

Chapter 10

Food and Agriculture

Chapter 10

Key Issue 1:

Where did agriculture originate?

Where Did Agriculture Originate?

- Invention of Agriculture
 - Prior to the advent of agriculture, all humans probably obtained needed food through hunting and gathering.
 - Origins of agriculture cannot be documented with certainty, because it began before recorded history.
 - *Agriculture* is deliberate modification of Earth's surface through cultivation of plants and rearing of animals to obtain sustenance or economic gain.

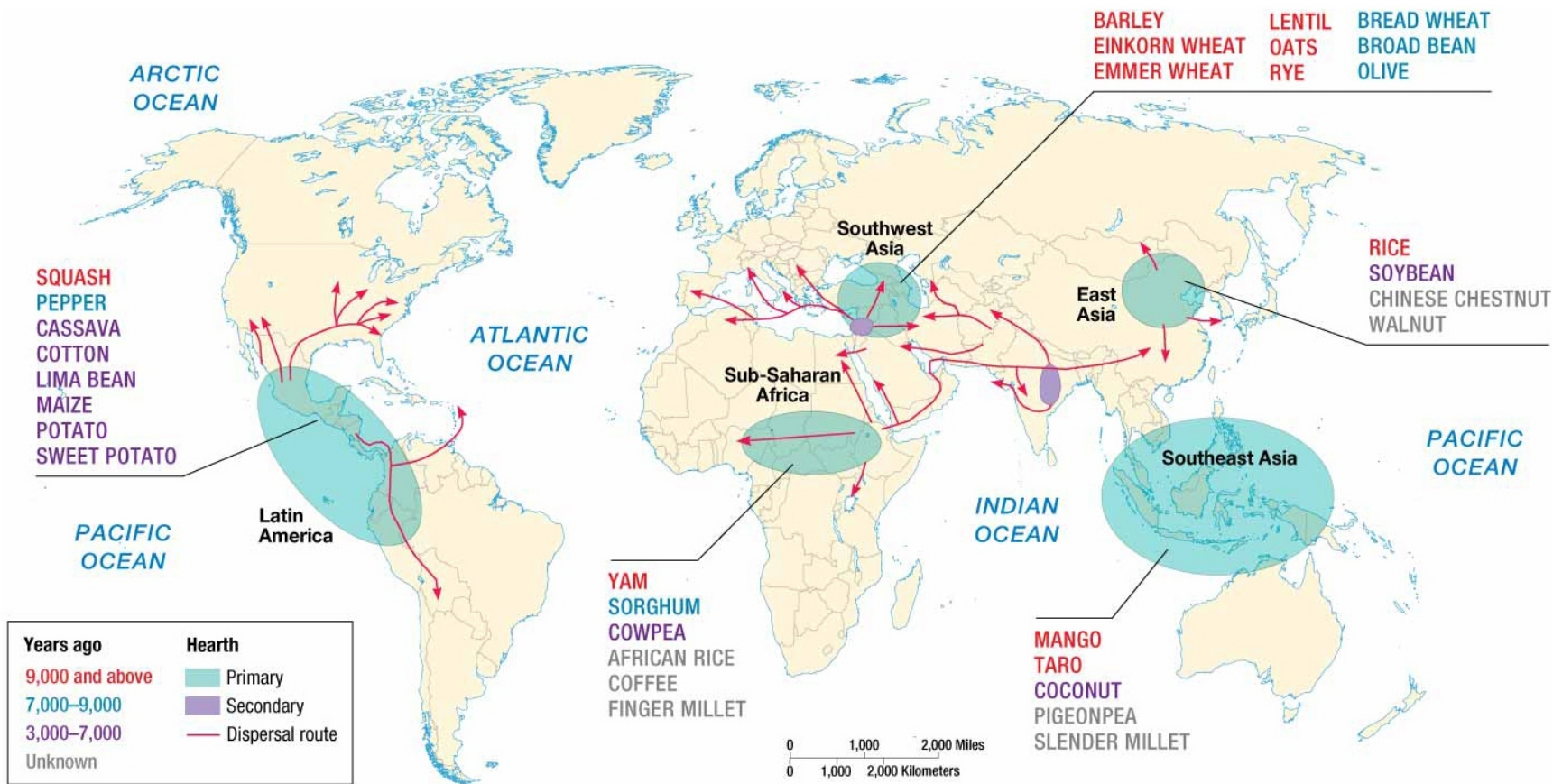
Where Did Agriculture Originate?

- Agricultural Revolution
 - The time when humans first domesticated plants and animals and no longer relied entirely on hunting and gathering was known as the *agricultural revolution*.
 - Agriculture originated in multiple hearths around the world:
 - Crop Hearths:
 - Southwest Asia:
 - » Early crops: barley, wheat, lentil, and olive.
 - East Asia:
 - » Early crops: Rice and millet.

Where Did Agriculture Originate?

- Crop Hearths Cont'd:
 - Sub-Saharan Africa:
 - » Early crops: Sorghum, yams, millet, and rice.
 - Latin America:
 - » Early crops: Beans, cotton, potato, and most importantly maize (corn).

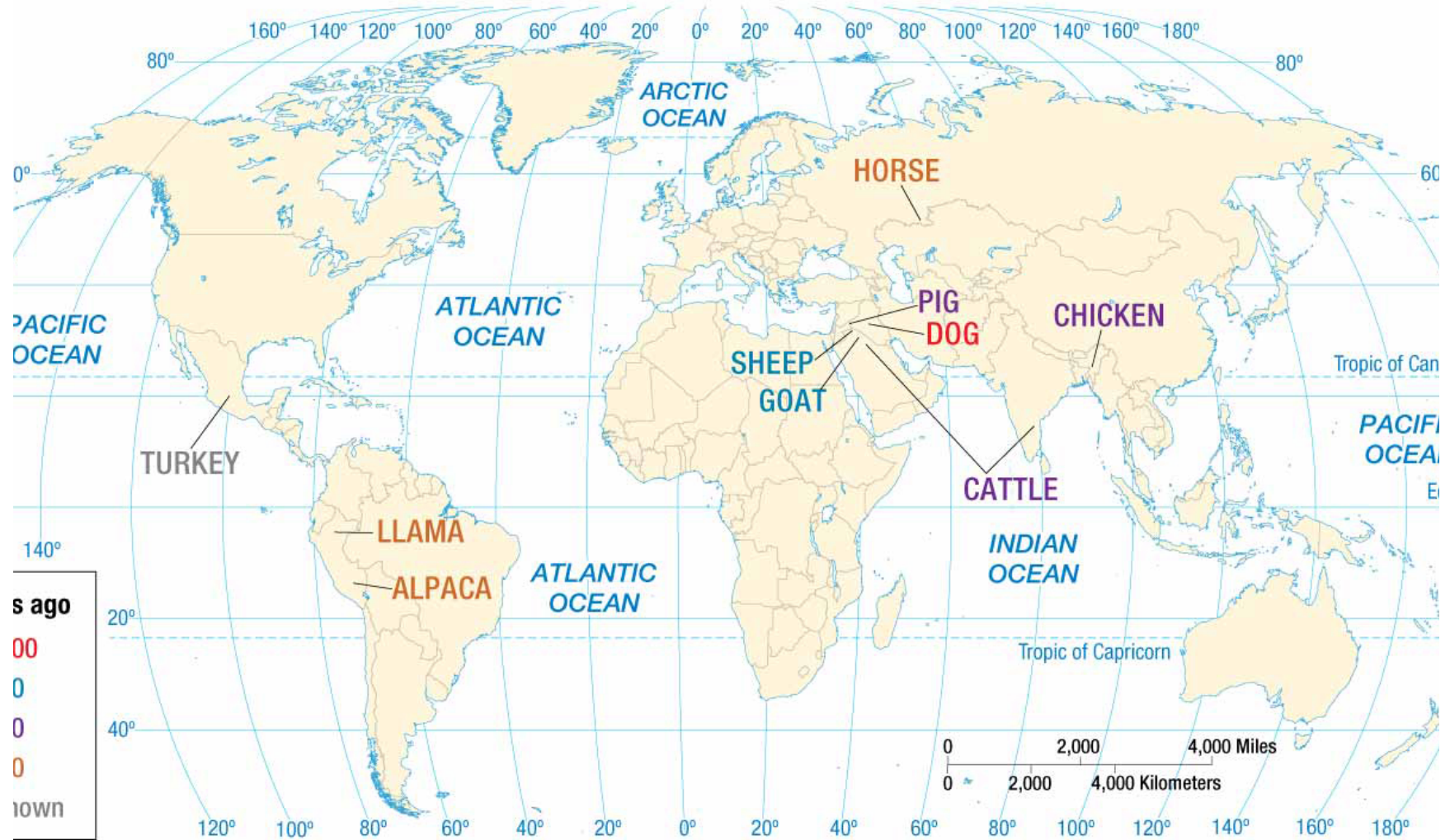
Crop Hearths



Where Did Agriculture Originate?

