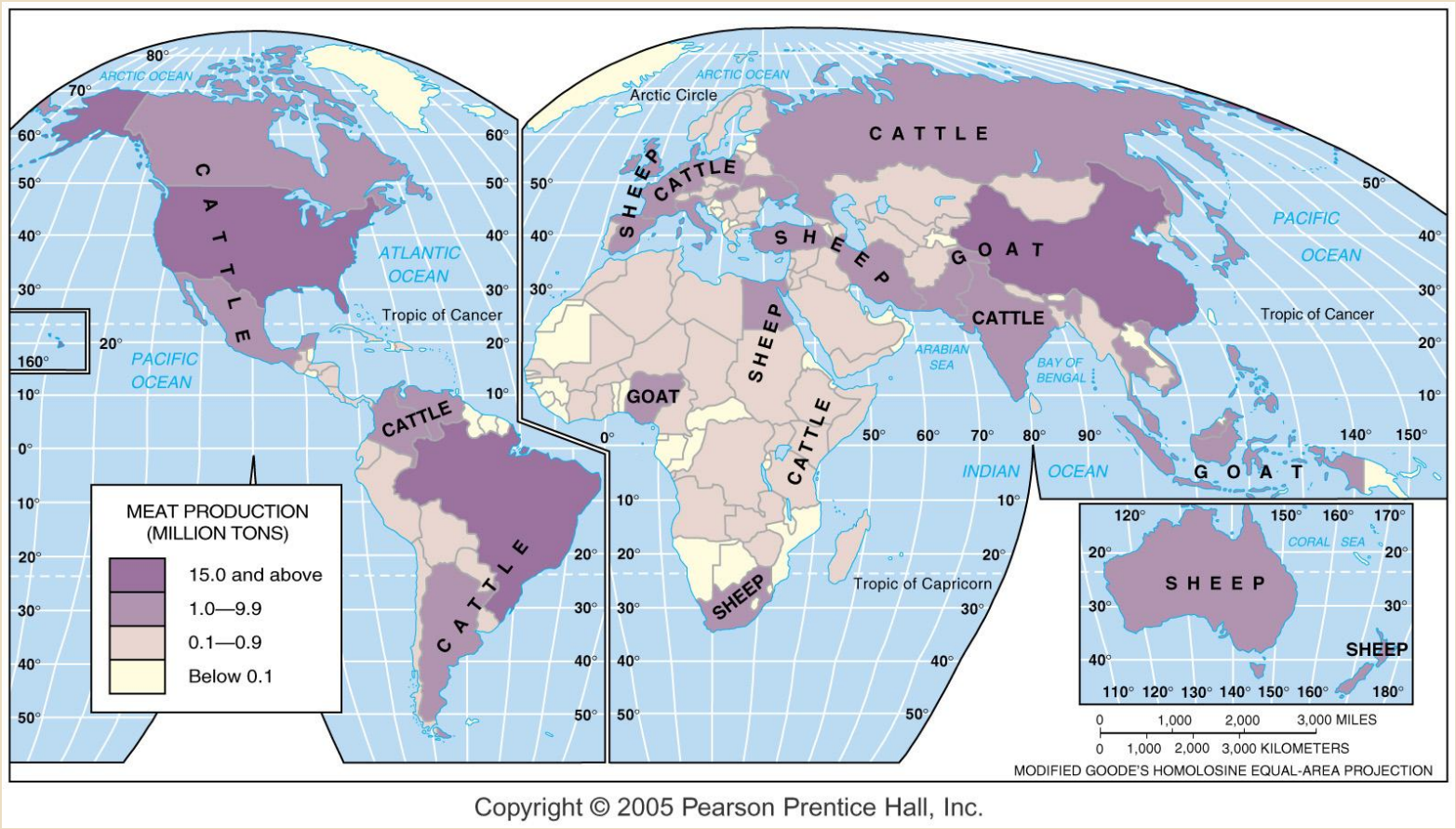


Fig. 10-12: Cattle, sheep, and goats are the main meat animals raised on ranches.

