



Agriculture, Food Production, & Rural Land Use

Unit 5

Peterson Brothers Video

Key Issues

- Where Did Agriculture Originate?
- Why Do People Consume Different Foods?
- Where is Agriculture Distributed?
- Why Do Farmers Face Sustainability Challenges?

Agriculture

- *A deliberate modification of Earth's surface through cultivation of plants and rearing of animals to obtain sustenance or economic gain.*
- *Cultivate = "to care for"*
- *Crop = any plant cultivated "by people"*
- *Intertillage – Planting many crops per plot of land.*
 1. Less than 2% of Americans are farmers
 2. Agriculture production is at a all time high
 3. **Culture** dictates how land is divided and for what purpose
 1. Islam and Judaism avoid pork
 2. Hindus do not eat beef, etc.

Economic Sectors

Primary employment sector. This sector consists of jobs in which people extract resources from the environment. Ex. Farming, mining, fishing, and forestry.

Secondary employment sector – Jobs in which people take resources and make them into something else are classified under the secondary employment sector. Ex. Manufacturing, processing, or construction jobs

Tertiary employment sector – Jobs classed in this sector are those in which people provide services. Ex. Lawyers, teachers, doctor

Hunters and Gatherers

Before the invention of agriculture, all humans probably obtained the food they needed for survival through hunting of animals, fishing, or gathering.

1. Lived in small groups
2. Traveled frequently
3. Establishing new homes or camps
4. Direction of migration depended on movement of game and seasonal growth of plants.
5. Only about 250,000 people throughout the world
 1. San in Southern Africa (Video 1a) – Human Hunter
 2. Aboriginal people in Australia
 3. Hunters and gathers of the Amazon

(Video 1b) – Year One

#paleoproblems

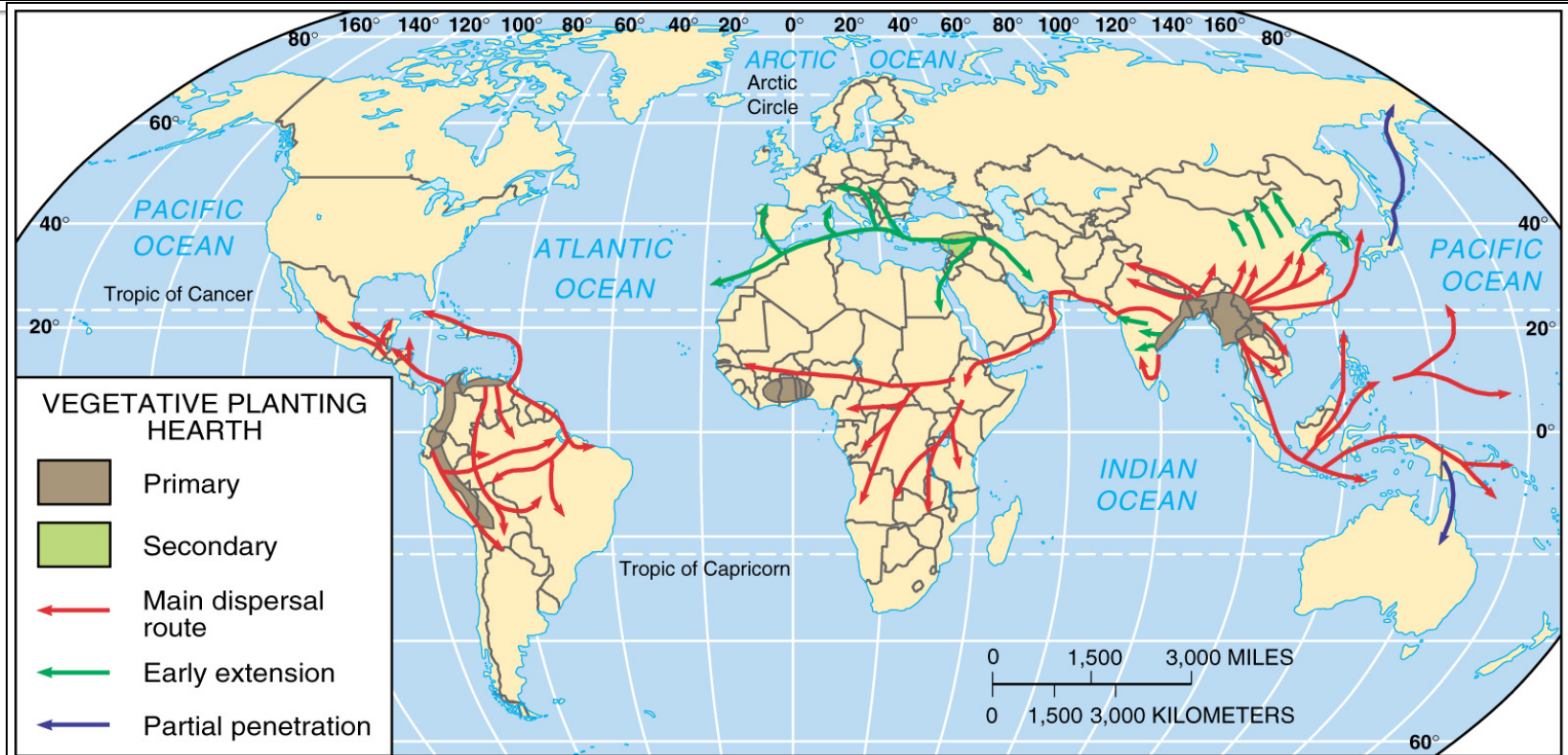


Types of Cultivation

Vegetative planting – direct cloning from existing plants, such as cutting stems and dividing roots. Plants found growing wild were deliberately divided and transplanted.

Seed agriculture – reproduction of plants through annual planting of seeds that results from sexual fertilization. Seed agriculture is practiced by most farmers today.