- Agricultural Revolution
 - Agriculture originated in multiple hearths around the world continued:
 - Animal Hearths:
 - Southwest Asia:
 - » Early domesticated animals: Cattle, goats, pigs, sheep, and dogs.
 - Central Asia:
 - » Early domesticated animals: Horses

Animal Hearths

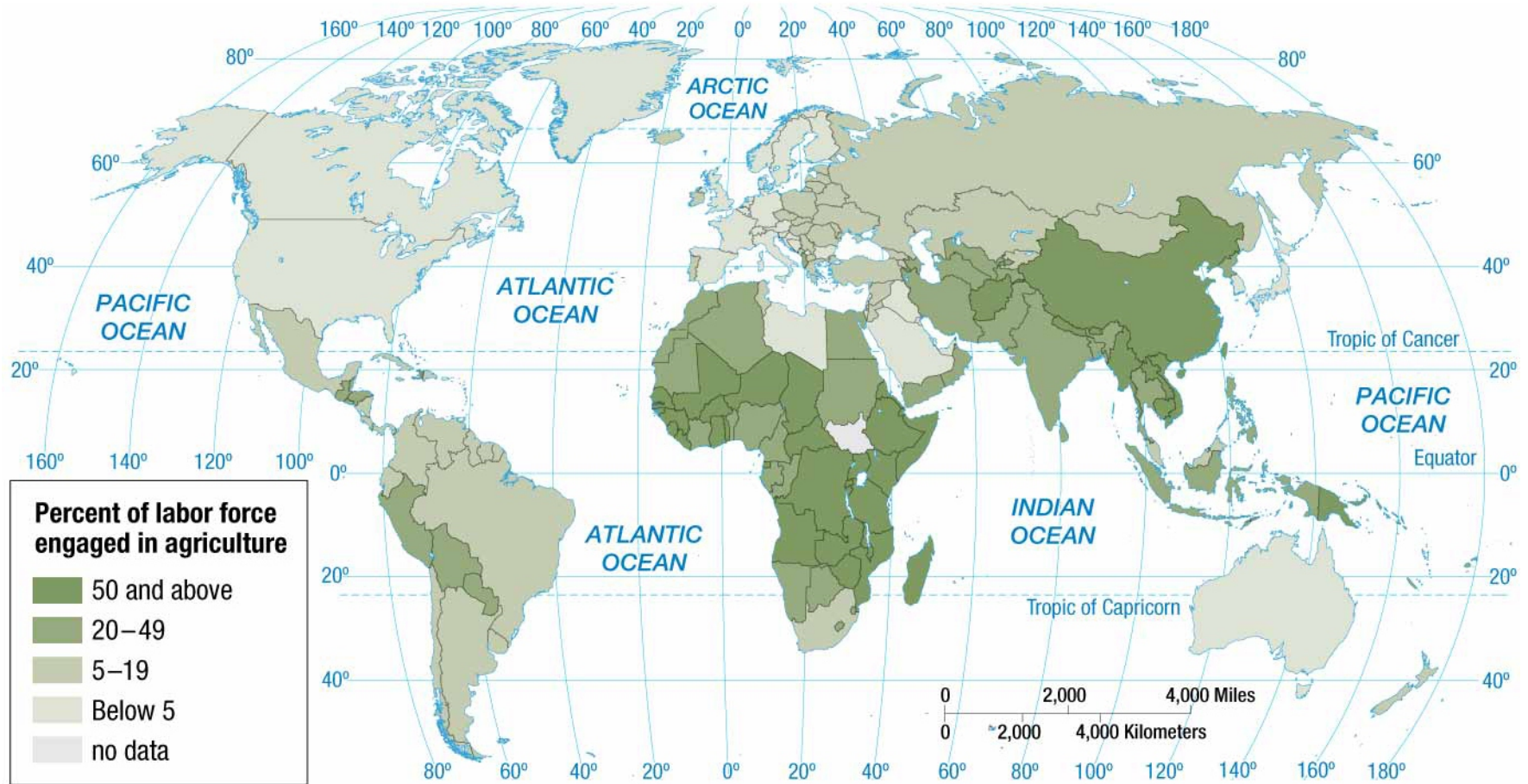


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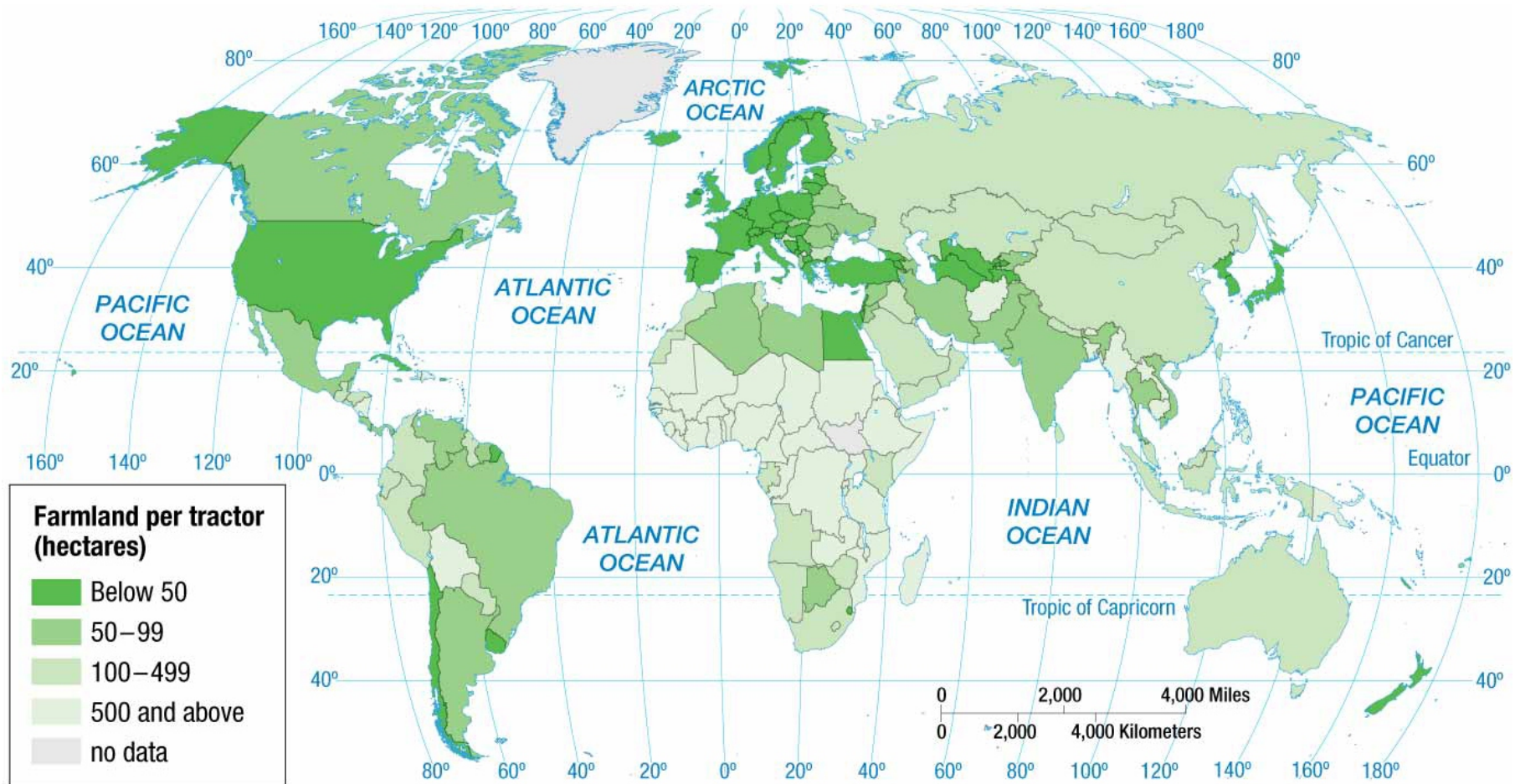
Where Did Agriculture Originate?

- Comparing Subsistence and Commercial Agriculture
 - *Subsistence agriculture* is the production of food primarily for consumption by the farmer's family.
 - Practiced primarily in developing countries
 - *Commercial agriculture* is the production of food primarily for sale off the farm.
 - Practiced primarily in developed countries.
 - Features that distinguish itself from subsistence agriculture include: lower percentage of farmers in labor force, highly mechanized, and larger farm size.

Agricultural Workers



Farmland per Tractor



1 hectare is approximately 2.5 acres.

1 acre is roughly $\frac{3}{4}$ the size of a football field

Farm Size



(a)



(b)

The average size of a family farm in China is much smaller than in the United States. (left) Family farm in Anhui Province, China. (right) Family farm in West Brooklyn, Illinois.

Chapter 10

Key Issue 2:

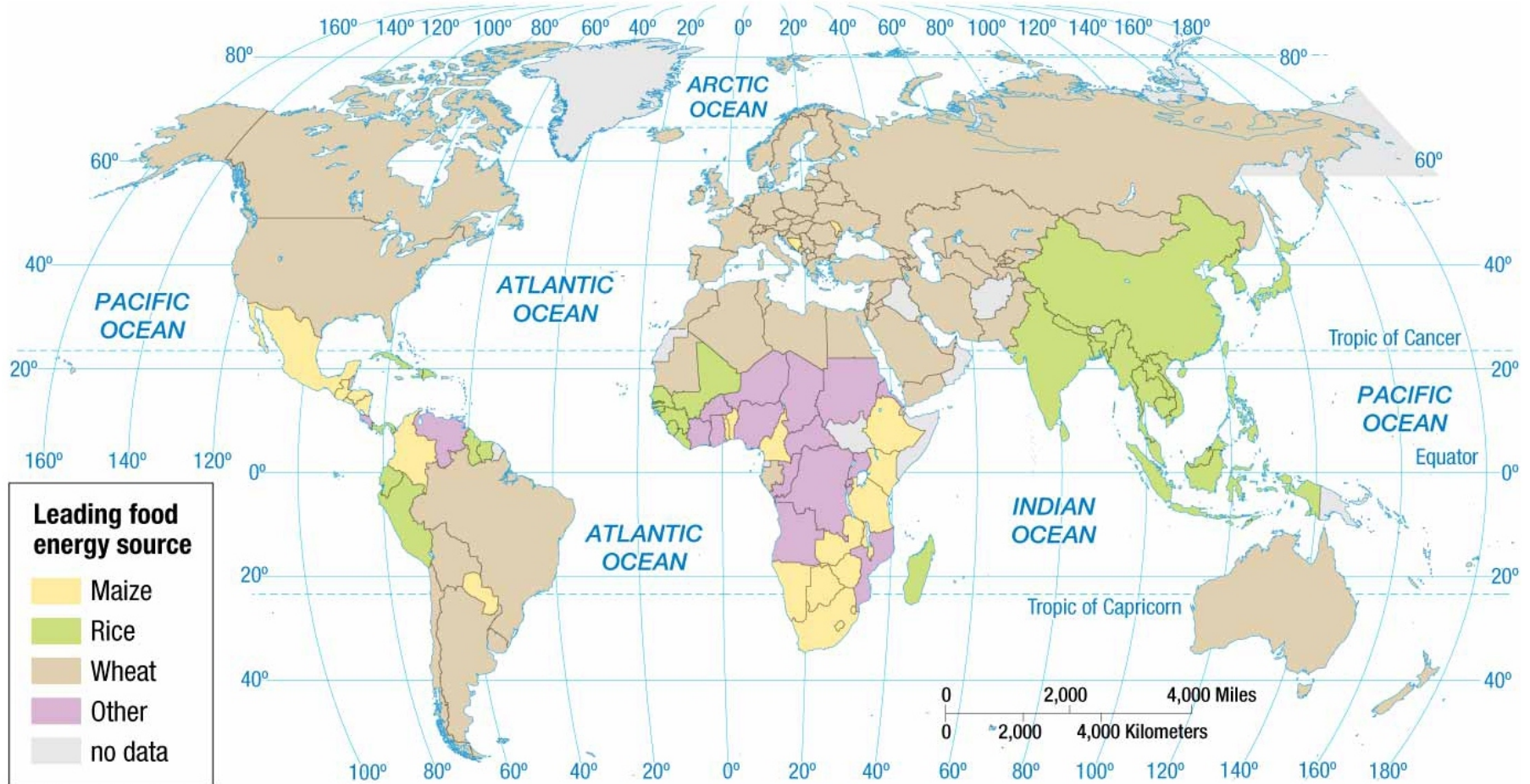
Why Do People Consume Different Foods?