Livestock Ranching

- Mediterranean Agriculture
  - Mediterranean Crops
- Commercial Gardening And Fruit Farming
- Plantation Farming

Key Issue 4: Why Do Farmers Face Economic Difficulties?

- Issues For Commercial Farmers
  - Access To Markets
    - Von Thünen's Model
    - Example Of Von Thünen's Model
    - Application Of Von Thünen's Model
  - Overproduction In Commercial Farming
    - U.S. Government Policies
  - Sustainable Agriculture
    - Sensitive Land Management
    - Integrated Crop Livestock
- Issues For Subsistence Farmers
  - Subsistence Farming And Population Growth
    - Forest Fallow
    - Bush Fallow
    - Short Fallow
    - Annual Cropping
    - Multi Cropping
  - Subsistence Farming And International Trade
    - Drug Crops
- Strategies To Increase Food Supply
  - Increase Food Supply By Expanding Agricultural Land
  - Increase Food Supply Through Higher Productivity
  - Increase Food Supply Of Identifying New Food Sources
    - Cultivate Oceans
    - Higher-Protein Cereals
    - Improve Palatability Of Rarely Consumed Foods
  - Increase Food Supply By Increasing Exports From Other Countries
- Africa's Food Supply Prices

Vocabulary

sustainable agriculture
ridge tillage
fallow
forest fallow
bush fallow
short fallow
annual cropping
Multicropping
desertification
green revolution

Issues for Commercial Farmers

- Access To Markets
  - Von Thünen's Model
    - Location, location, location
    - Balance of income to expenses
    - Proximity to market
  - Example Of Von Thünen's Model - see TBp356

Application of Von Thünen's Model

The Von Thünen model of agricultural land use was created by farmer and amateur economist Johann Heinrich Von Thünen (1783-1850) in 1826 (but it wasn't translated into English until 1966). Von Thünen's model was created before industrialization and is based on the following limiting assumptions:

- The city is located centrally within an "Isolated State" which is self sufficient and has no external influences.
- The Isolated State is surrounded by an unoccupied wilderness.
- The land of the State is completely flat and has no rivers or mountains to interrupt the terrain.
- The soil quality and climate are consistent throughout the State.
- Farmers in the Isolated State transport their own goods to market via oxcart, across land, directly to the central city. Therefore, there are no roads.
- Farmers act to maximize profits.