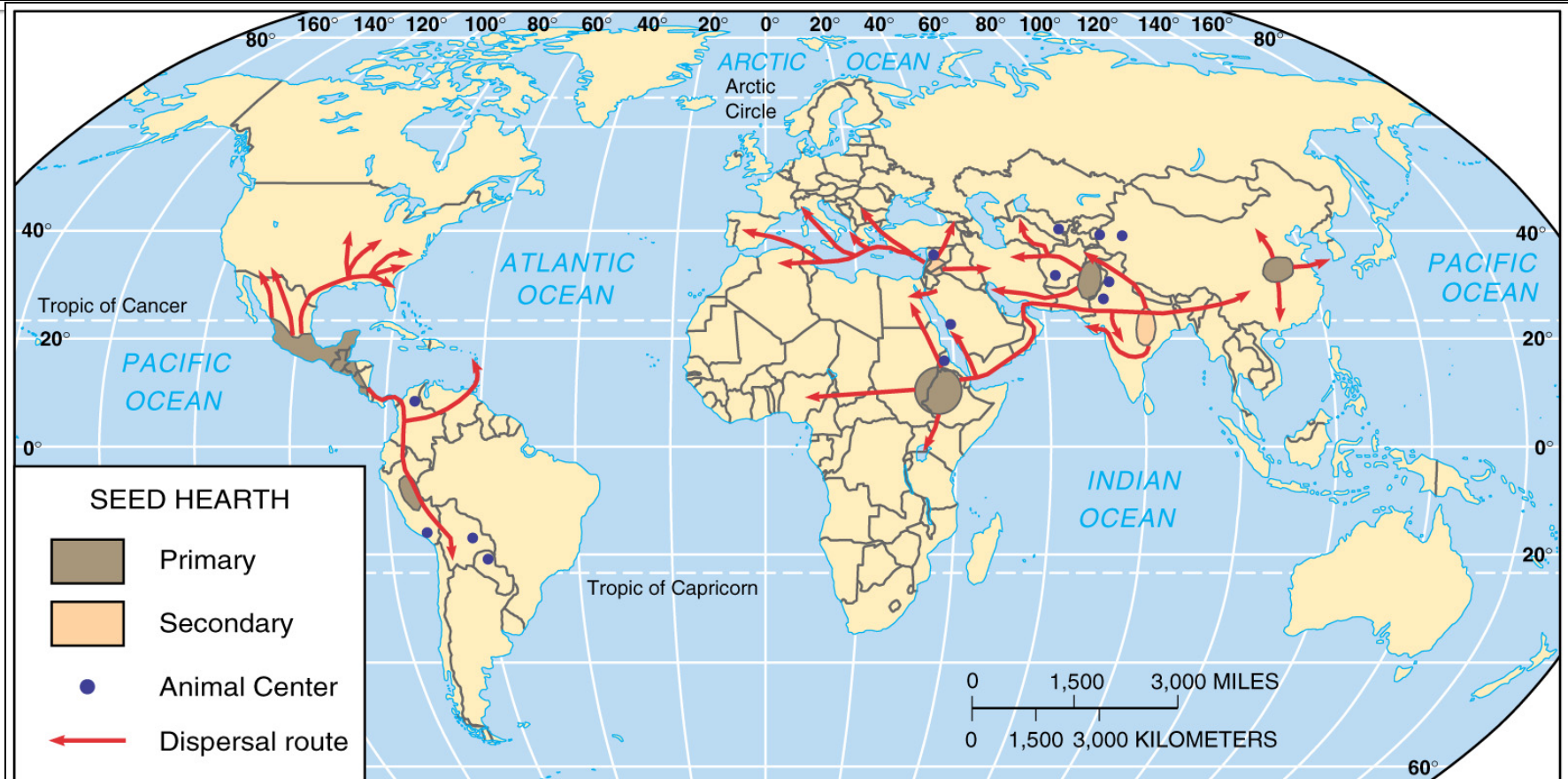
Vegetative Planting Hearths



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

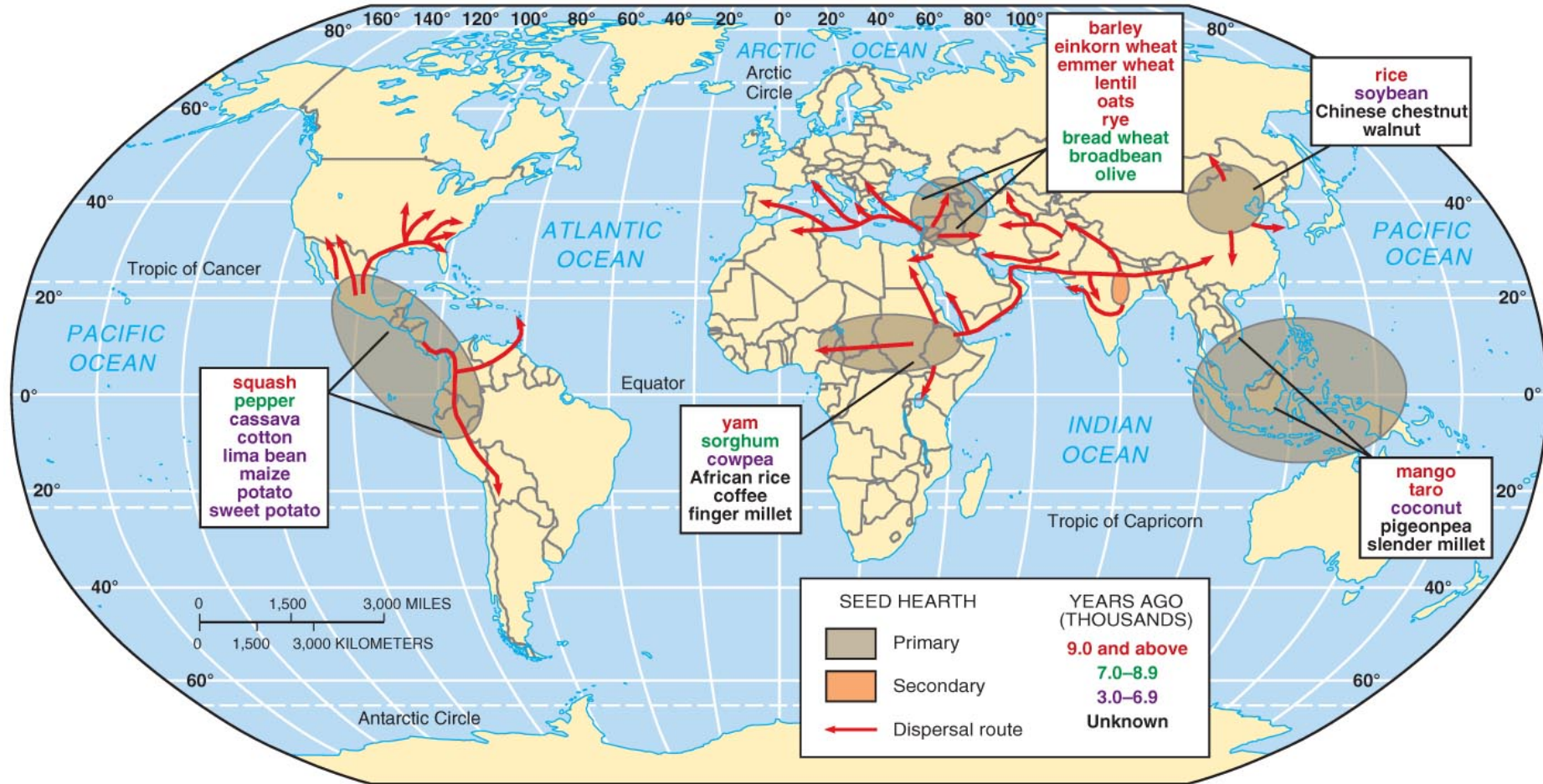
Seed Agriculture Hearths



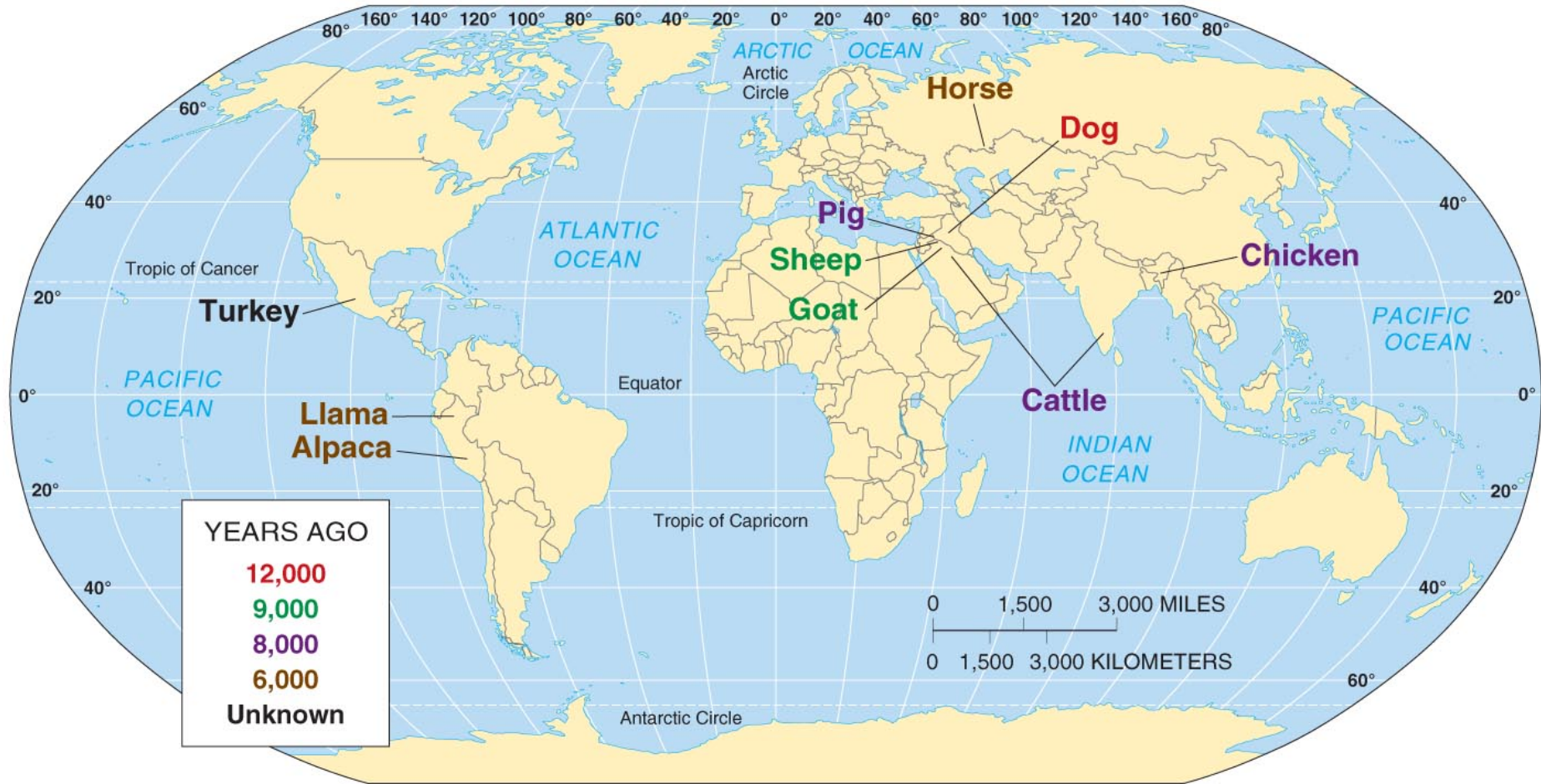
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Seed agriculture also originated in several hearths and diffused from those elsewhere.

Crop Hearths



Animal Hearths



First Agriculture Revolution

10,000 – 12,000 years ago, closely aligned with the declining Ice Age, accompanied by a modest population explosion.

Hearths or regions of plant domestication and specific products

1. Upper SE Asia – *rice, bananas, beans, teas*
2. Lower SE Asia – *sugarcane, ginger, citrus*
3. Eastern India – *rice, sorghum, ginger*
4. SW Asia – *wheat, barley, rye, beets, grapes*
5. East Africa – *melons, gourds, coffee*
6. Mesoamerica – *corn, squash, chili peppers, avocado*
7. Mediterranean Basin – *grapes, olives, dates, lettuce, carrots*
8. Central China – *radishes, peaches*
9. Sudan – *sorghum, millets, yams, peas*
10. Andean Highlands – *potato, pumpkin, tomatoes, strawberry, papaya*
11. Eastern South America – *peanuts, pineapples, cotton, tobacco*

Categories of Agriculture

Subsistence – growing only enough to survive. Most common in LDC's

1. Shifting Cultivation (also know as slash and burn)
 - a. Clear the land
 - b. burn foliage for fertilizer
 - c. Moving to the next field when yields go down

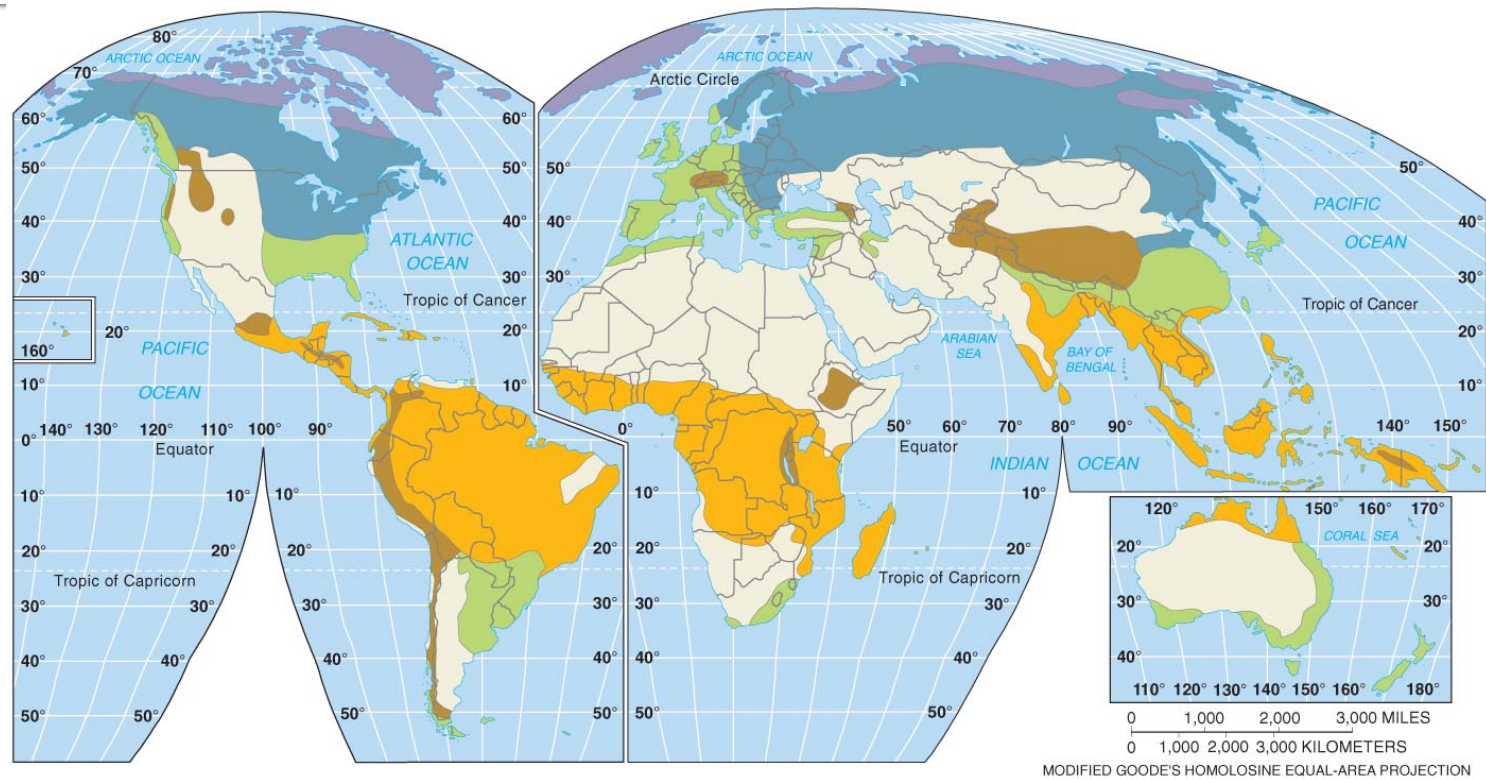
Commercial farming – production of food for sale. Most common in MDCs.

- a. commercial agriculture is less efficient. Why?
- b. in order for commercial agriculture to be a success, it must be supported through the use of subsidies.
- c. Commercial agriculture is dependent on inanimate energy.
- d. Commercial agriculture is generally a monoculture system.
- e. Commercial farming lends itself to agribusiness – large food production industry. Ex, Tyson, Conagra, etc.