Why Do People Consume Different Foods?

- Diet

- *Dietary energy consumption* is the amount of food that an individual consumes.
- Consumption of food varies around the world, both in total amount and source of nutrients, for two reasons.
 1. Level of development
 2. Physical conditions

Dietary Energy by Source



Why Do People Consume Different Foods?

- Source of Nutrients

- Developed and developing regions typically differ most in their primary sources of protein consumed.

- Developed Countries

- Leading source of protein is meat products.

- » Beef

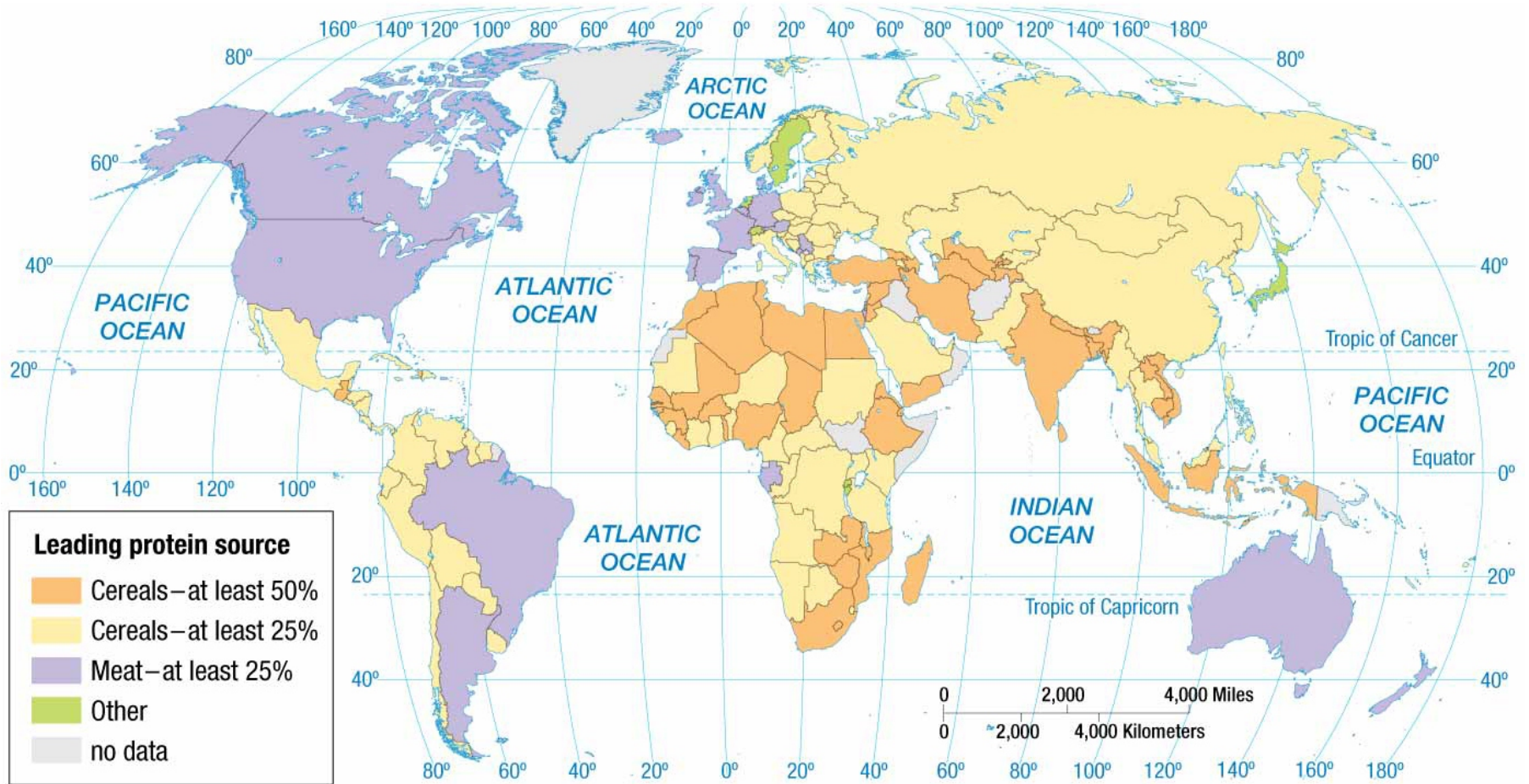
- » Pork

- » Poultry

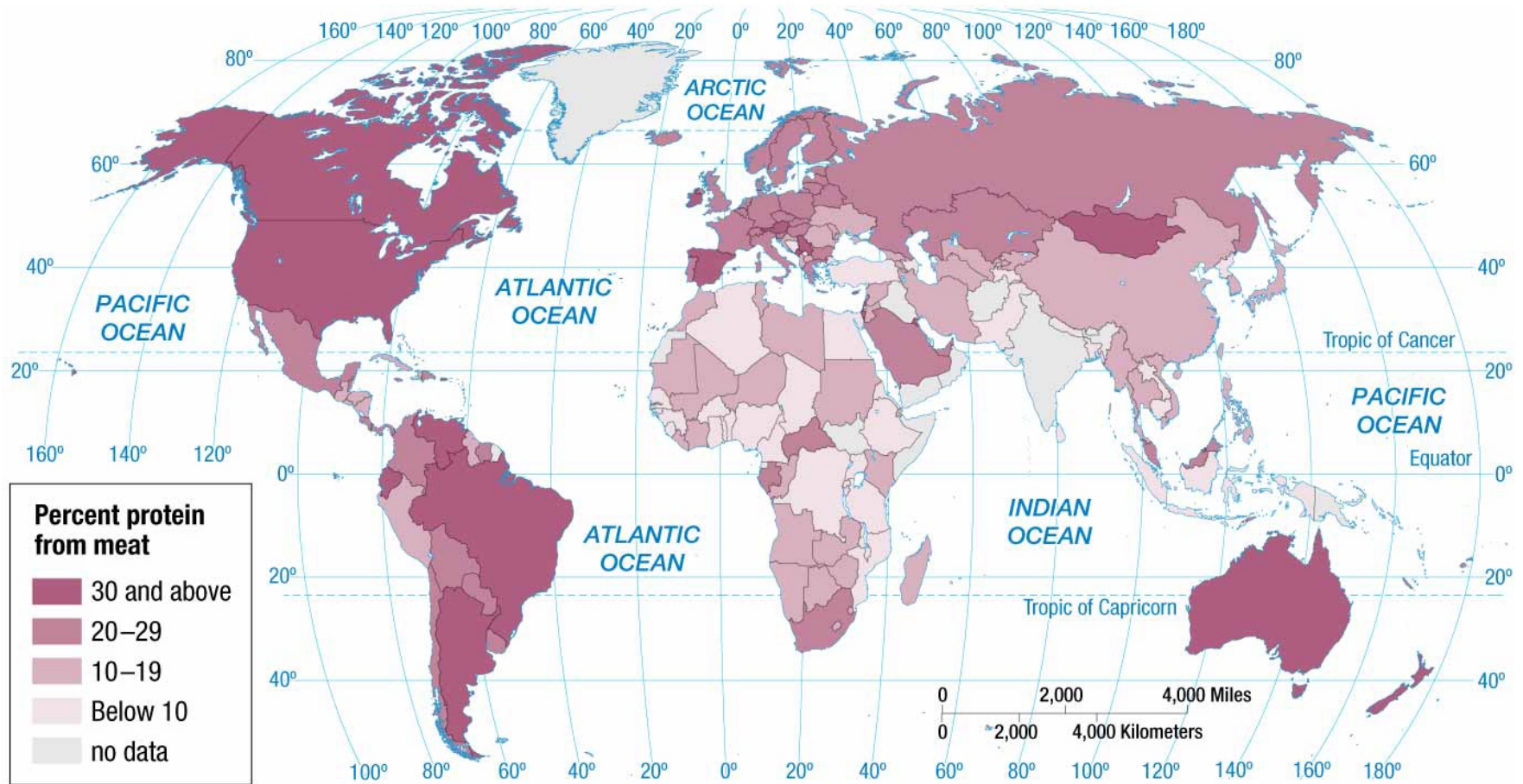
- Developing Countries

- Leading source of protein is cereal grains.