Von Thünen
Model of Agricultural Land Use

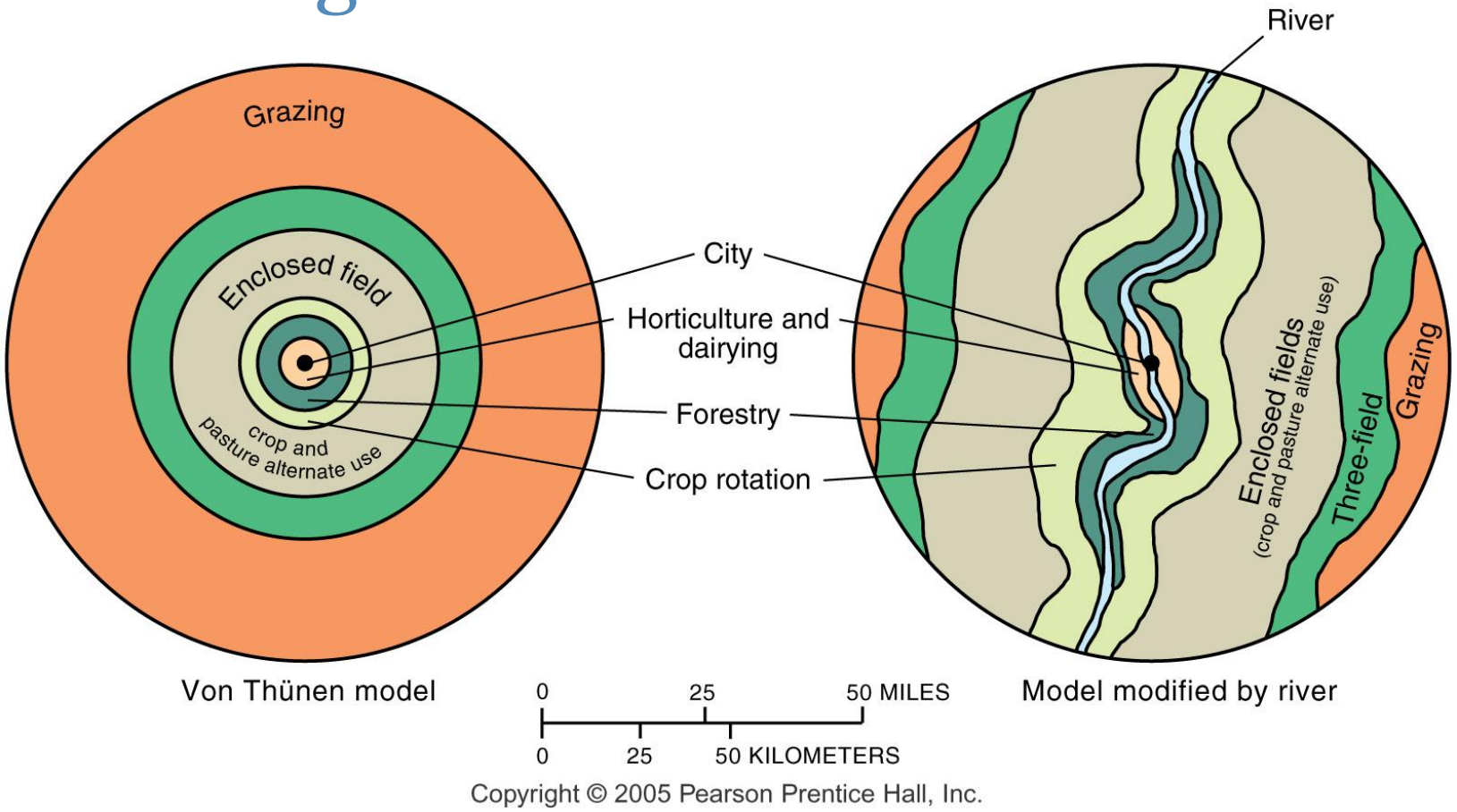


Fig. 10-13: Von Thünen's model shows how distance from a city or market affects the choice of agricultural activity in (a) a uniform landscape and (b) one with a river.