Commercial and Subsistence Agriculture

- Five characteristics distinguish commercial from subsistence agriculture.
 - Purpose of farming
 - Percentage of farmers in the labor force
 - Use of machinery
 - Farm size
 - Relationship of farming to other businesses

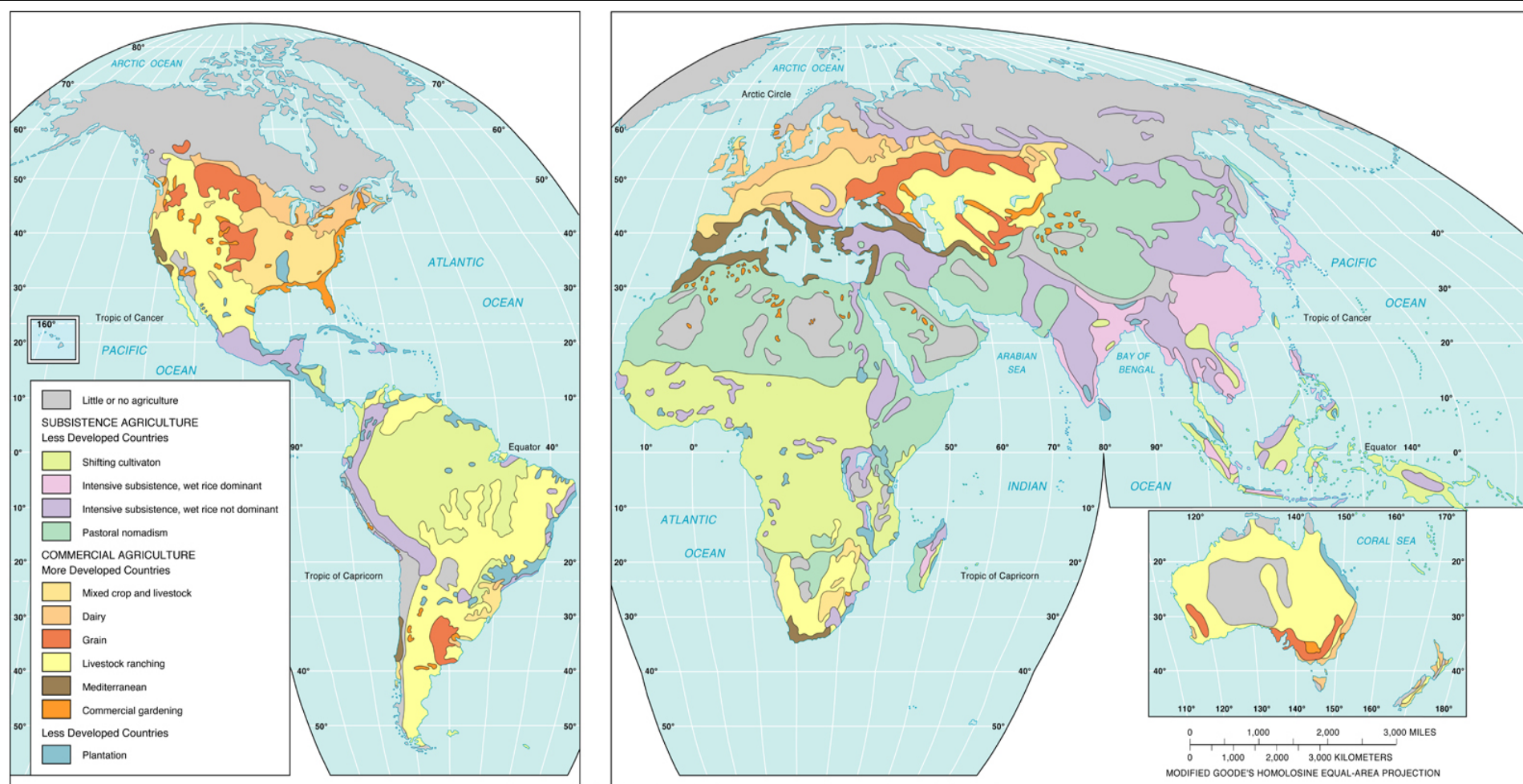
Agriculture and Climate



- A Humid Low-Latitude
- B Dry
- C Warm Mid-Latitude

- D Cold Mid-Latitude
- E Polar
- H Undifferentiated Highlands

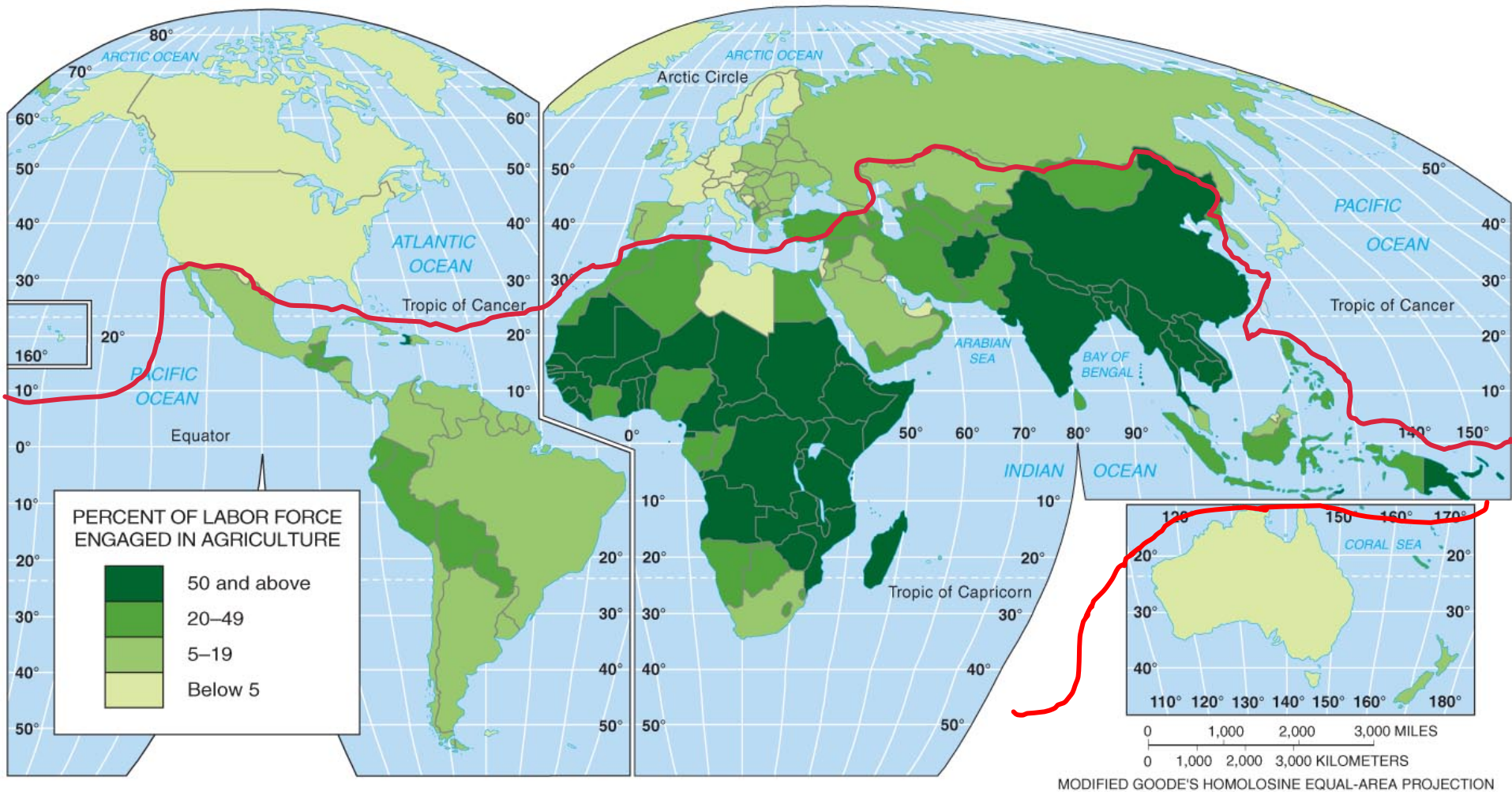
World Agriculture Regions



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Locations of the major types of subsistence and commercial agriculture.

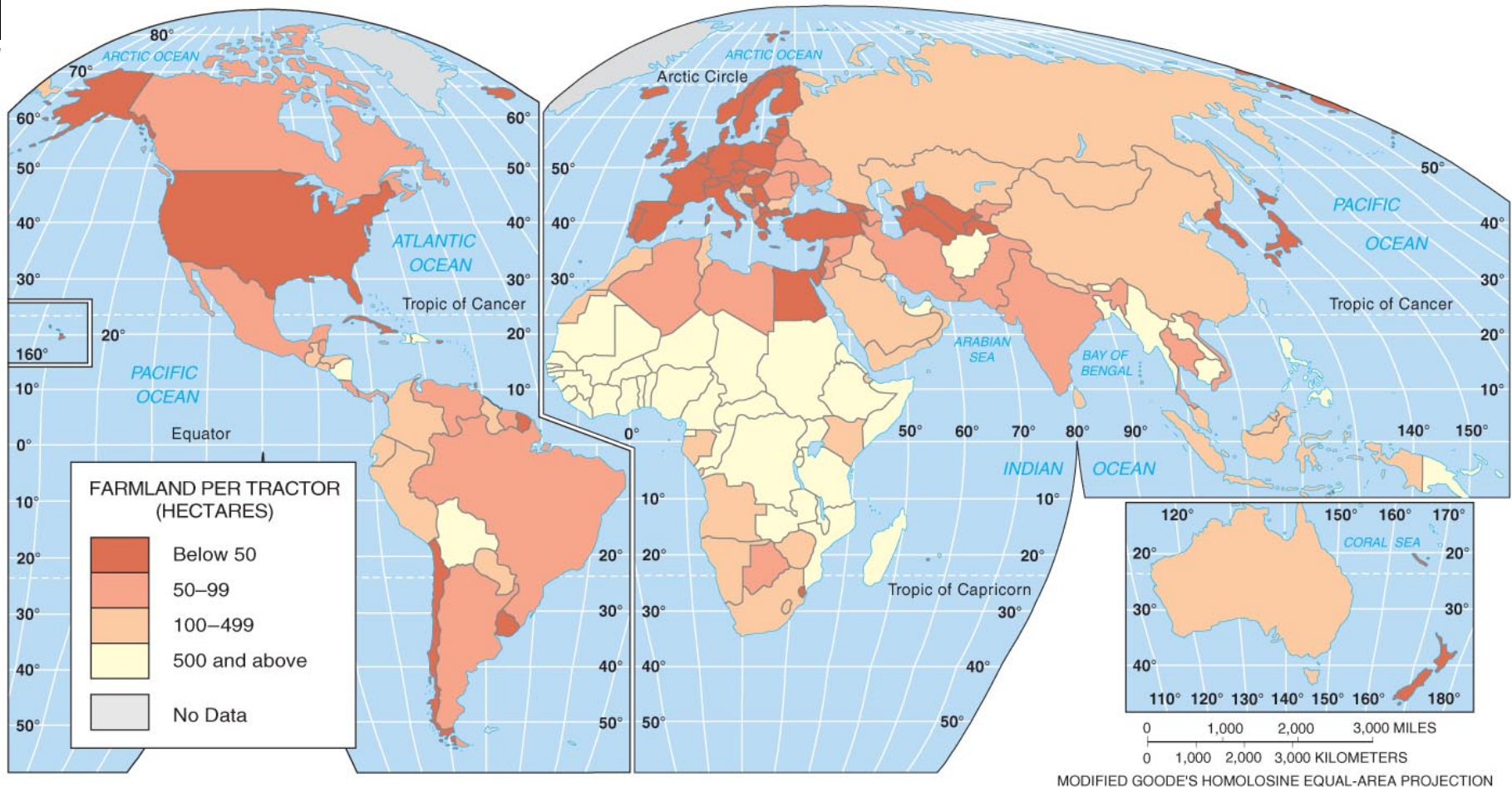
Labor Force in Agriculture



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A large proportion of workers in most LDCs are in agriculture, while only a small percentage of workers in MDCs are engaged in agriculture.

Area of Farmland Per Tractor



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Use of machinery is extensive in most MDC agriculture, but it is much less common in LDCs.

Shifting Cultivation

1. Practiced in much of the world's low-latitude. A-type climate regions.
2. Two Features:
 - land is cleared by slashing and burning debris
 - land is tended for only a few years at a time.
3. Traditionally, land is not owned individually
4. Types of crops grown vary regionally.
5. Shifting cultivation is being replaced by logging, cattle ranching, and *cash crops*.

Shifting cultivation – positive or negative?