Protein by Source



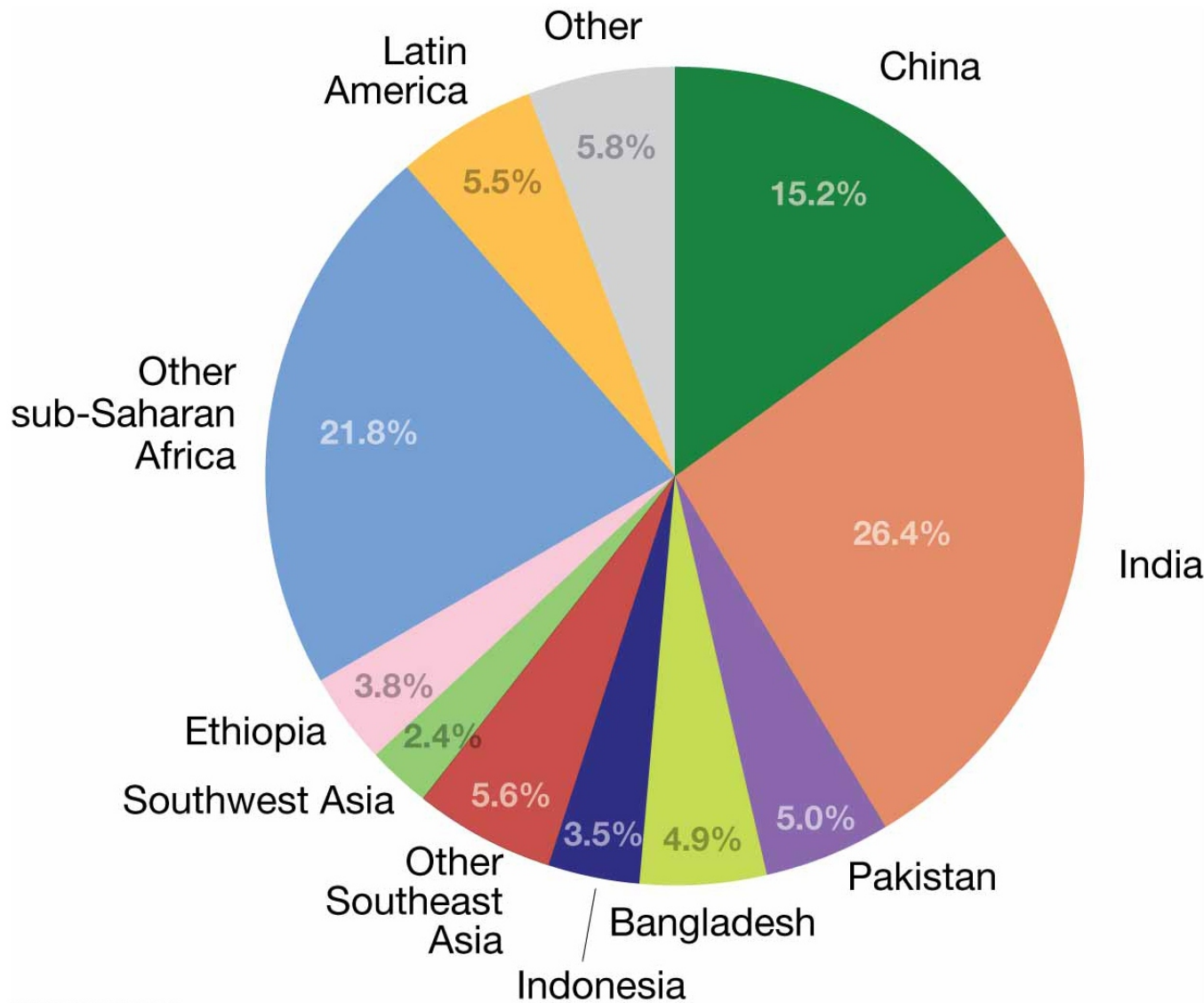
Protein from Meat



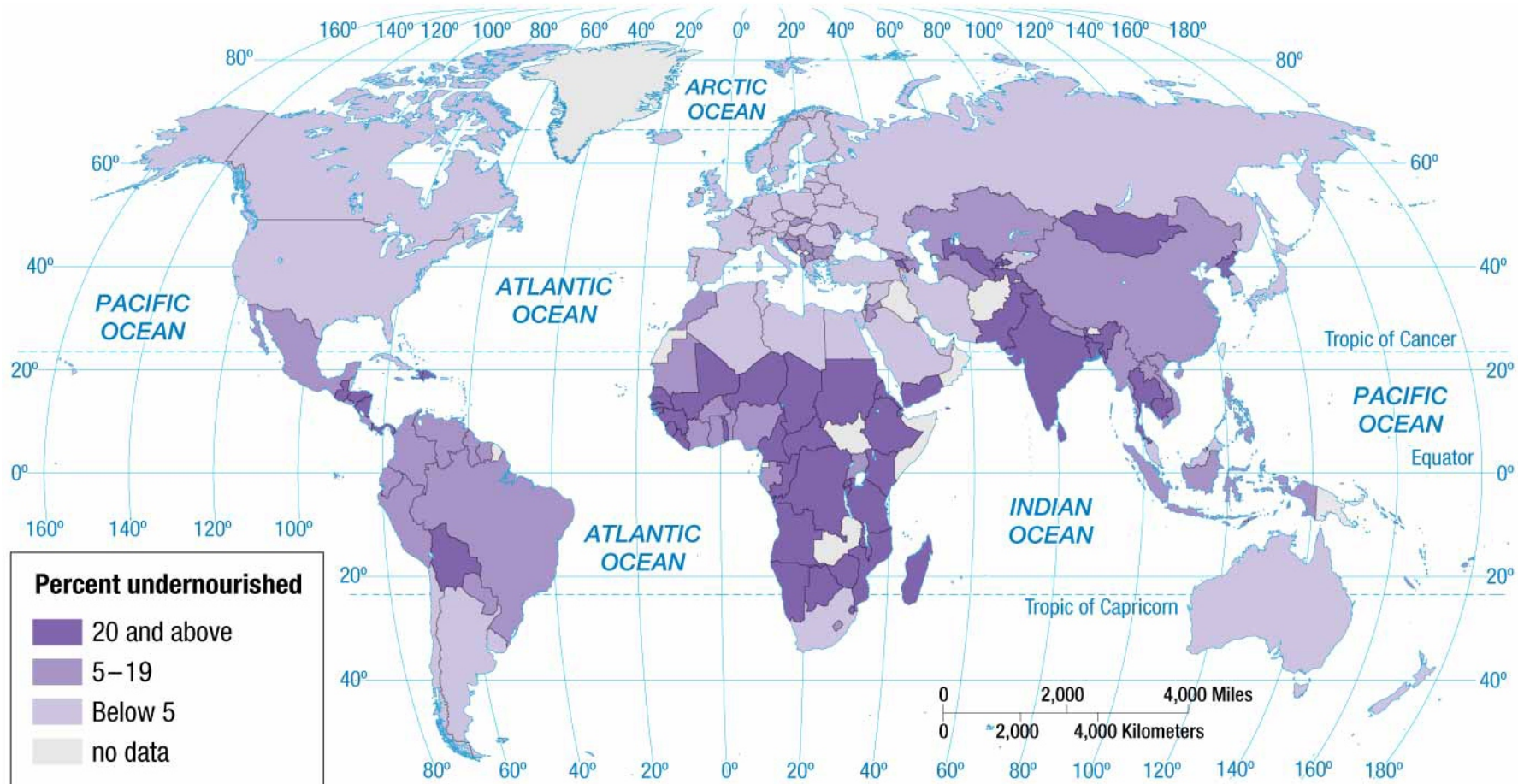
Why Do People Consume Different Foods?

- Nutrition and Hunger
 - *Undernourishment* is dietary energy consumption that is continuously below the minimum requirement for maintaining a healthy life and carrying out light physical activity.
 - UN estimates 850 million people in world are undernourished.
 - 99% located in developing countries
 - Worldwide, the total number of undernourished people has not changed much in several decades.