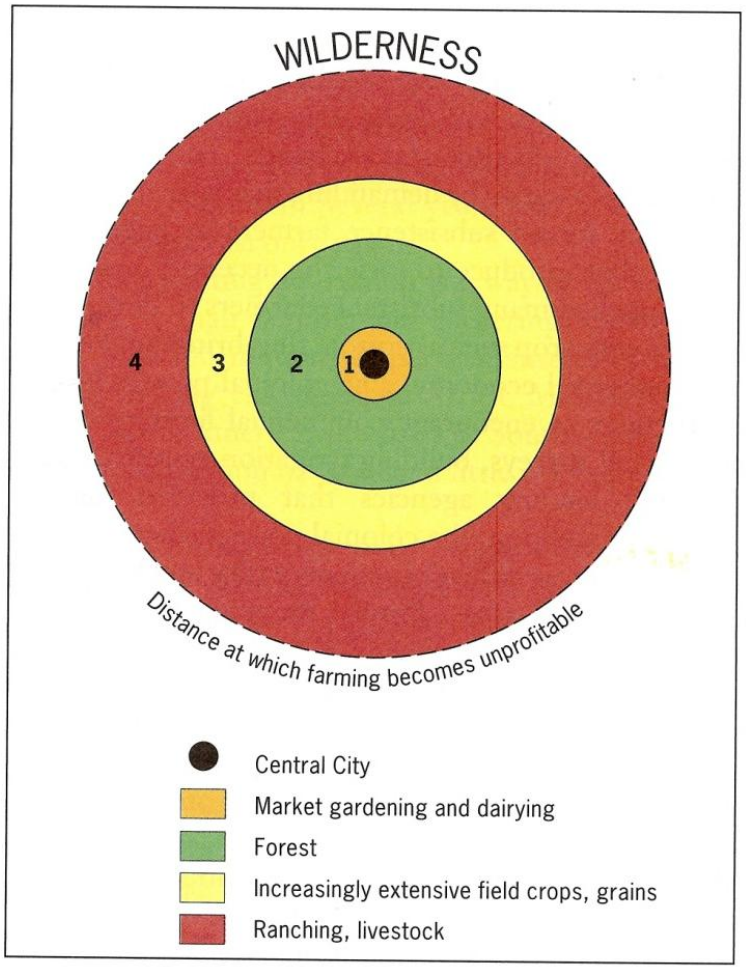
In an Isolated State with the foregoing statements being true, Von Thünen hypothesized that a pattern of rings around the city would develop. There are four rings of agricultural activity surrounding the city.