Shifting Cultivation



Shifting cultivation by the Trio tribe in the rainforest of Southern Suriname

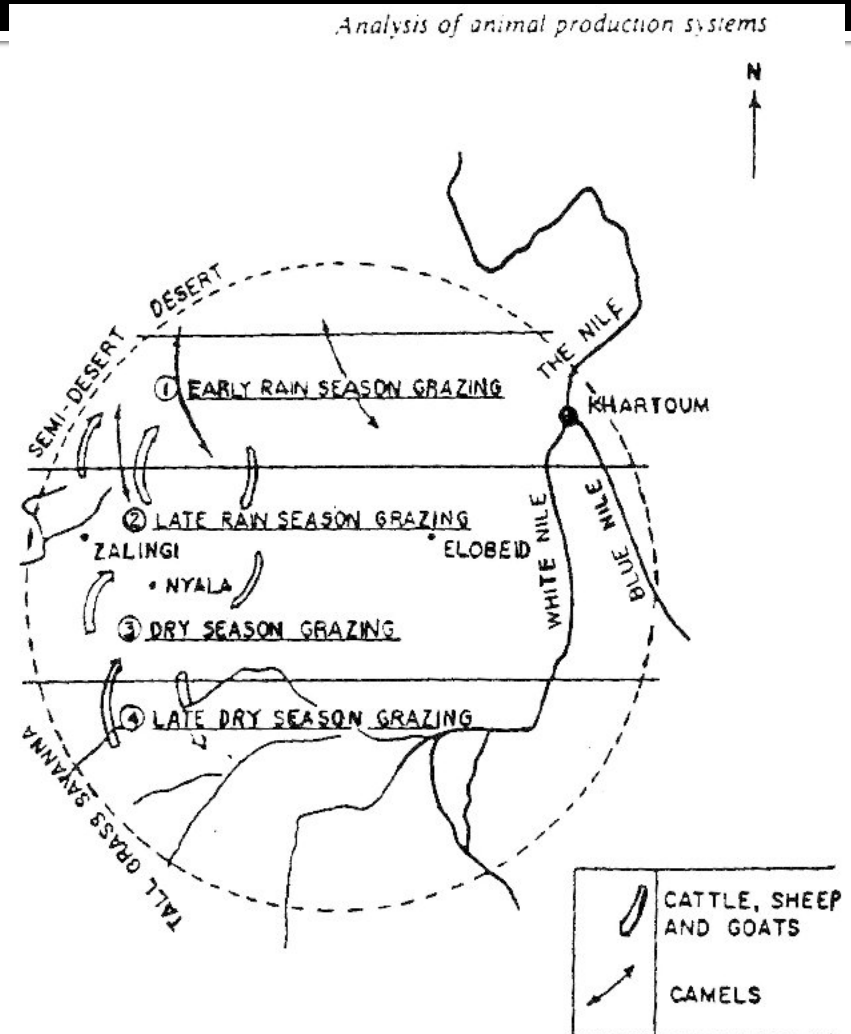
Pastoral Nomadism

1. Form of subsistence agriculture based on the herding of domesticated animals.
2. Found primarily in arid and semiarid B-type climates
3. Animals are seldom eaten
 - The size of the heard indicates power and prestige
4. Number and type of animals are selected according to local cultural and physical characteristics.
 - For example, camels are favored in North Africa and SW Asia
5. *Transhumance* practiced by some pastoral nomads
6. Declining because of technology

Pastoral Nomadism



Pastoral nomads camping near Namtso in 2005



Source: Sidahmed and Koong (1984)

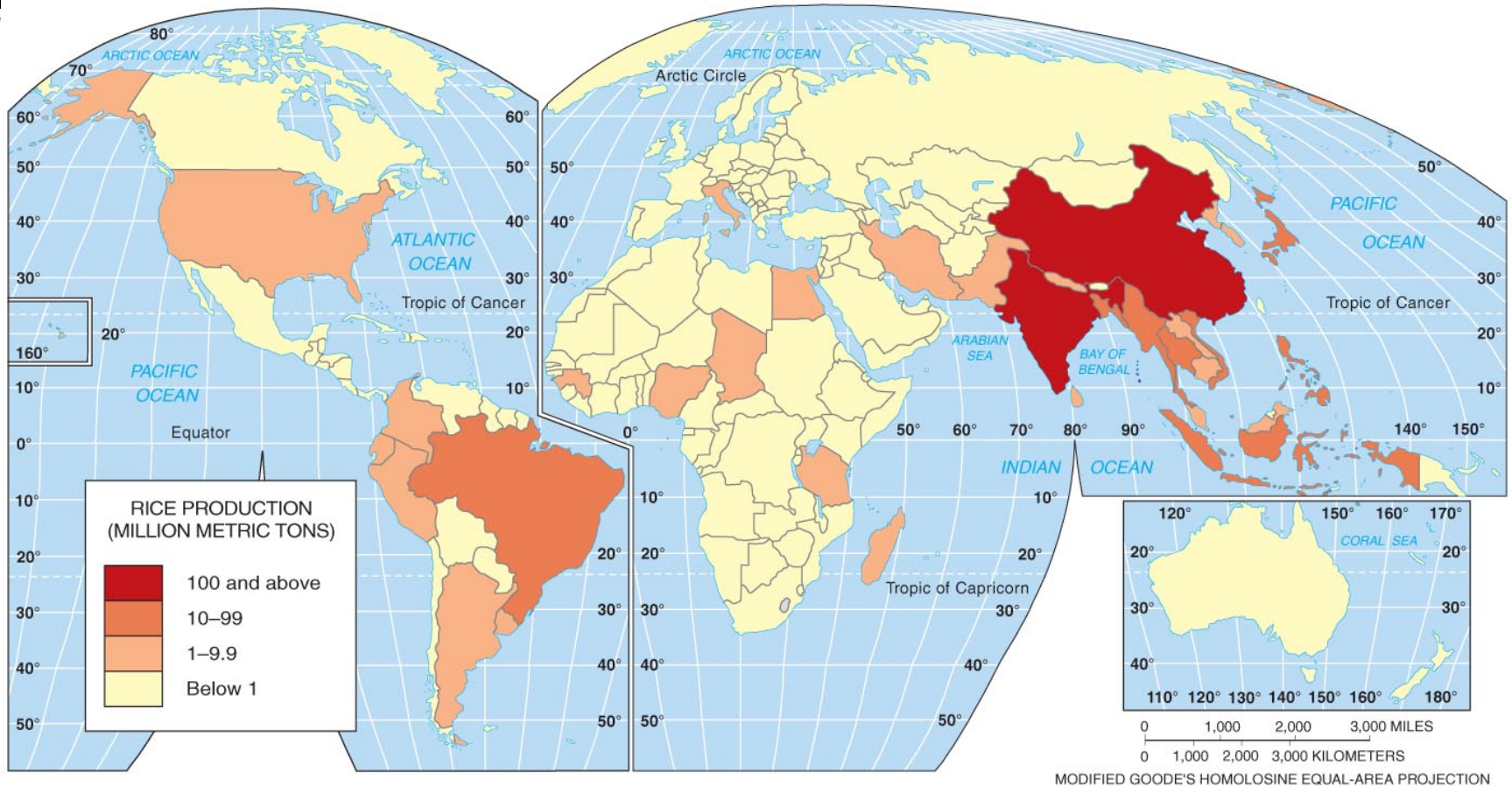
Intensive Subsistence Agriculture

1. Found in areas with high population and agricultural densities.
 - Especially in East, South, and SE Asia
 - To maximize production, little or no land is wasted.
2. Farm is much smaller than elsewhere in the world.
3. Families must produce enough food for their survival from a very small area of land.
4. Little grain is grown to feed the animals.

Intensive with Wet Rice Dominant

Intensive with Wet Rice not Dominant

World Rice Production



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

Plantation Farming

1. Found in the tropics and subtropics, especially in Latin America, Africa, and Asia.
2. Owned by Europeans and North Americans and grow crops for sale primarily in more developed countries.
3. Large farm specialized in one or two cash crops.
4. Bananas, coffee, tobacco, cocoa, cotton, sugarcane and rubber
5. A large labor force is usually needed in sparsely settled regions.
6. Crops are processed at the plantation to cut down on transportation costs.

Plantation Farming



Banana plantation. Farming bananas (*Musa* sp.) at San Juan on Tenerife, Canary Islands.



Palm Tree **Plantation**, Israel, Aravah Desert

Agriculture Regions in More Developed Countries

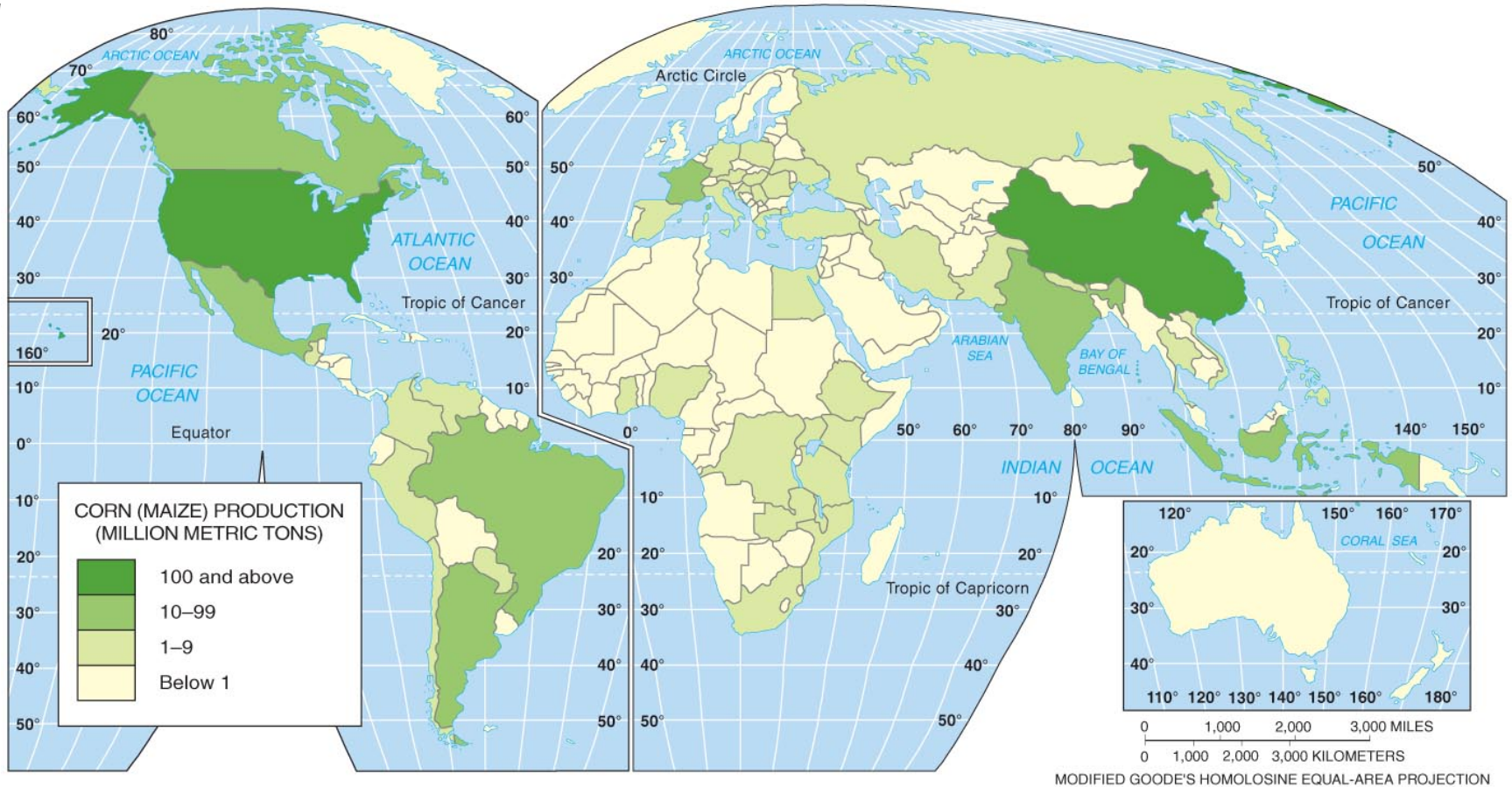
Commercial agriculture in more developed countries can be divided into six main types.

1. Mixed crop and livestock farming
 - most land = devoted to crops
 - most profits = derive from the livestock.
2. Dairy farming (most important type of commercial agriculture)
 - Regional distribution: the milk shed
 - Two primary challenges
 - labor-intensive
 - expense of winter feed
 - Near large urban areas
 - 60% of the world's supply of milk is produced and consumed in developed countries.