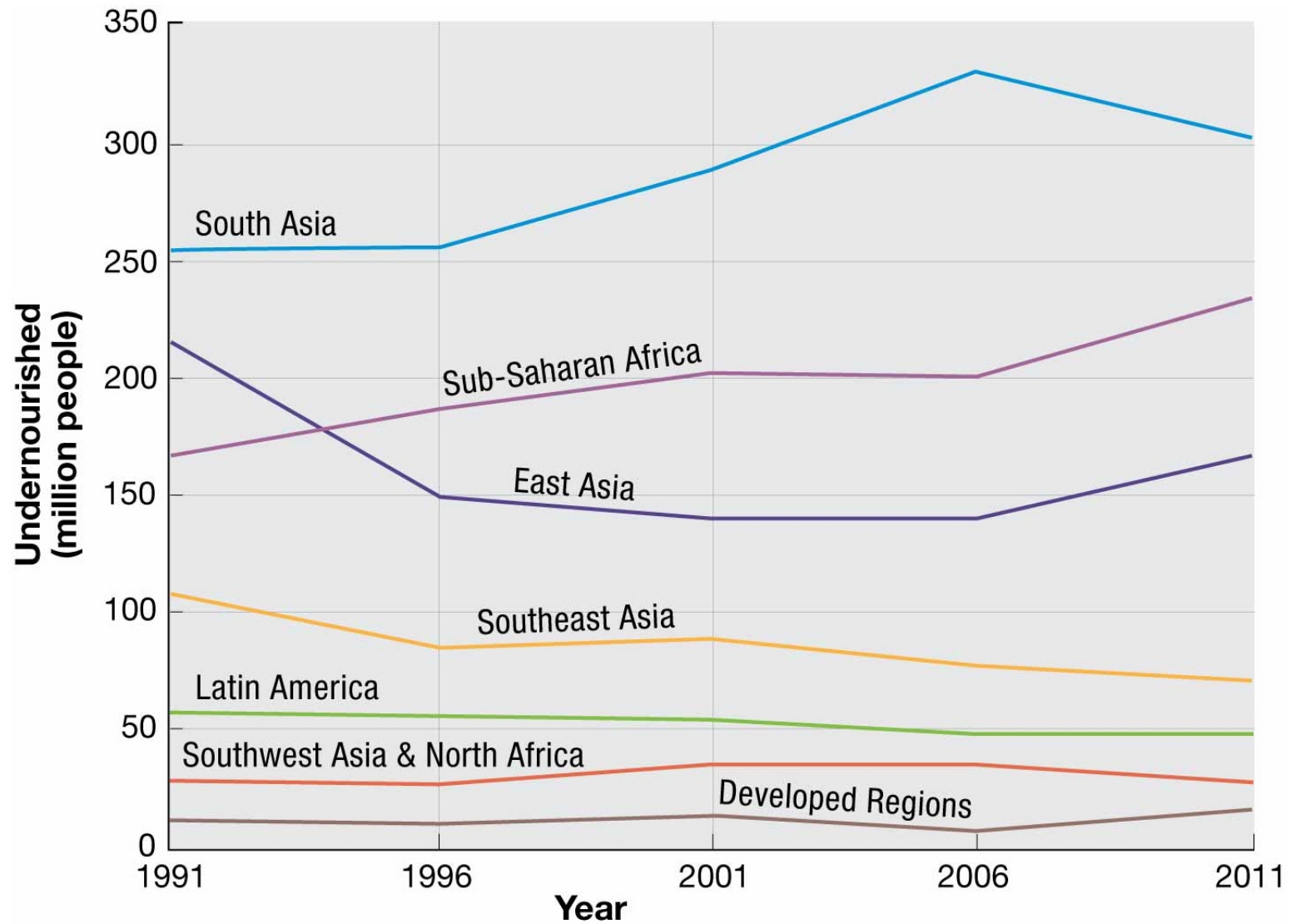
Distribution of Under Nourishment



Extent of Under Nourishment



Change in Under Nourishment



Chapter 10

Key Issue 3:

Where is Agriculture Distributed?

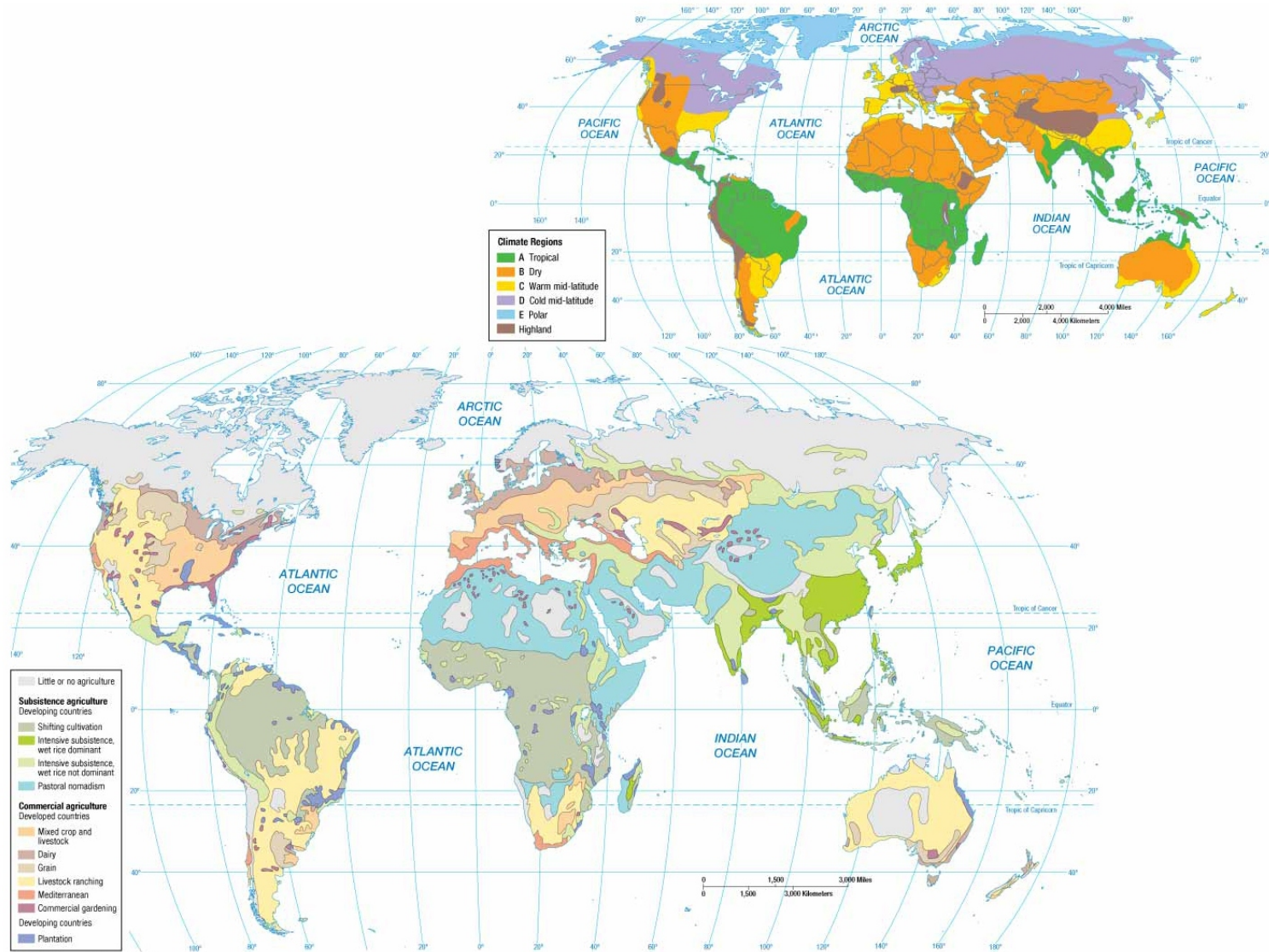
Where is Agriculture Distributed?

- Geographer Derwent Whittlesey identified 11 main agricultural regions, plus an area where agriculture was nonexistent.
 - 5 present in developing countries
 1. Pastoral Nomadism
 2. Shifting Cultivation
 3. Intensive Subsistence, wet rice dominant
 4. Intensive Subsistence, crops other than rice dominant
 5. Plantation

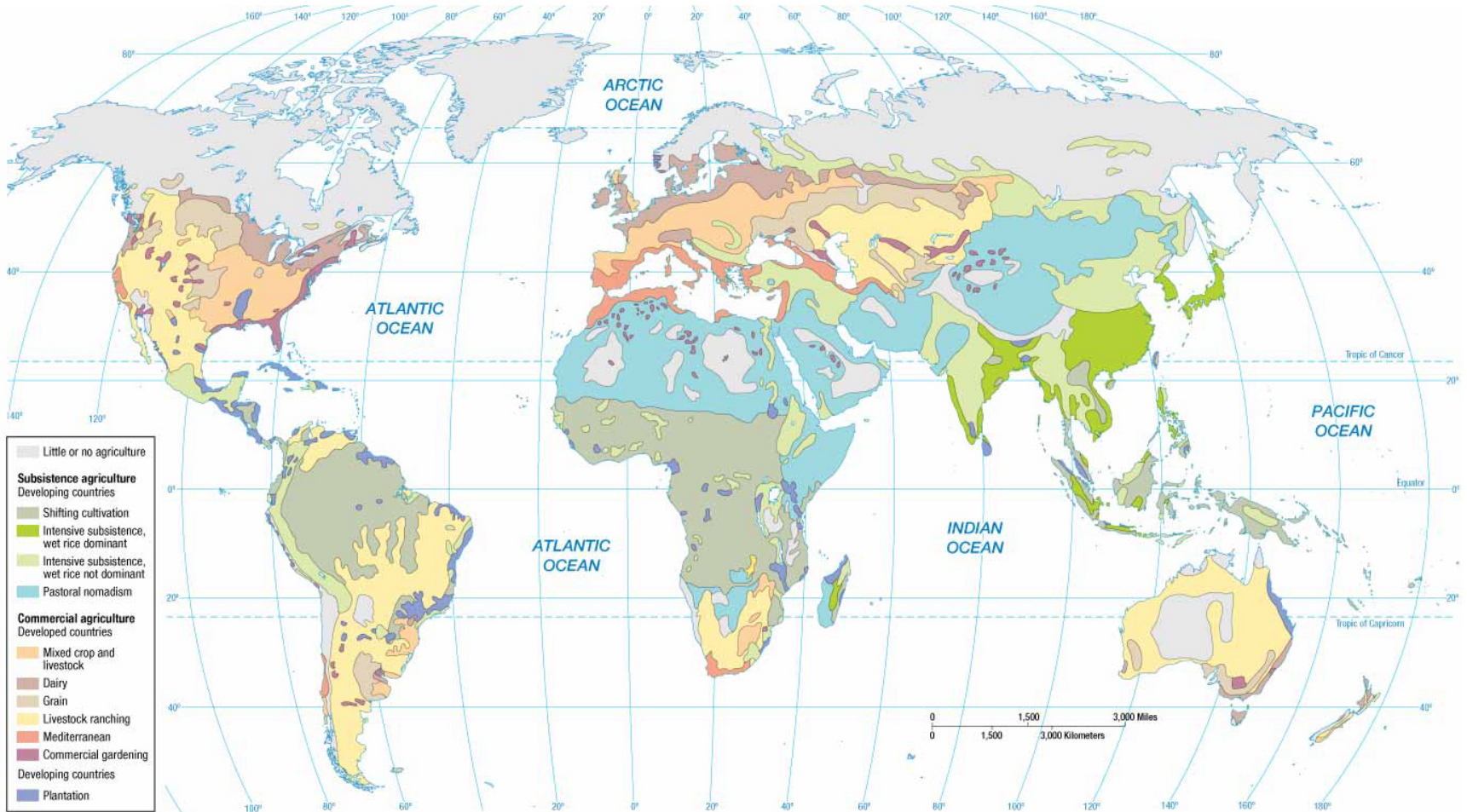
Where is Agriculture Distributed?