Dairying and intensive farming occur in the ring closest to the city. Since vegetables, fruit, milk and other dairy products must get to market quickly, they would be produced close to the city (remember, we didn't have refrigerated oxcarts!)

Timber and firewood would be produced for fuel and building materials in the second zone. Before industrialization (and coal power), wood was a very important fuel for heating and cooking. Wood is very heavy and difficult to transport so it is located as close to the city as possible.

The third zone consists of extensive fields crops such as grains for bread. Since grains last longer than dairy products and are much lighter than fuel, reducing transport costs, they can be located further from the city.

Figure 11.7
Von Thünen's Model.



Von Thünen continued

Ranching is located in the final ring surrounding the central city. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering.

Beyond the fourth ring lies the unoccupied wilderness, which is too great a distance from the central city for any type of agricultural product.

Even though the Von Thünen model was created in a time before factories, highways, and even railroads, it is still an important model in geography. The Von Thünen model is an excellent illustration of the balance between land cost and transportation costs. As one gets closer to a city, the price of land increases. The farmers of the Isolated State balance the cost of transportation, land, and profit and produce the most cost-effective product for market. Of course, in the real world, things don't happen as they would in a model.

http://geography.about.com/od/urbaneconomicgeography/a/vonthunen.htm

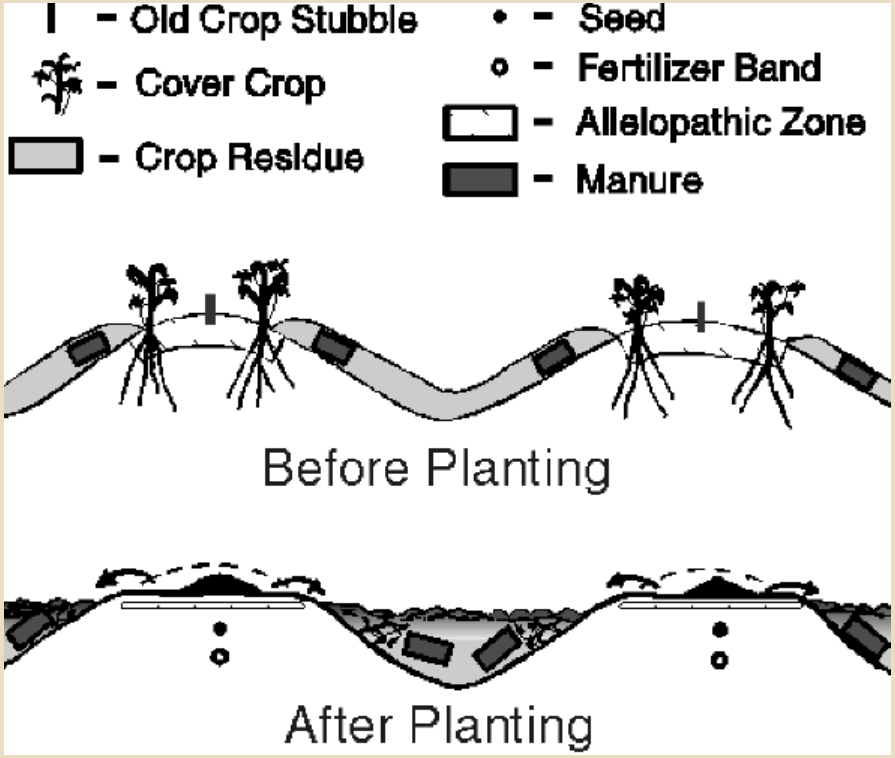
Issues For Commercial Farmers

- **Overproduction In Commercial Farming**
  - Food demand inelastic… due to limit of consumption
  - Efficiency can work against the farmer
    - Efficiency of agriculture practices increases yields (supply) which can cause surplus which decreases market price
  - **U.S. Government Policies**
    - Discourages production of surplus crops
      - Encourages planting of fallow crops
    - Government subsidies ≈$10 billion annually
      - paid to farmers – difference between target price and market price if less then the target price
      - Government purchases surplus product and sells or donates to foreign governments
- **Sustainable Agriculture**
  - **Sensitive Land Management**
    - Ridge tillage (see next slide)
  - **Integrated Crop Livestock**
    - Feed crops grown for farm livestock to graze on
    - Forgo purchase of feed for livestock

Ridge Tillage

Allelopathy - suppression of growth of a plant by a toxin ("Roundup-Ready" seeds) released from a nearby plant of the same or another species.

Ridge tillage resembles contemporary and traditional cropping systems in which plants grow on a hill or bund. Cotton, for example, is often grown on ridges for purposes of irrigation. In ridge tillage the ridges are a product of cultivation of the previous crop and are not tilled out after harvest. The planter may remove part of the ridge top, but before planting there is no tillage. This provides potential advantages in soil conservation and weed management.