Mixed Crop and Livestock Farming

1. Mixed crop and livestock farming is the most common form of commercial agriculture in the U.S. west of the Appalachians.
2. Distinctive characteristic of mixed crop and livestock farming is its integration of crops and livestock.
3. Most of the crops are fed to animals rather than consumed by humans.
4. Reduces seasonal variations in income.
5. Typically involves crop rotation.
6. United States, mixed crop and livestock farmers select corn most frequently because of higher yields per area than other crops.

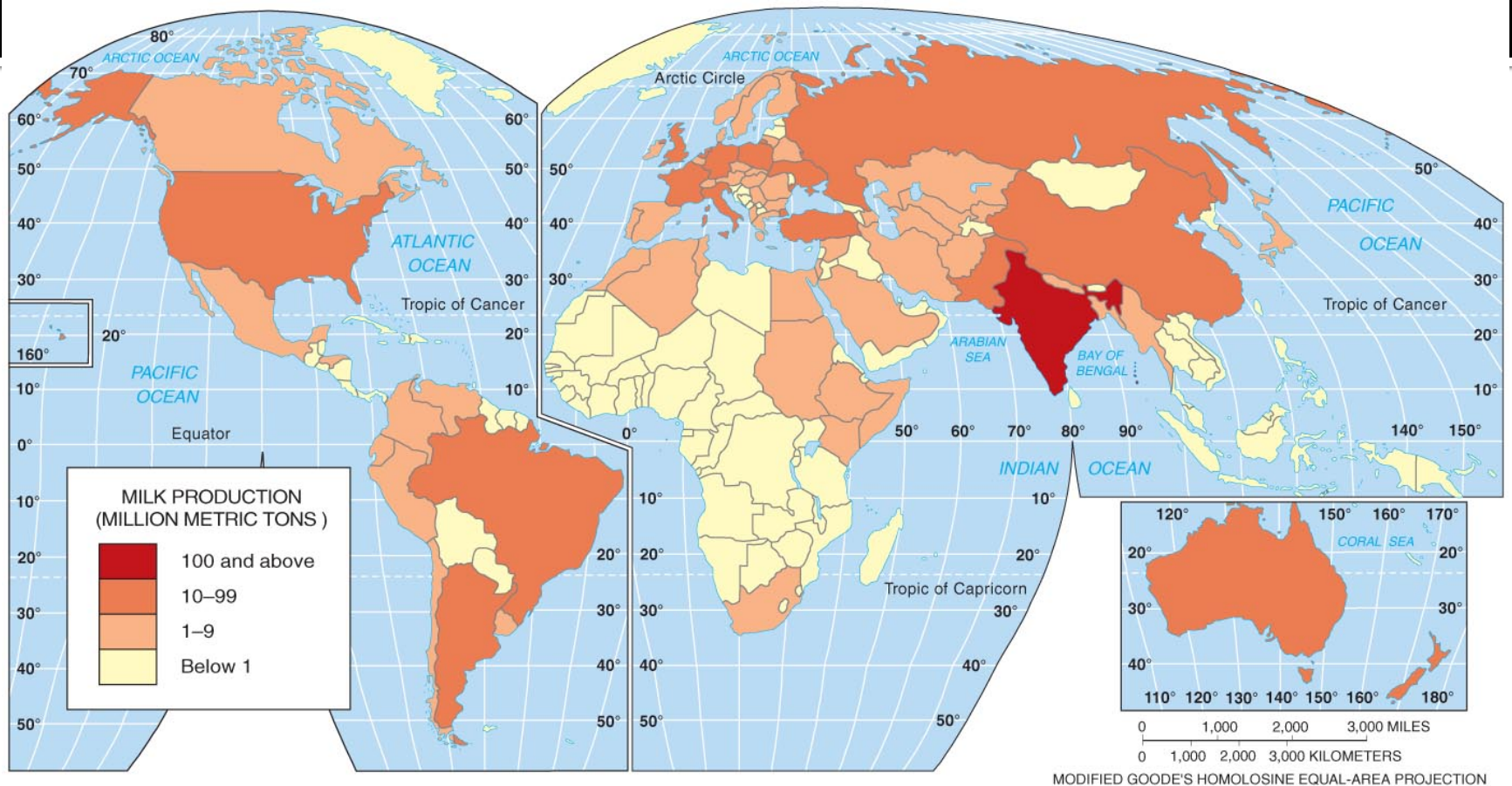
World Corn (Maize) Production



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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.

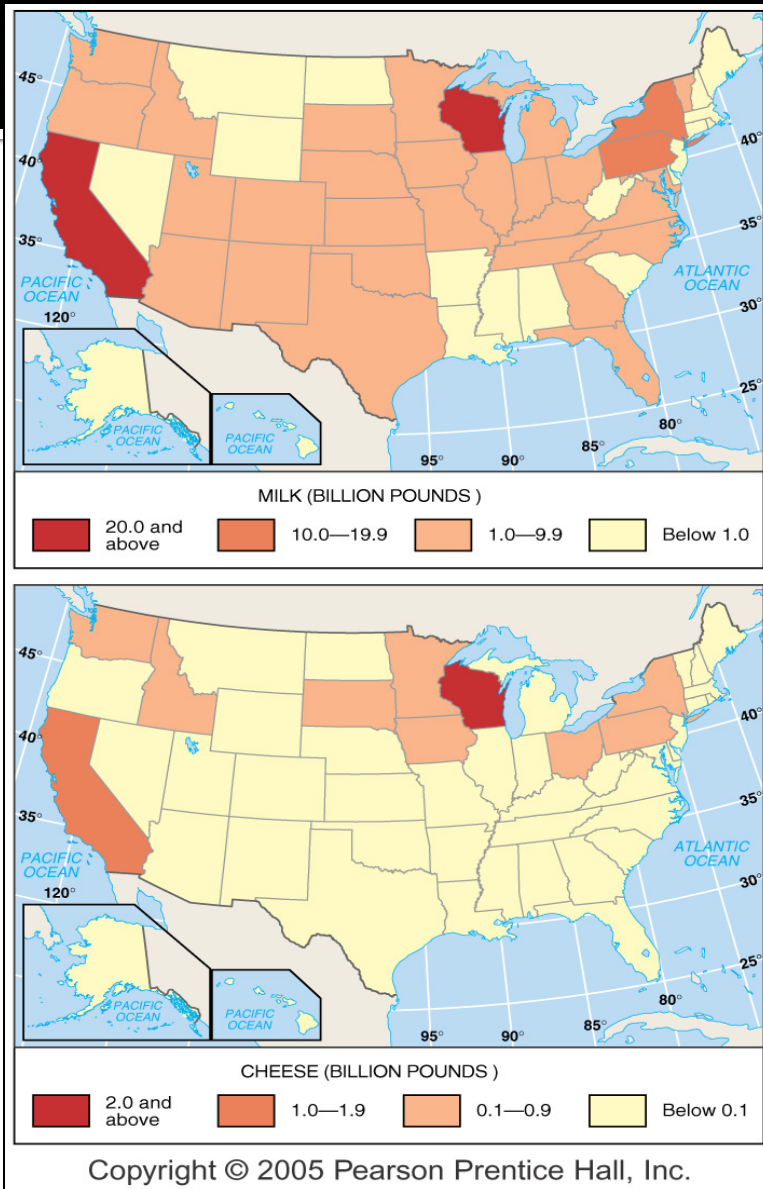
World Milk Production



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

Dairy Production in the U.S.



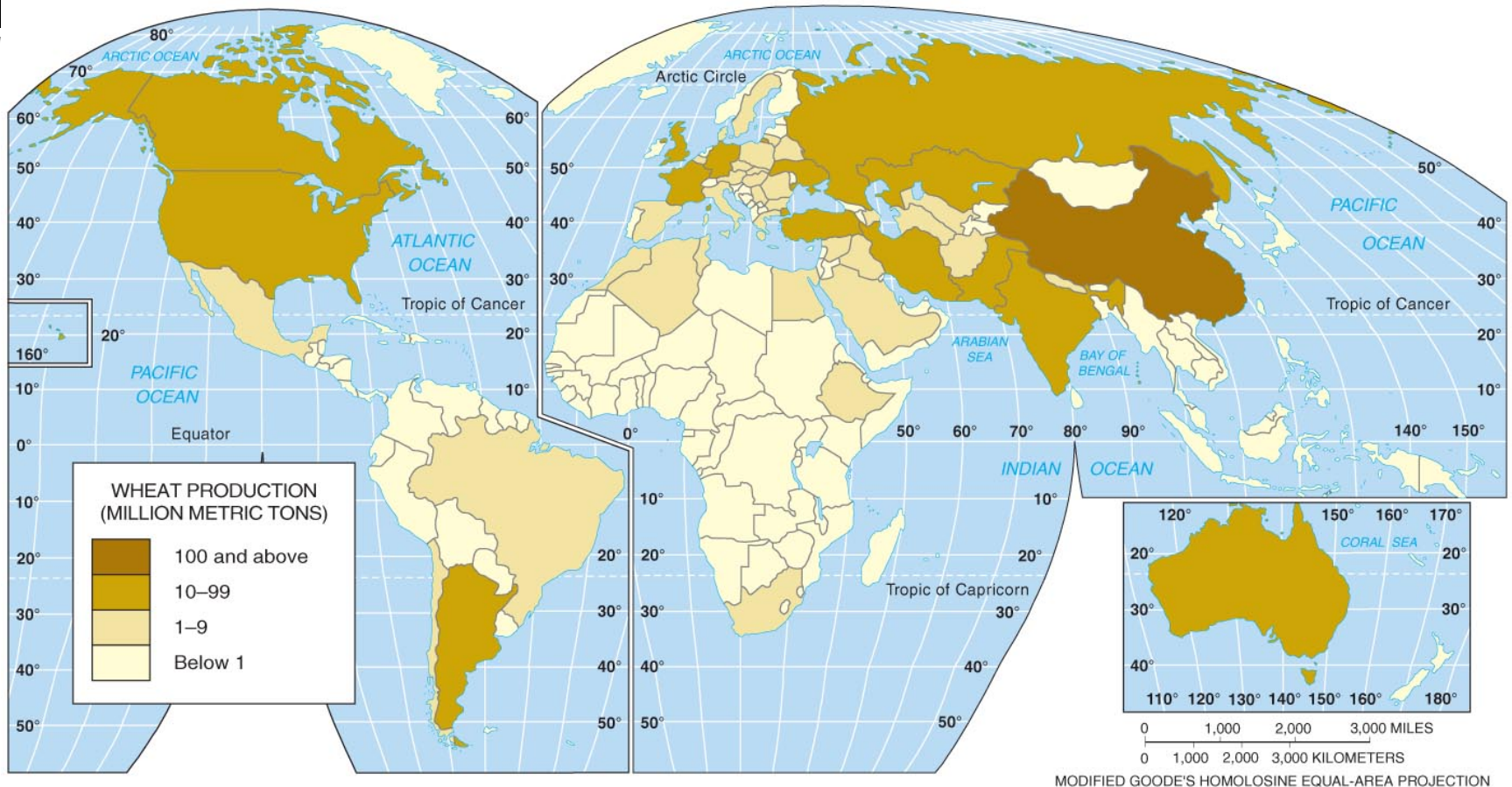
Milk production is widely dispersed because of its perishability, but cheese production is far more concentrated.