- 6 present in developed countries
 1. Mixed Crop and Livestock
 2. Dairying
 3. Grain
 4. Ranching
 5. Mediterranean
 6. Commercial Gardening

Agriculture and Climate Regions

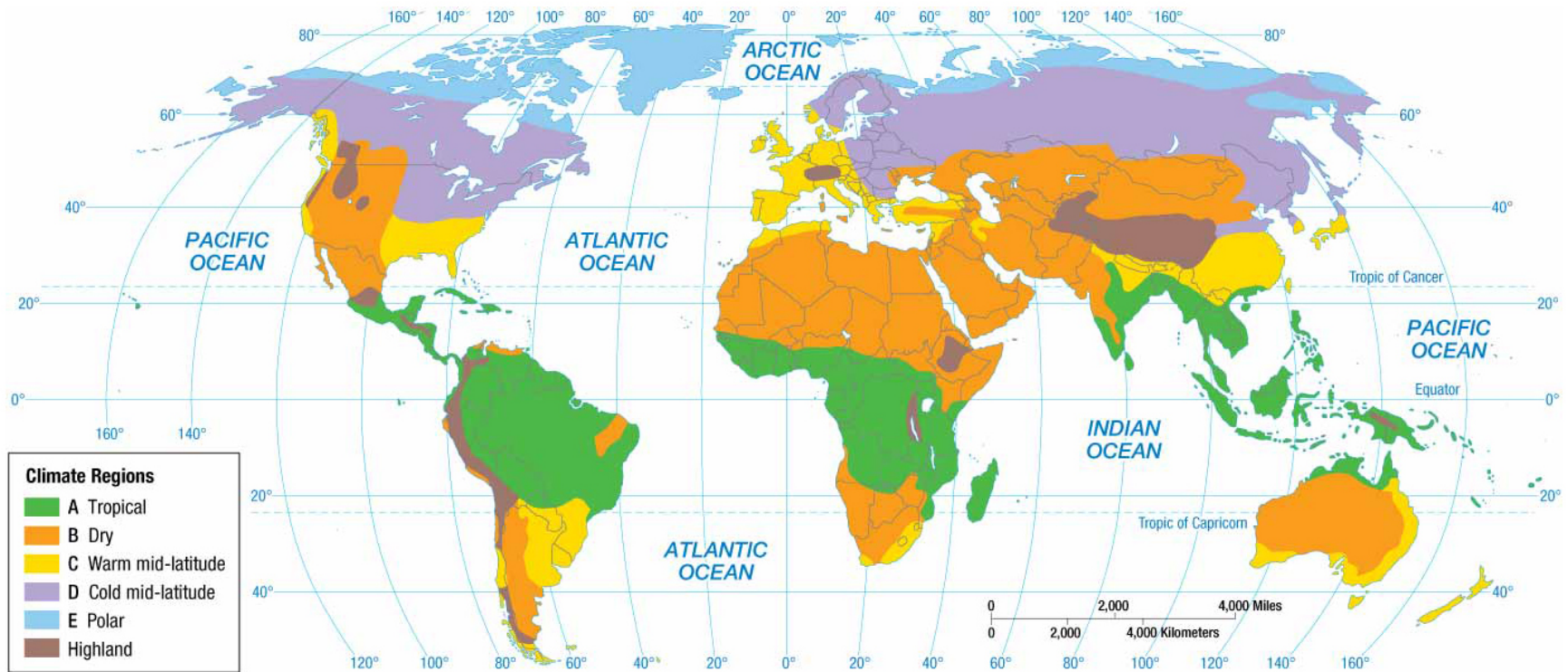


Agriculture and Climate Regions



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Agriculture and Climate Regions



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Where is Agriculture Distributed?

- Agriculture in Developing Regions

- Pastoral Nomadism

- *Pastoral nomadism* is a form of subsistence agriculture based on the herding of domesticated animals.
 - Various approaches combine some reliance on sedentary agriculture with the herding of livestock.
 - Some pastoral nomads obtain grain from sedentary subsistence farmers.
 - More commonly, women and children of a nomadic group tend to crops at a fixed location.
 - Nomads may hire worker to practice sedentary agriculture.
 - Some nomads will remain in a place and cultivate the land only when rainfall is abundant.

Pastoral Nomadism: Movement



Where is Agriculture Distributed?

- Agriculture in Developing Regions
 - Shifting Cultivation
 - *Shifting cultivation* is characterized by two distinctive features:
 1. Farmers clear land for planting by slashing vegetation and burning the debris.
 2. Farmers grow crops on a cleared field for only a few years, until soil nutrients are depleted, and then leave it fallow for many years so the soil can recover.
 - » Farmers return to a fallow site as few as 6 years later or as many as 20 years later.
 - Land Ownership
 - Traditionally, land collectively owned by village.
 - Today, private individuals now own land, especially in Latin America.

Shifting Cultivation: Slash and Burn



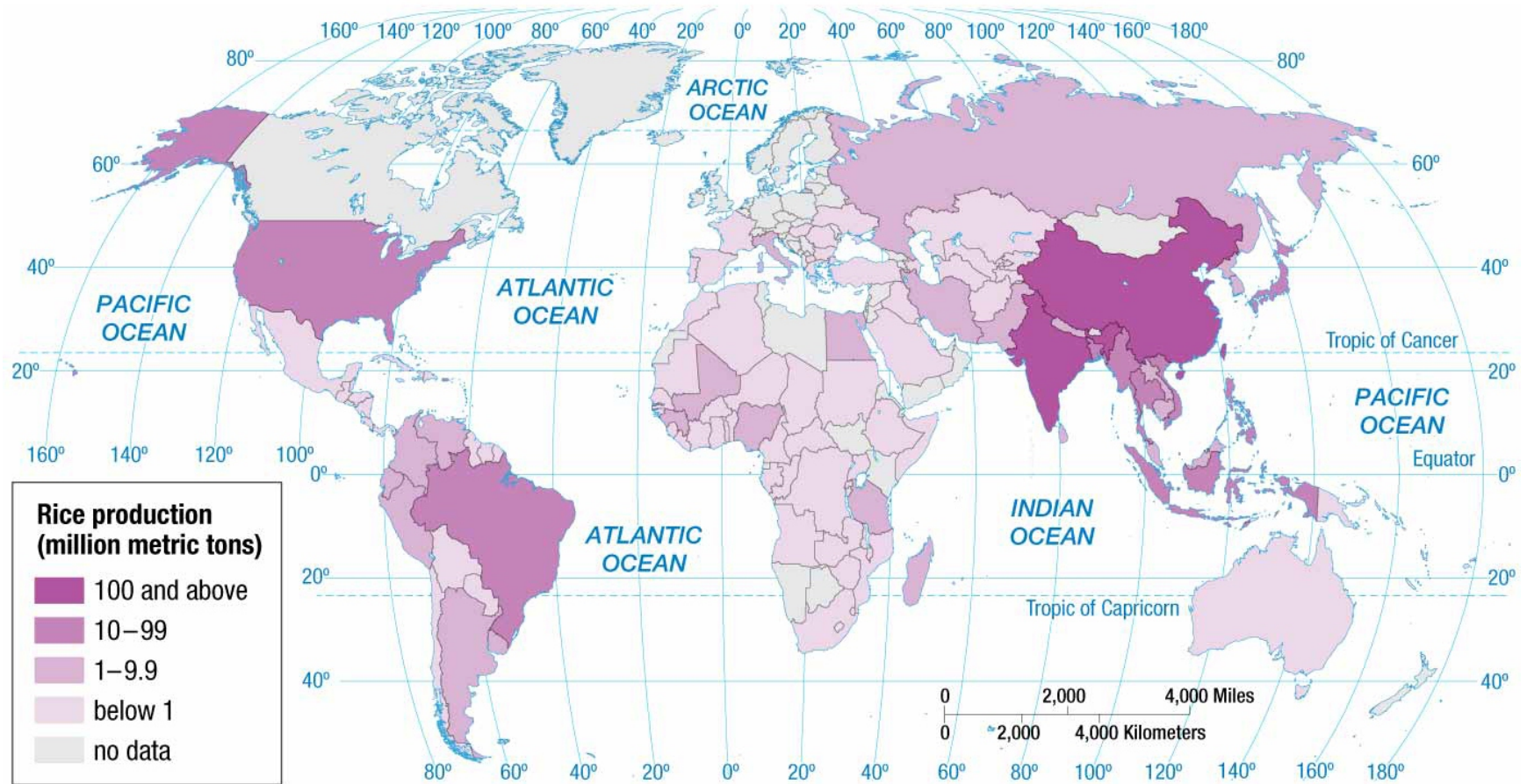
Shifting Cultivation: Slash and Burn



Where is Agriculture Distributed?

- Agriculture in Developing Regions
 - Intensive Subsistence Farming
 - Feeds most of the $\frac{3}{4}$ of the world's people who live in developing countries.
 - Farmers work intensively to subsist on a parcel of land.
 - Most of the work is done by hand or with animals rather than machines.
 - Virtually all available land is used for production.
 - Parcels of land are much smaller than elsewhere in world.
 - Example
 - *Wet rice*: the process where rice is planted on dryland in a nursery and then moved as seedlings to a flooded field to promote growth.