http://www.pfi.iastate.edu/OFR/RT_description.htm

Grain Importers and Exporters

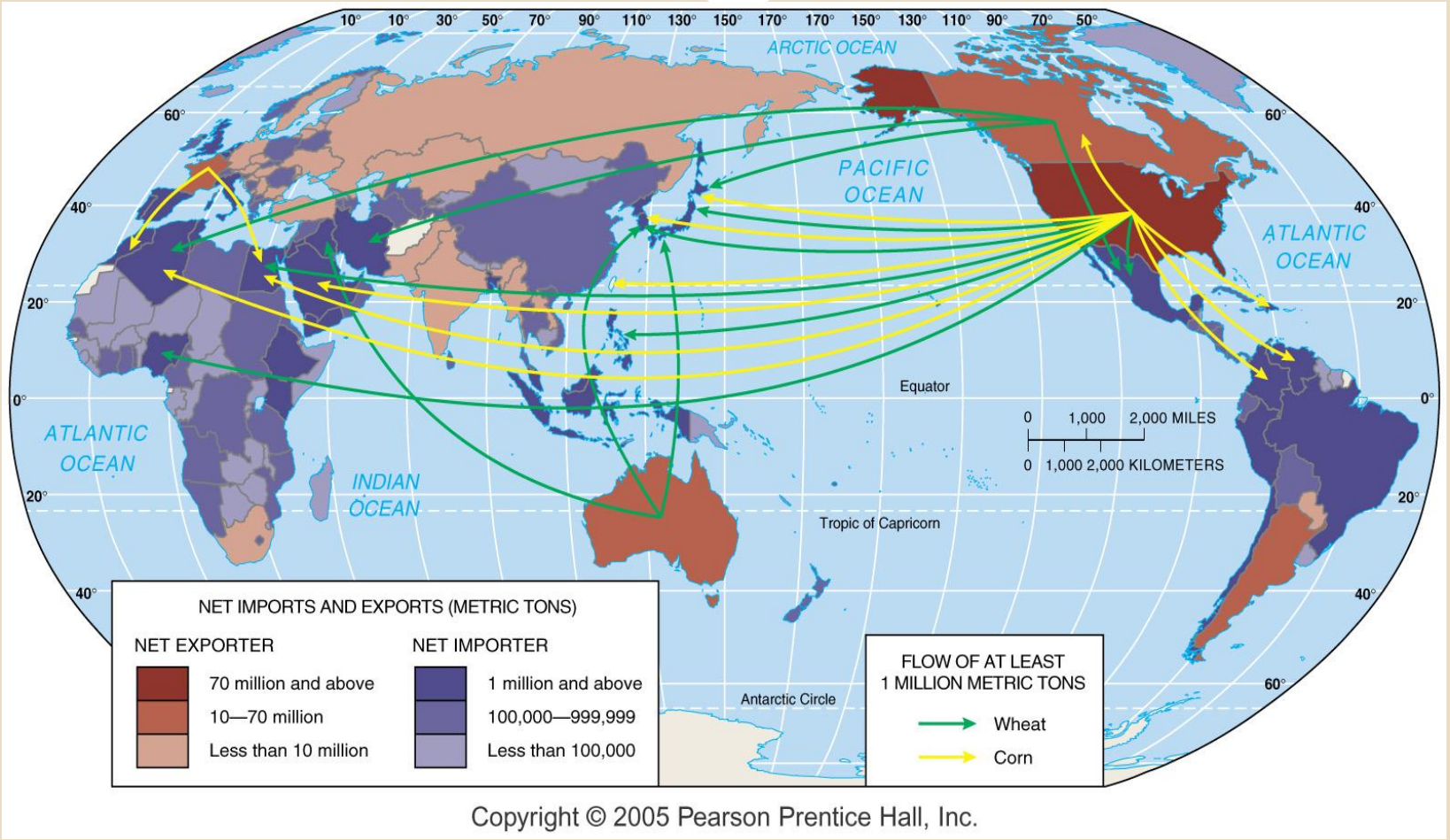


Fig. 10-15: Most countries are net importers of grain. The U.S. is the largest net exporter.

Issues For Subsistence Farmers

- Subsistence Farming And Population Growth

  Ester Boserup – relationship between population growth and types of subsistence farming

  As population increases the intensity of agricultural practices increases.

Type	Time Used for Crops	Time Left Fallow	Fallow period growth
Forest Fallow	Two years	20+ years	Forest grows back
Bush Fallow	≤ 8 years	≤10 years	Bushes and small trees grow back
Short Fallow	≈2 years	≈2 years	Wild grasses grow back
Annual Cropping	Every year	Few months	Legumes and roots planted during fallow period
Multicropping	All year	Never	Several crops grow all year

- Subsistence Farming And International Trade
  - **Conundrum – LDCs need money to modernize but are focused on survival**
    - Workers plant "cash crops" to earn foreign money but money often used to support efforts to earn the money and so modernization is slow at best
  - **Drug Crops**
    - "cash crops" chosen often plants from which illegal drug are derived

Strategies to Increase Food Supply

- Increase Food Supply By Expanding Agricultural Land
  - Need more food… cultivate more land
    - Historical method of increasing production
  - (2005) 11% of Earth land area devoted to agriculture
  - Desertification an issue in LDCs
    - Some 104,000 square miles once arable land lost each year
  - Excessive agriculture stresses the land
  - Man-made irrigation systems w/poor drainage threaten other regions with too much water
  - Urban sprawl