Agriculture Regions in More Developed Countries

3. Grain farming
 - The largest commercial producer of grain = the U.S.
4. Livestock ranching
 - Practiced in marginal environments
5. Mediterranean Agriculture
 - Based on horticulture
6. Commercial gardening and fruit farming
 - Truck Farming

World Wheat Production



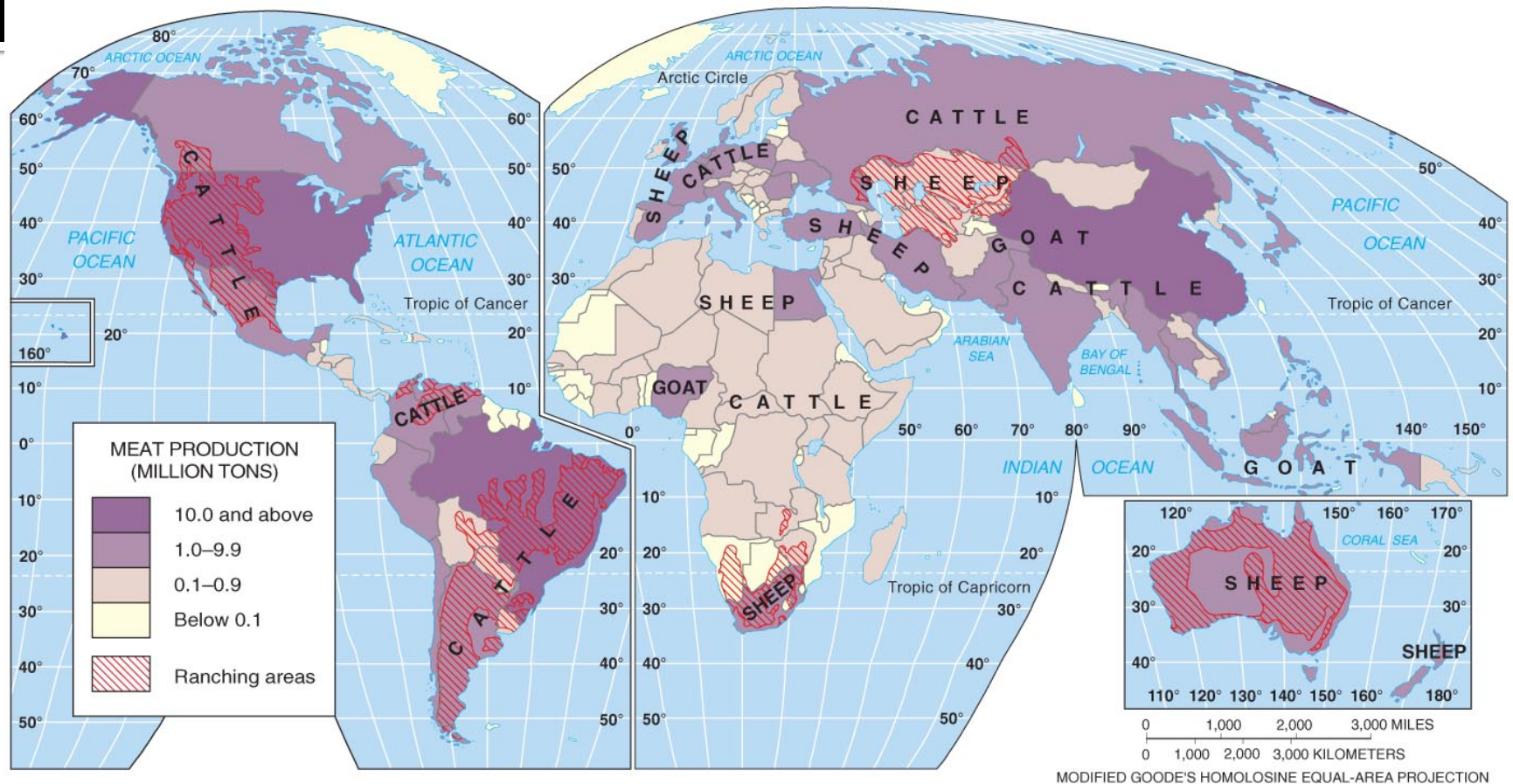
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China is the world's leading wheat producer, but the U.S. and Canada account for about half of world wheat exports.

Grain Farming

1. Crops on a grain farm are grown primarily for consumption by humans rather than livestock.
2. Wheat generally can be sold for a higher price than other grains.
3. The U.S. is by far the largest producer of grain.
4. Grain production is characterized by heavy machinery, large farms, and oriented to consumer preferences. *(70% of American grain is converted to meat, which is an indication of how affluent our society is.)*

Meat Production on Ranches



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Cattle, sheep, and goats are the main meat animals raised on ranches.

Livestock Ranching

1. Commercial grazing of livestock over an extensive area.
2. Practiced in more developed countries, where the vegetation is too sparse and the soil too poor to support crops.
3. Commercial ranching is conducted in more developed regions of the world.
4. Ranching is rare in Europe

The Chisholm Trail

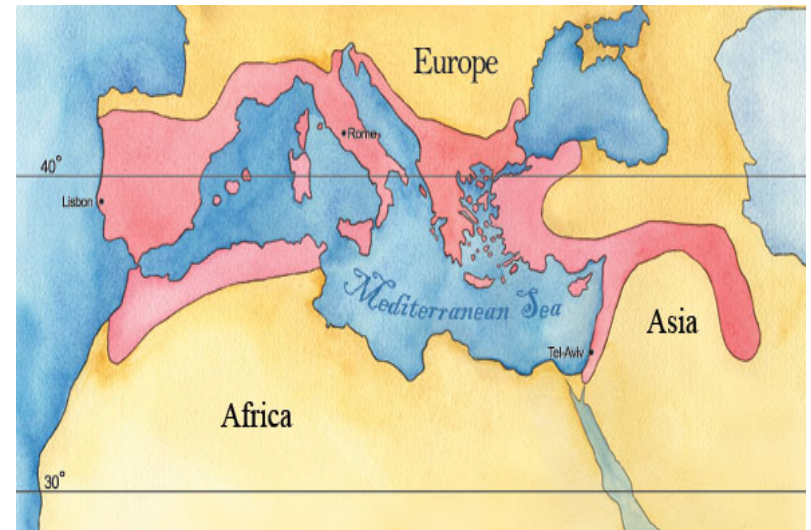
The Chisholm Trail became famous as the main route for cattle drives from Texas to the railheads in Kansas.



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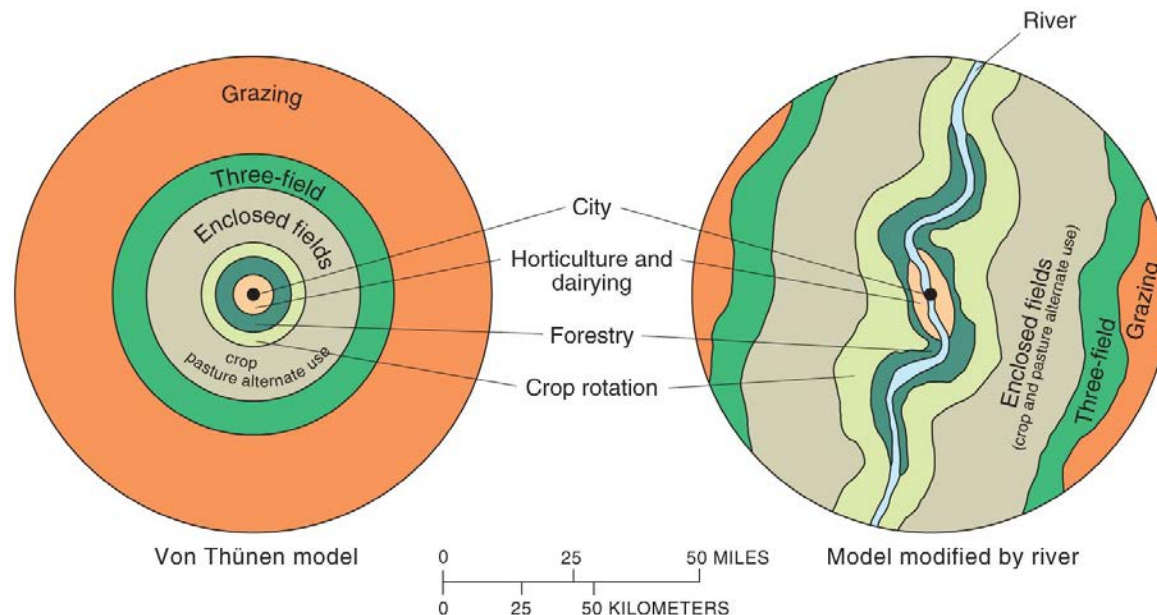
Mediterranean Agriculture

1. Exists primarily in lands that border the Mediterranean Sea.
2. Always borders a sea/ocean
3. Most crops are for human consumption rather than for animal feed.
4. Most important cash crops are olives, grapes, Wheat
5. Southern hemisphere provides these crops to the Northern hemisphere when it is winter.

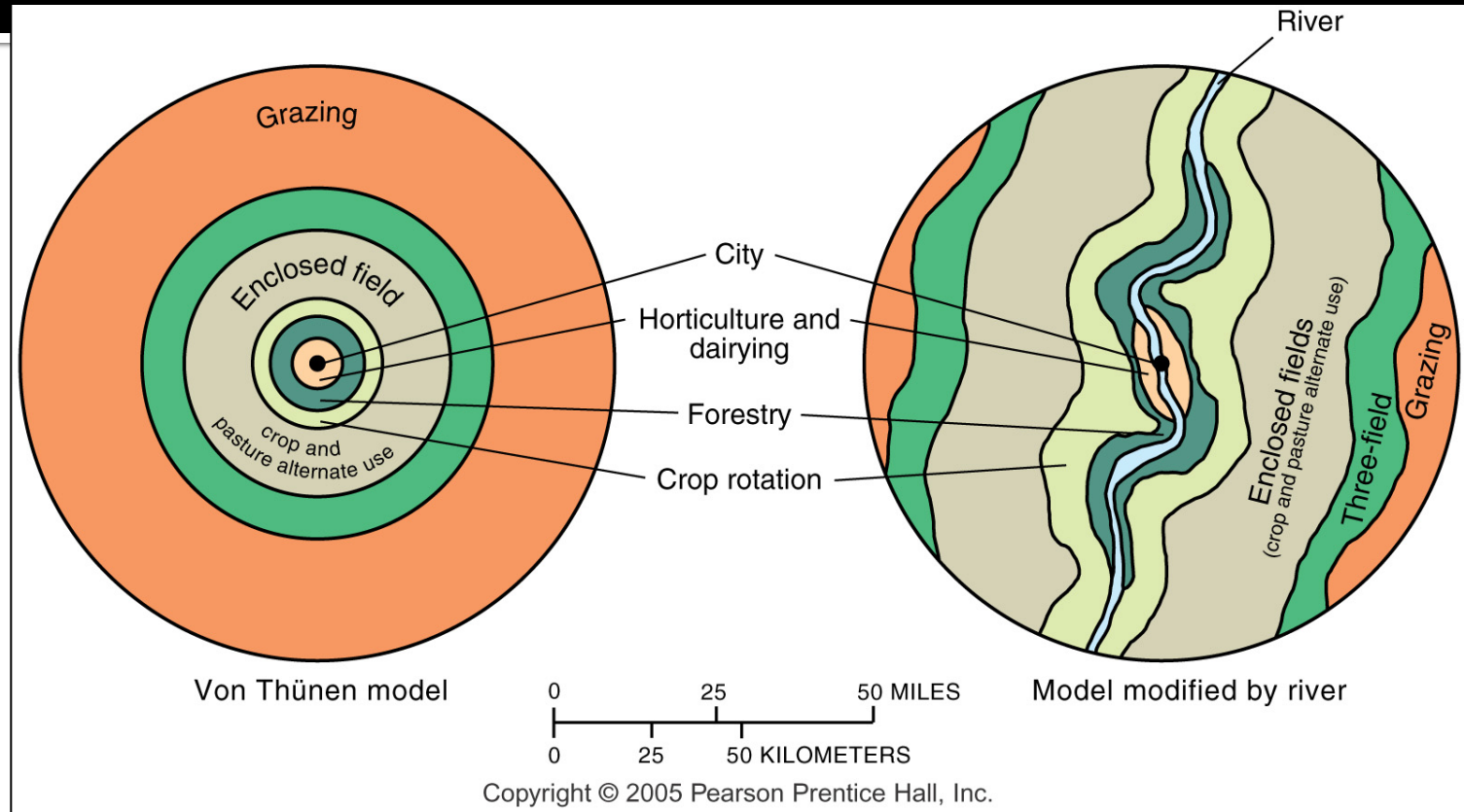


Why Do Farmers Face Economic Difficulties?