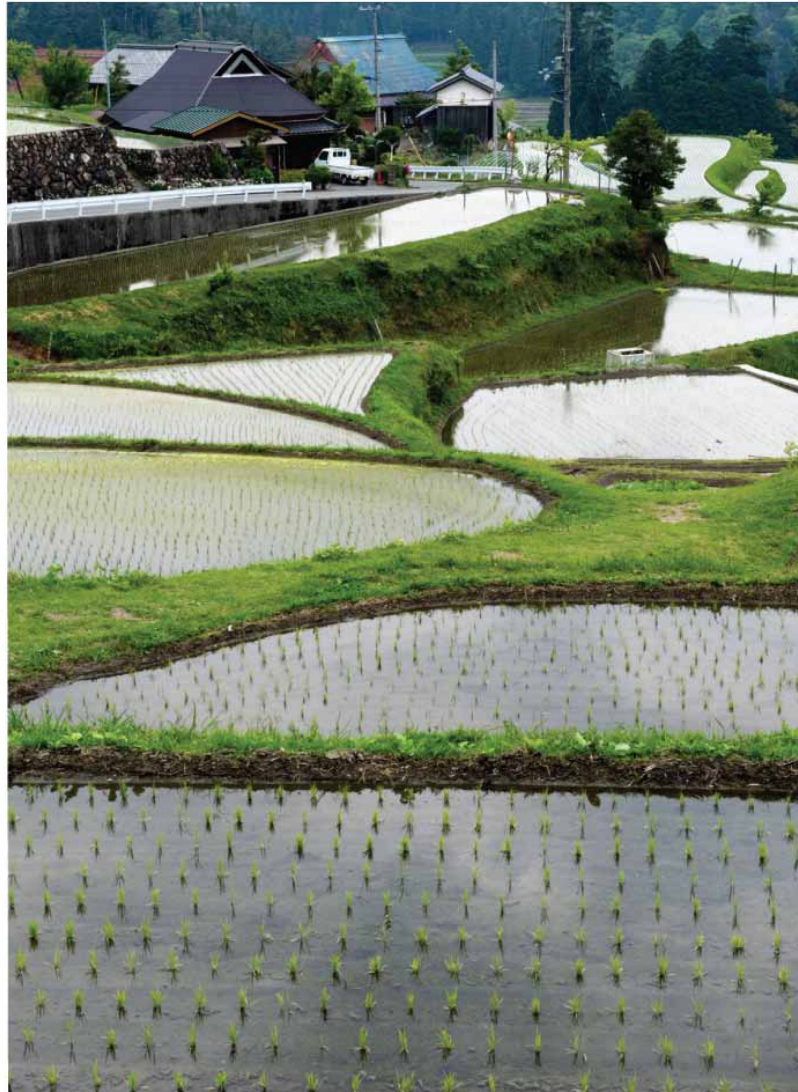
Rice Production



Growing Rice – Preparing the Field



Growing Rice – Flooding the Field



Where is Agriculture Distributed?

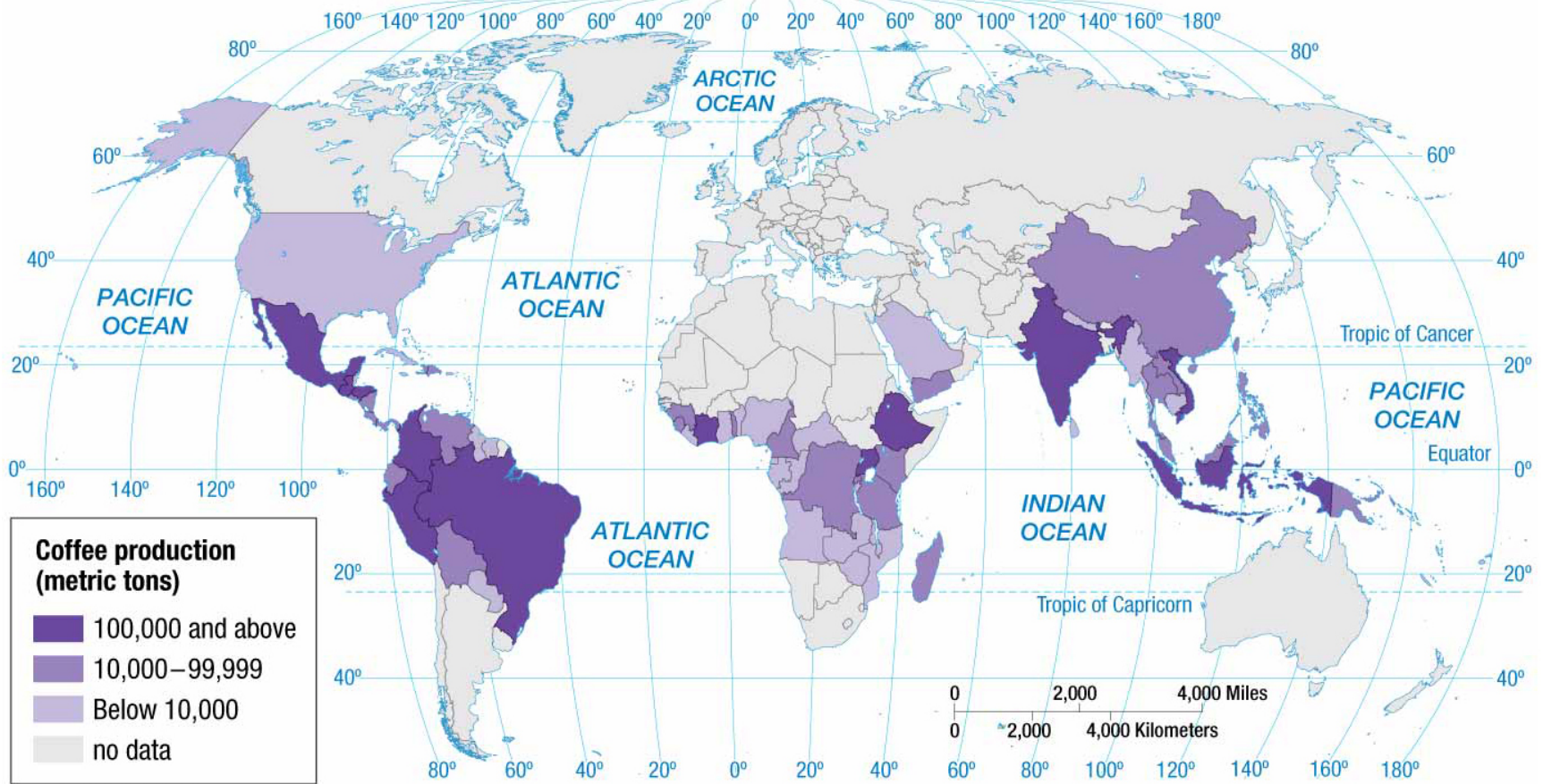
- Agriculture in Developing Regions
 - Intensive Subsistence Farming
 - Intensive wet-rice farming is the dominant type of agriculture in the following places:
 - Southeastern China
 - East India
 - Much of Southeast Asia
 - Climate prevents farmers from growing wet rice in portions of Asia, especially where summer precipitation levels are too low and winters are too harsh.

Plantation Farming



Plantation farming is a form of commercial agriculture found in developing countries. Plantations specialize in one or two crops. This photo is from a coffee plantation.

Coffee Production



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Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Commercial agriculture in developed countries can be divided up into six main types:
 - Mixed Crop and Livestock Farming
 - Dairy Farming
 - Commercial Gardening and Fruit Farming
 - Grain Farming
 - Mediterranean Agriculture
 - Livestock Ranching
 - *Agribusiness* is commonly used to refer to these types of farming listed, because the family farm is not an isolated activity but is integrated into a large food-production industry.

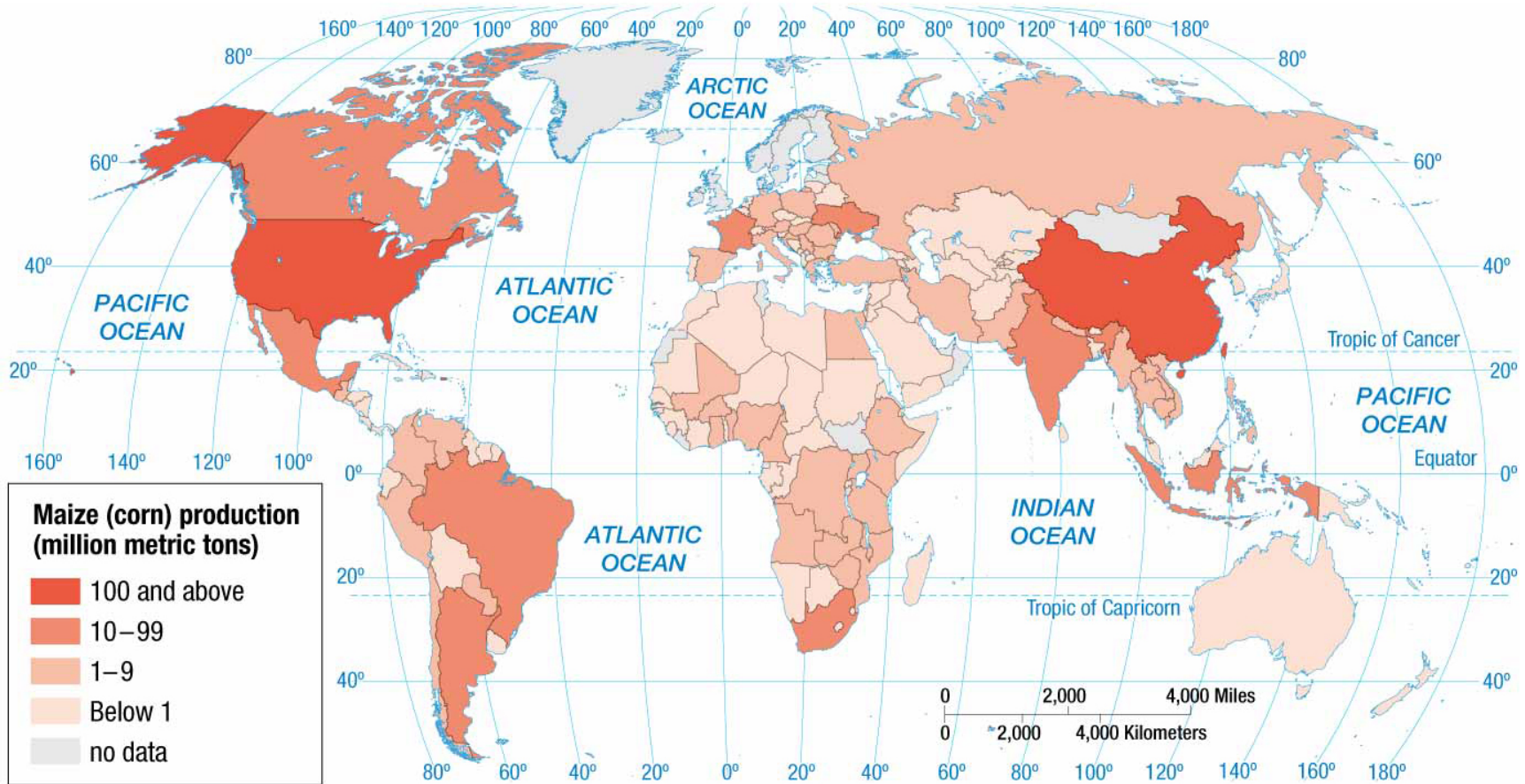
Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Mixed Crop and Livestock Farming
 - Most distinctive characteristic is the integration of crops and livestock.
 - Most of the crops are fed to animals instead of humans.
 - Typical example devotes nearly all land area to growing crops but derives more than $\frac{3}{4}$ of its income from the sale of animal products. e.g. beef and eggs
 - Permits farmers to distribute the workload more evenly through the year, because crops require less attention, aside from planting and harvesting them.
 - Typically involves *crop rotation*, practice of rotating use of different fields from crop to crop each year to avoid exhausting the soil.