Desertification Hazard

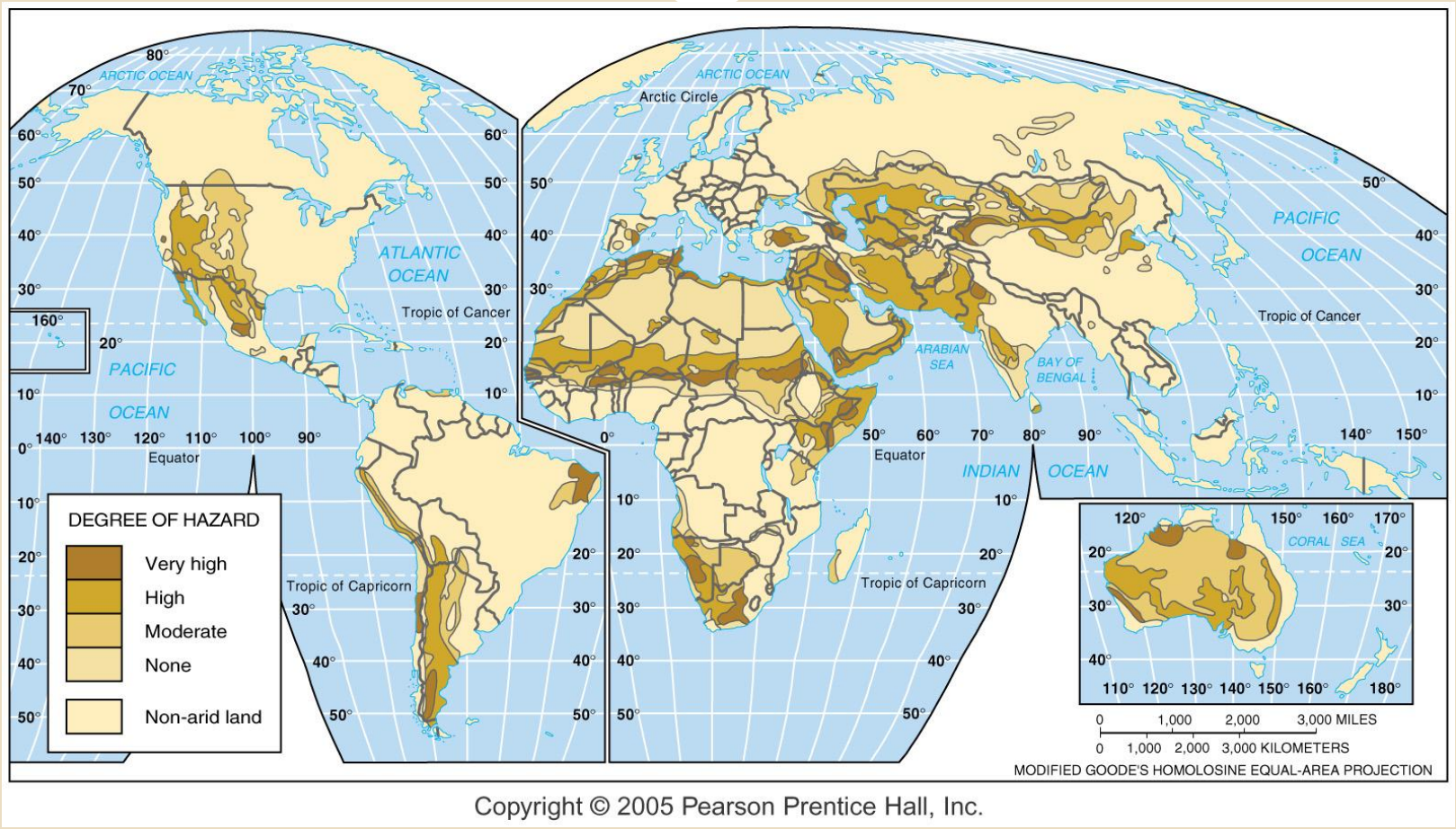
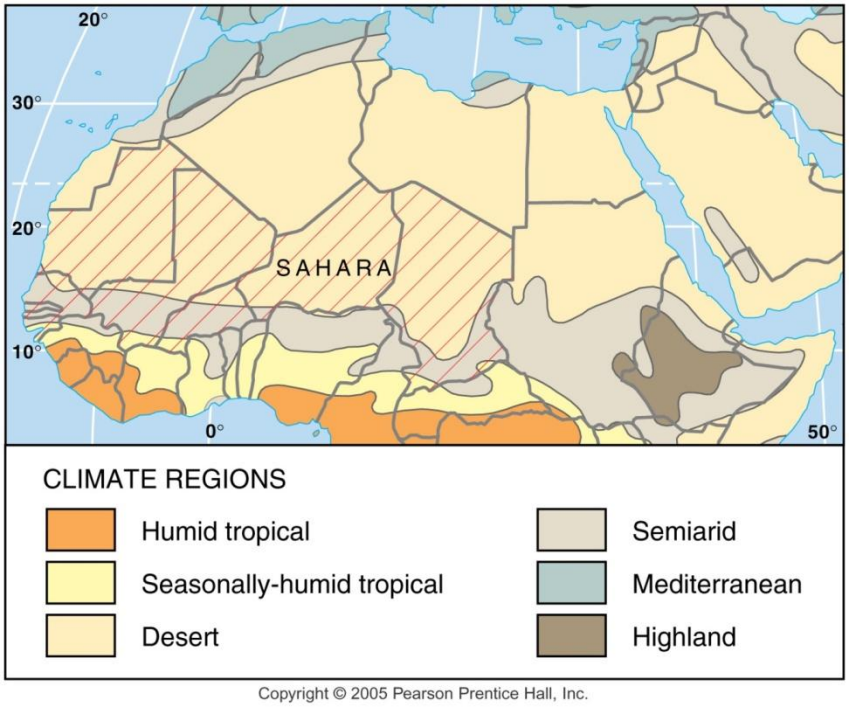