- Challenges for commercial farmers
 - Access to markets is important
 - The Johann Heinrich von Thünen model (1826)
 - The choice of crop to grow is related to the proximity to the market.



Von Thünen Model



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.

Von – Thünen's Model

In choosing an enterprise, a commercial farmer compares two costs:

1. The cost of the land
2. The cost of transporting products to market

A farmer identifies a crop that can be sold for more than the land cost. A farmer will not necessarily plant the crop that sells for the highest price.

Distance to market is critical because the cost of transporting each product is different.

Example

1. Gross profit from sale of wheat grown on 1 hectare of land not including transportation cost:
 - a. Wheat can be grown for 25 cents per kilo
 - b. Yield per hectare of wheat is 1,000 kilos
 - c. Gross profit is \$250 per hectare
2. Net profit from sale of wheat on 1 hectare of land including transportation costs:
 - a. costs of transporting 1,000 kilos of wheat to the market is \$62.50 per kilometer.
 - b. Net profit of 1,000 kilos of wheat grown on a farm located 1 kilometer from the market is \$187.50.
 - c. Net profit from a sale of 1,000 kilos of wheat grown on a farm located 4 kilometers away from the market is \$0.

Economic Issues of Agriculture

- Challenges for commercial farmers
 - Overproduction
 - Agricultural efficiencies have resulted in overproduction
 - Access to markets
 - Demand has remained relatively constant
 - As a consequence, incomes for farmers are low
 - Sustainable agriculture
 - Sensitive land management
 - Integrated crop and livestock
 - Organic markets - (Video 1d) Grocery Wars
(Video 1e) - Portlandia

Issues for Commercial Farmers

Two economic factors influence the choice of crops (or livestock) by *commercial farmers*:

1. **Access to markets** – Because the purpose of commercial farming is to sell produce off the farm, the distance from the farm to the market influences the farmer's choice of crops to plant.
2. **Overproduction** – Commercial farmers suffer from low incomes because they produce too much food rather than too little. A surplus of food has been produced in part because of widespread adoption of efficient agriculture practices. While the food supply has increased in more developed countries, demand has remained constant, because the market for most products is already saturated.

U.S. Overproduction Policies

1. Farmers are encouraged to avoid producing crops that are in excess supply.
2. The government pays farmers when certain commodity prices are low.
3. The government buys surplus production and sells or donates it to foreign governments.

The irony: farmers are encouraged to grow less food in developed countries, while less developed countries struggle to increase food production to match the rate of the growth in population.

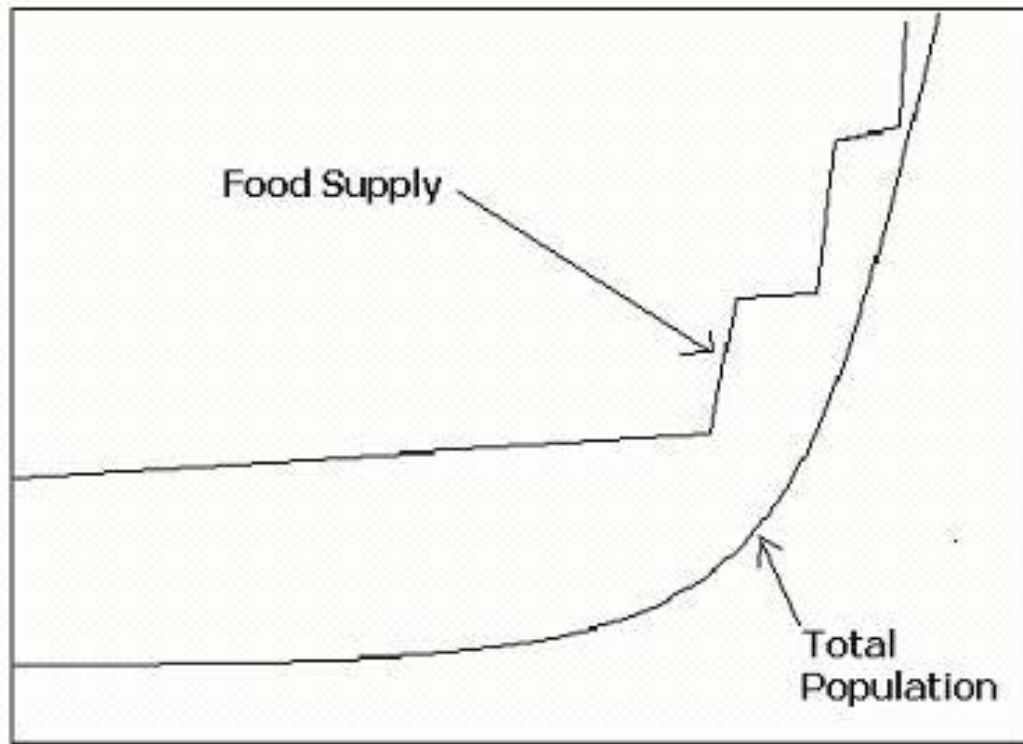
Economic Issues of Agriculture

- Challenges for subsistence farmers
 - Population growth
 - International trade
 - Increase food supply
 - Drug crops



Ester Boserup

- Theory of agricultural intensification
- Contrary to Malthusian theory



Subsistence Farming and Population Growth

According to *Boserup*, population growth compels subsistence farmers to consider new farming. For hundreds of years, subsistence farming yielded enough food. Suddenly in the late 20th century, the LDCs needed to provide enough food for a rapidly increasing population.

According to the *Boserup* thesis, subsistence farmers increase the supply food supply in two ways:

1. Land is left fallow for shorter periods.
2. Adopting new farming methods. The additional labor comes from the extra population growth.

Subsistence Farming and International Trade

To expand production, subsistence farmers need higher-yield seeds, fertilizers, pesticides, etc.. To generate the funds the need to buy agriculture supplies, less developed countries must produce something they can sell in more developed countries.

Example: Kenya – divide villages or families

Strategies to Increase Food Supply

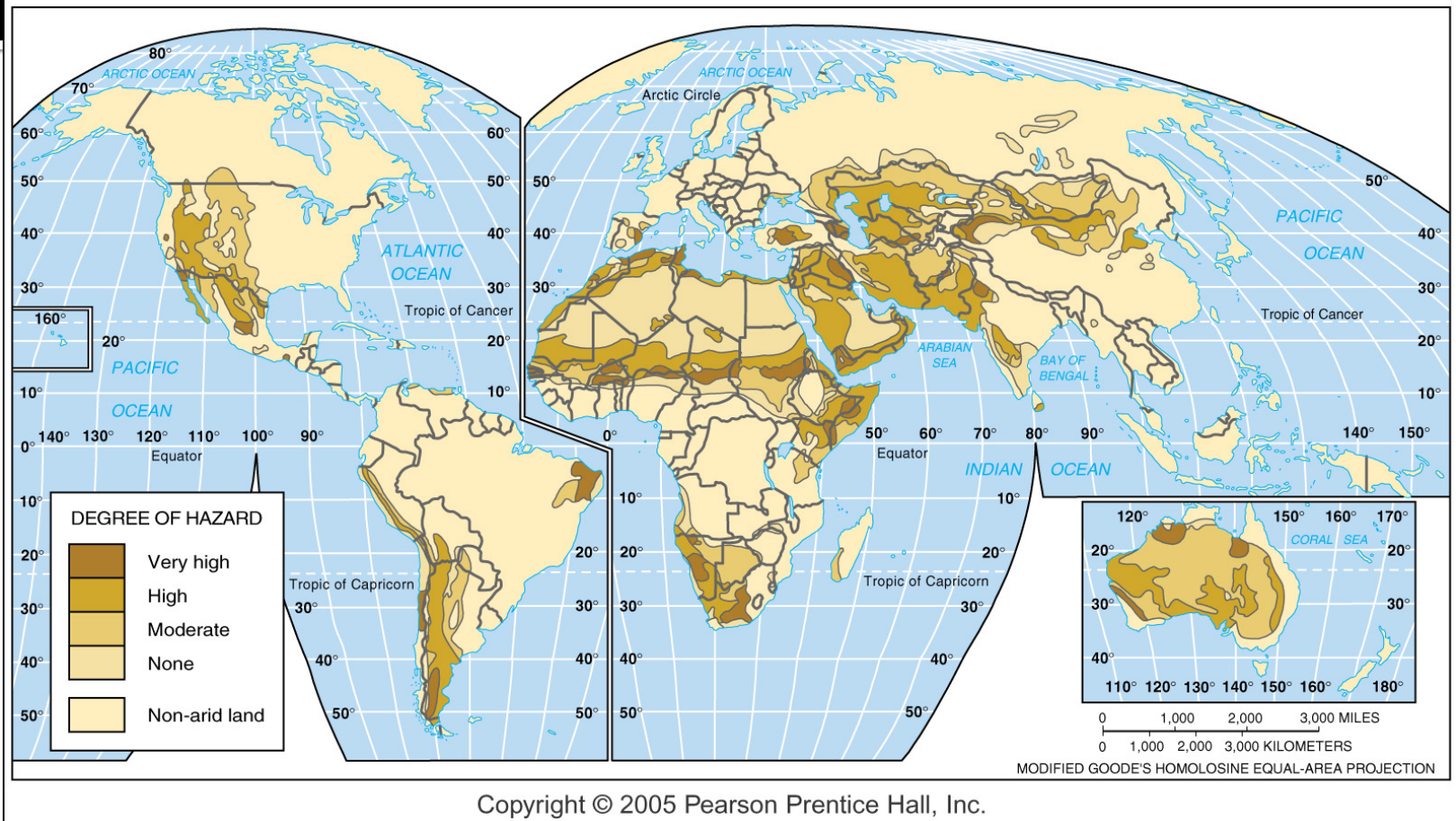
1. Expanding agriculture land
 - Desertification (Video 1f) – Allan Savory
2. Increase food supply through higher productivity-
Green Revolution
3. Identifying new food sources
 - Cultivating oceans, developing higher-protein cereals, and improving palatability of foods
4. Increasing exports from other countries (trade)
5. Finding new areas to grow crops. (urban) (Video 1g) – Vertical Farms

(Video 1h) – Brooklyn Rooftop Garden

Green Revolution

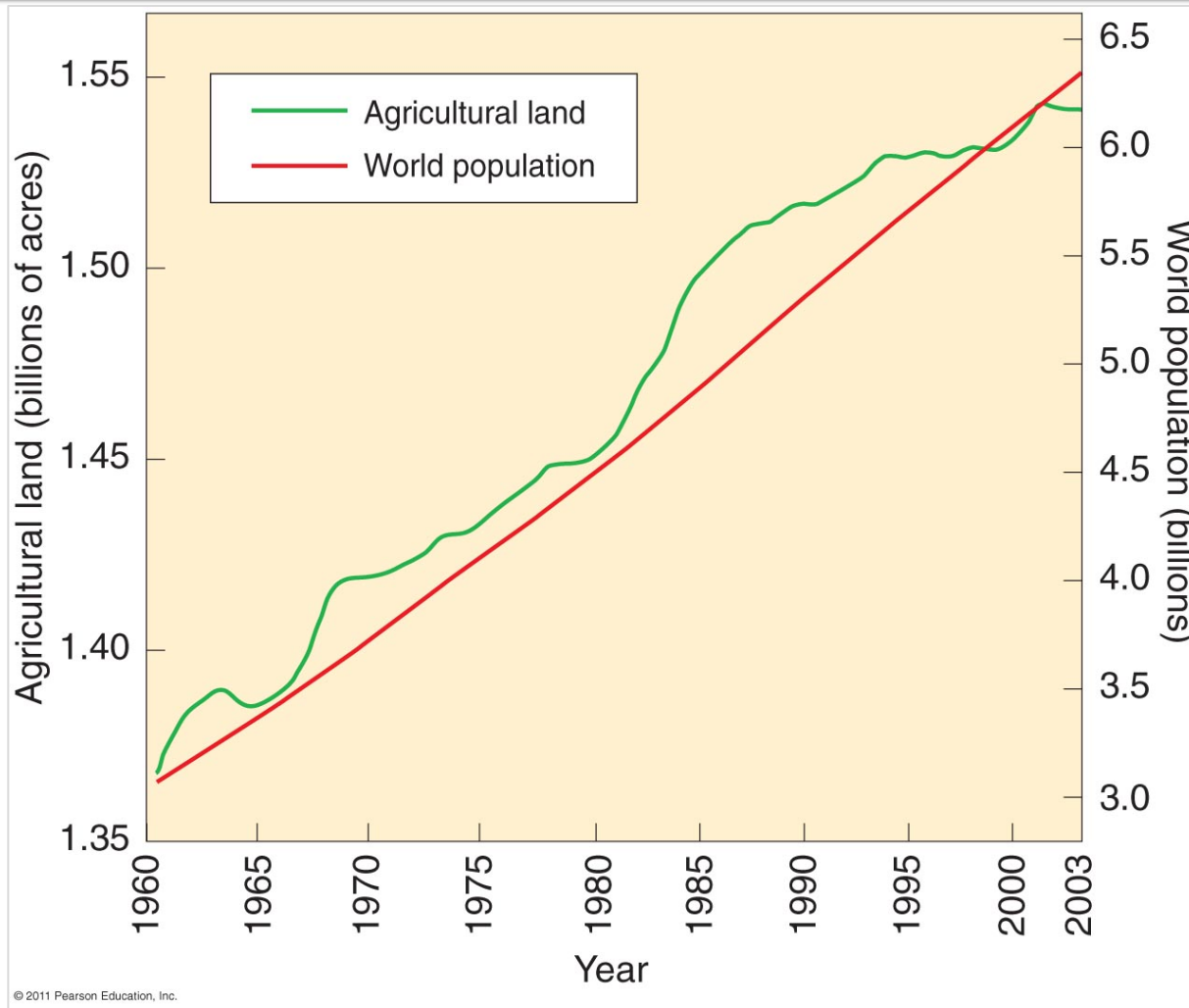
Norman Ernest Borlaug: called the “*father of the Green Revolution*”, agriculture’s greatest spokesperson and “The Man Who Saved a Billion Lives.” He took up an agricultural research position in Mexico, where he developed semi-dwarf, high-yield, disease-resistant wheat varieties. During the mid -20th century, Borlaug led the introduction of these high-yielding varieties combined with modern agricultural production techniques to Mexico, Pakistan, and India. As a result, Mexico became a net exporter of wheat by 1963. Between 1965 and 1970, wheat yields nearly doubled in Pakistan and India, greatly improving the food security in those nations. These collective increases in yield have been labeled the *Green Revolution*, and Borlaug is often credited with saving over a billion people worldwide from starvation. He has awarded the Nobel Peace Prize in 1970 in recognition of his contributions to world peace through increasing food supply. Later in his life, he helped apply these methods of increasing food production to Asia and Africa.

Desertification Hazard

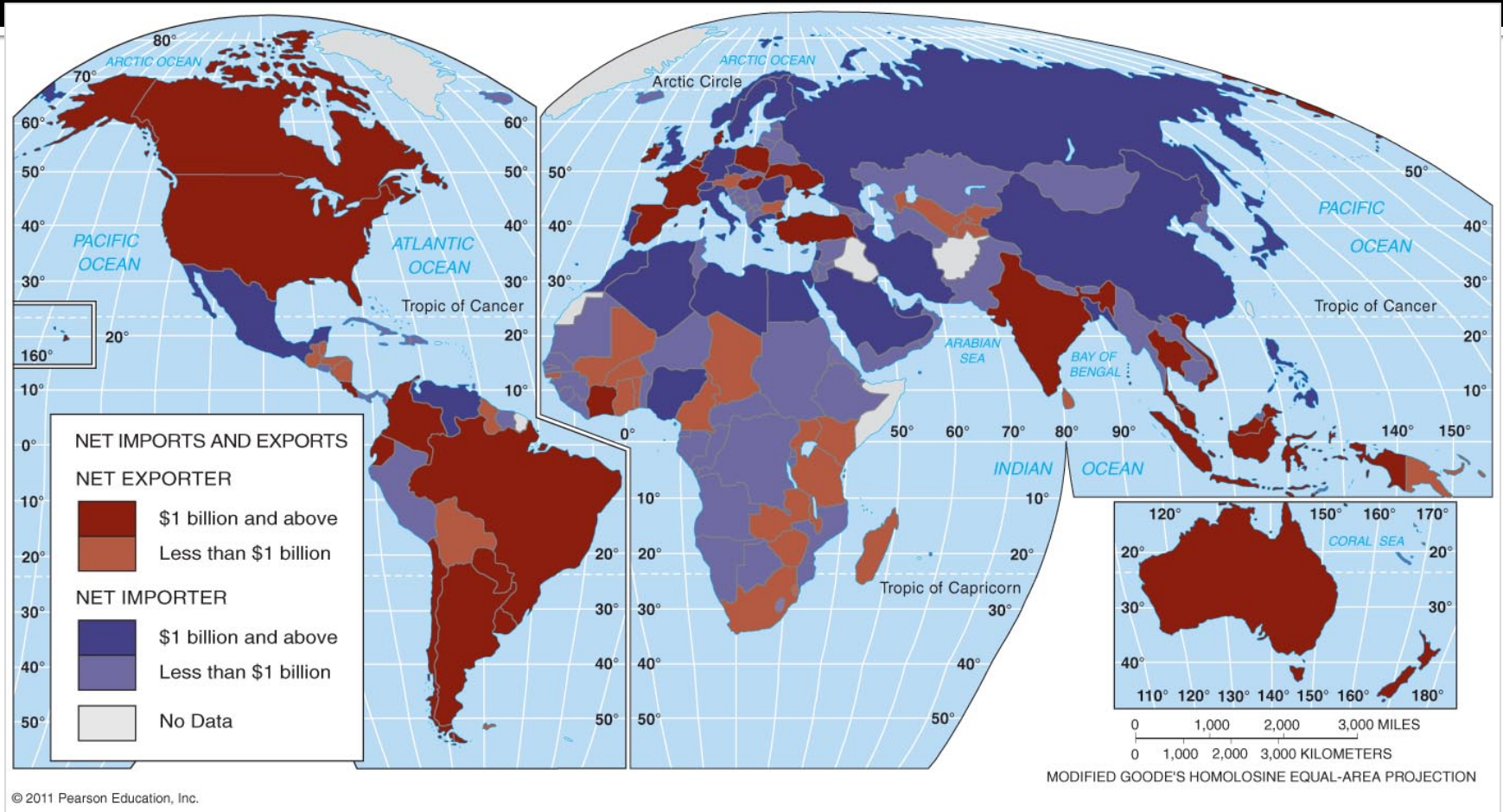


The most severe desertification hazards are in northern Africa, central Australia, and the southwestern parts of Africa, Asia, North America, and South America.

Agricultural Land and Population

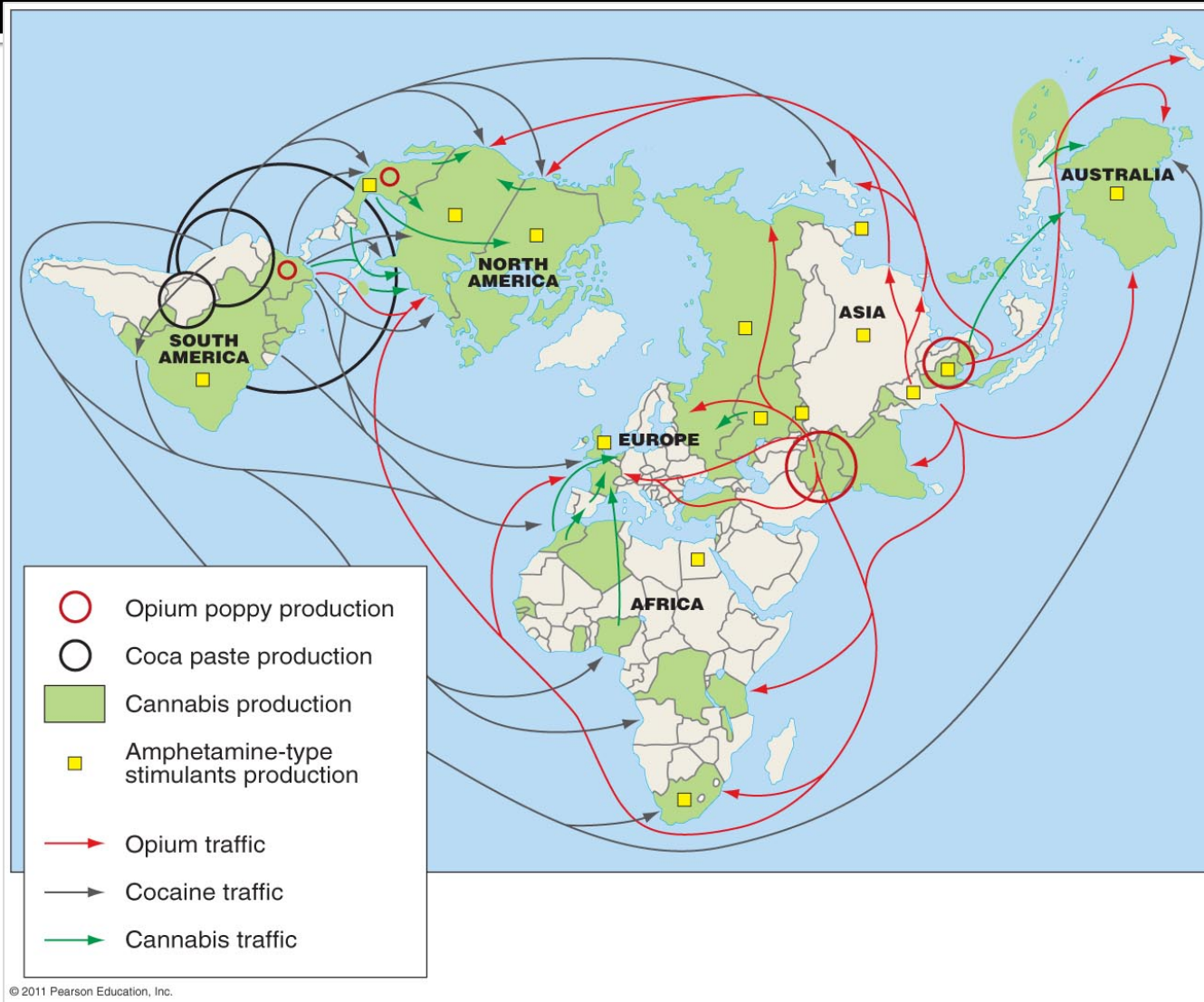


Grain Imports and Exports



Most countries are net importers of grain. The U.S. is the largest net exporter.

Drug Trade



Key Points to Remember

- The technological breakthroughs resulting from the Agricultural Revolution began economic development toward industrialization.
- There are two categories of agriculture:
 - Subsistence
 - Commercial (Video 1i)
 - Which one is more efficient? And why?

- No longer an automatic correlation between the type of agriculture in a country and the standard of living: agriculture below “the line” is not all subsistence. Increasingly, countries below “the line” are developing commercial agriculture in order to sell crops on the international market to earn money.
- The **economy of scale**. Economy of scale simply means the more you produce, the cheaper it costs. Commercial farmers able to produce huge amounts of goods at a fairly low cost because commercial agriculture is conducted at such a large scale.

- Commercial agriculture is generally a “monoculture” system, in which only one crop is grown in a given area. The corn fields of the Midwest are an example of **monoculture**. What is the problem with this system?
- Agricultural production is the key to human survival on the planet today.
- Farmland is the ultimate resource on the planet.

(Video 1j) Peterson Brothers
Farmers Feed The World

Up Next: Development



(Video 1k) Strawberry Icecream

Sustainability:
(Video 1l)



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