Fig. 10-14: The most severe desertification hazards are in northern Africa, central Australia, and the southwestern parts of Africa, Asia, North America, and South America.

Strategies to Increase Food Supply

- Increase Food Supply Through Higher Productivity
  - Threat of population out growing food supply (1960s) encouraged innovation (1970-80s)
    - Enter… the GREEN REVOLUTION – the third Agricultural Revolution (1930s – present)
      - Introduction of new higher-yield seeds (research started in 1950s)
      - The expanded use of fertilizers
        - Understand how fertilizers work… the nutrient components– nitrogen, phosphorus and potassium
        - Nutrients not readily or uniformly available everywhere
  - Increase Food Supply by Identifying New Food Sources
    - Cultivate Oceans
      - ¾ of Earth surface
      - Caution – overfishing an issue (65 of 153 species monitored overfished)
      - 200 mile economic zone off shore of each countrys
    - Higher-Protein Cereals
      - Genetically Modified (GM) grains to increase protein content
      - Vitamin fortified processed foods are limited help to LDCs as they are subsistence farmers
    - Improve Palatability Of Rarely Consumed Foods
      - Culture/religion play a role in food choices
      - Changing perception and improving taste are not easy
  - Increase Food Supply By Increasing Exports From Other Countries
    - US largest wheat/corn grain exporter currently with Canada, Australia and Argentina following
    - Potential for international increase in exportation but slow moved

Africa's Food-Supply Crisis



The Sahel, which is south of the Sahara, frequently faces drought and food shortages, as does the Horn of Africa.

- Sub-saharan Africa from the Sahel south to South Africa
- 70% of Africans have too little to eat
- Expect to get worst before it gets better
- Per person food production down by < 20%
- Severe in "Horn of Africa" – Somalia, Ethiopia and Sudan
- Population increases creates land scarcity and intensive agriculture which stresses the land
- Unusual droughts lasting decades
- Stagnate economies

Sources

- About.com, Von Thunen Model; http://geography.about.com/od/urbaneconomicgeography/a/vonthunen.htm
- Rubenstein, James M., *The Cultural Landscape An Introduction to Human Geography*, 8th Edition, Pearson Prentice Hall, New Jersey, 2005
- De Blij, Harm J., *Human Geography People Place and Culture*, 8th Edition, Wiley & Sons, 2007
- National Geographic Video: Diamond, Jared, *Guns, Germs and Steel*
- USDA 2002 Census of Agriculture *http://www.nass.usda.gov/research/atlas02/index.html*
- USDA Farms, Land in Farms, and Livestock Operations 2008 Summary, February 2009 *http://usda.mannlib.cornell.edu/usda/nass/FarmLandIn//2000s/2009/FarmLandIn-02-12-2009.pdf*
- Maps of the World, World Climate Map; http://www.mapsofworld.com/world-maps/world-climate-map.html
- Practical Farmers of Iowa, *What is Ridge-Till? http://www.pfi.iastate.edu/OFR/RT_description.htm*