Mixed Crop and Livestock



Corn Production



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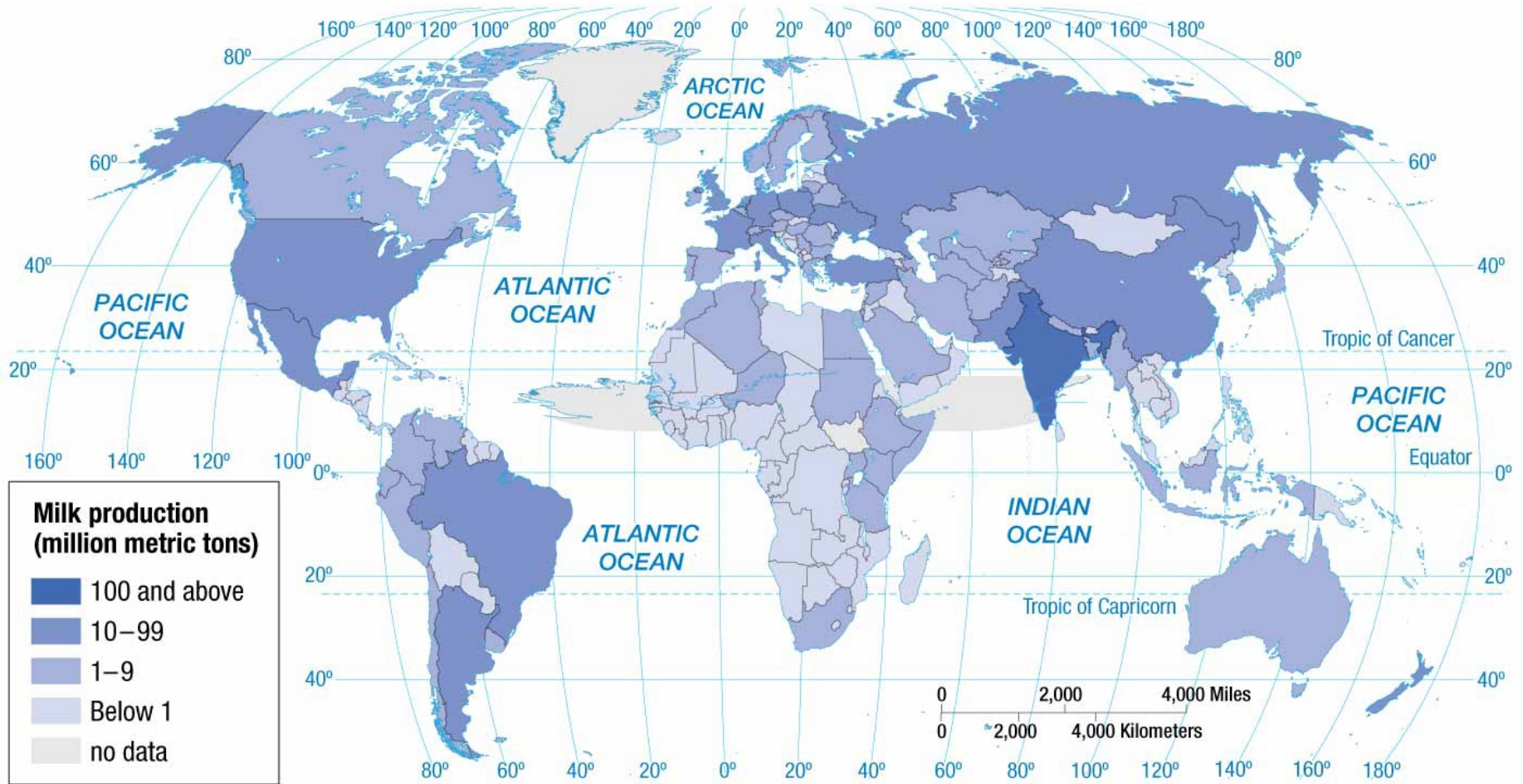
Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Dairy Farming
 - Most important type of commercial agriculture in the first ring outside the large cities because of transportation factors.
 - Ring surrounding a city from which milk can be supplied is known as the *milkshed*.
 - Advancements in modes of transportation have increased the radius of milksheds to 500 km. (300 mi.)
 - Process
 - Dairy farmers typically sell their milk to wholesalers who later distribute it to retailers.
 - Retailers then sell it to consumers in shops or at home.

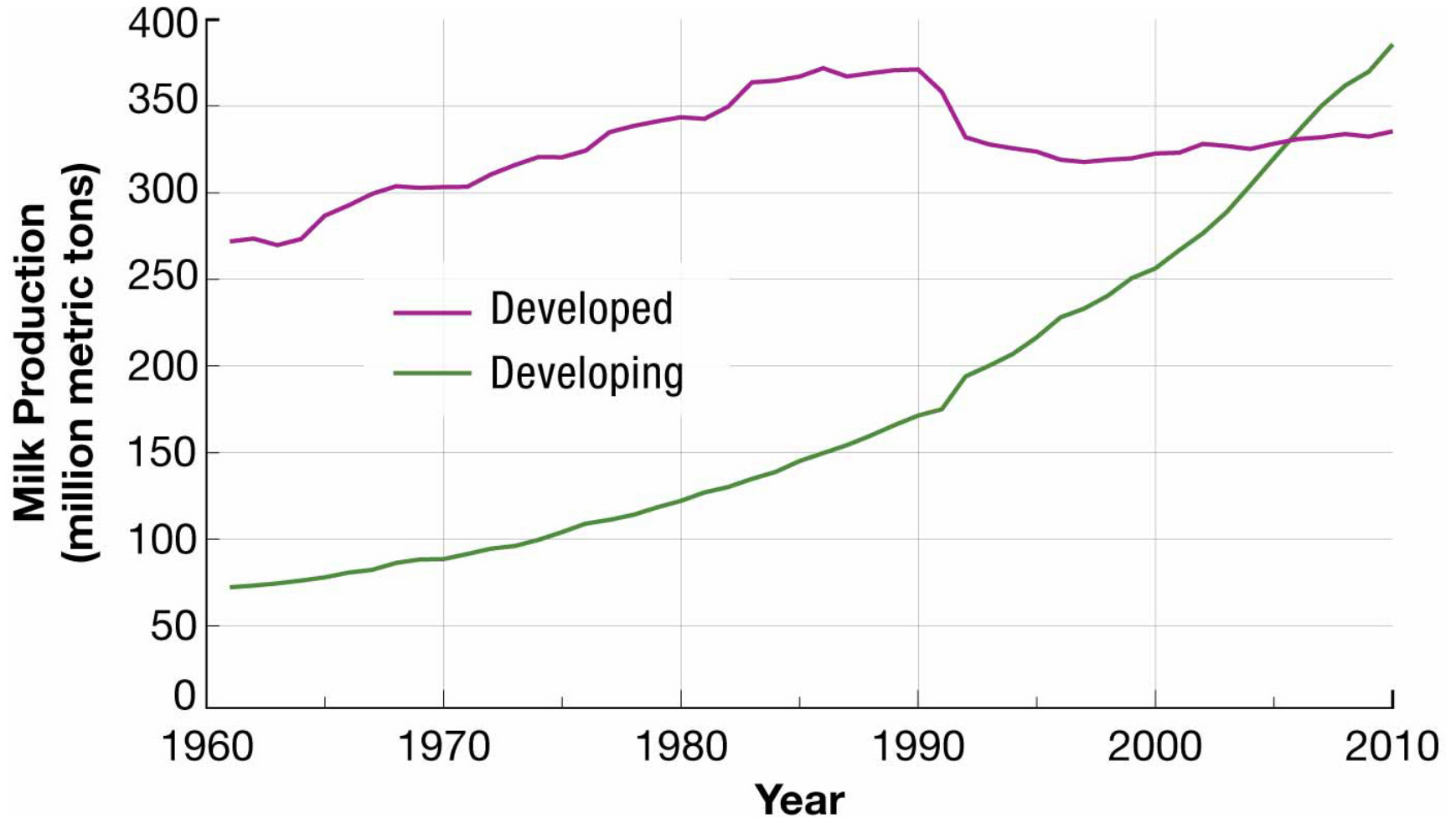
Dairy Farm



Milk Production



Changing Milk Production



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Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Commercial Gardening and Fruit Farming
 - Predominant type of farming in southeastern U.S.
 - Commonly referred to as *truck farming* from the Middle English word, truck, meaning “bartering” or “exchange of commodities.”
 - Grow many of the following fruits and vegetables that consumers in developed countries demand:
 - Apples
 - Asparagus
 - Cherries
 - Lettuce
 - Mushrooms
 - Potatoes

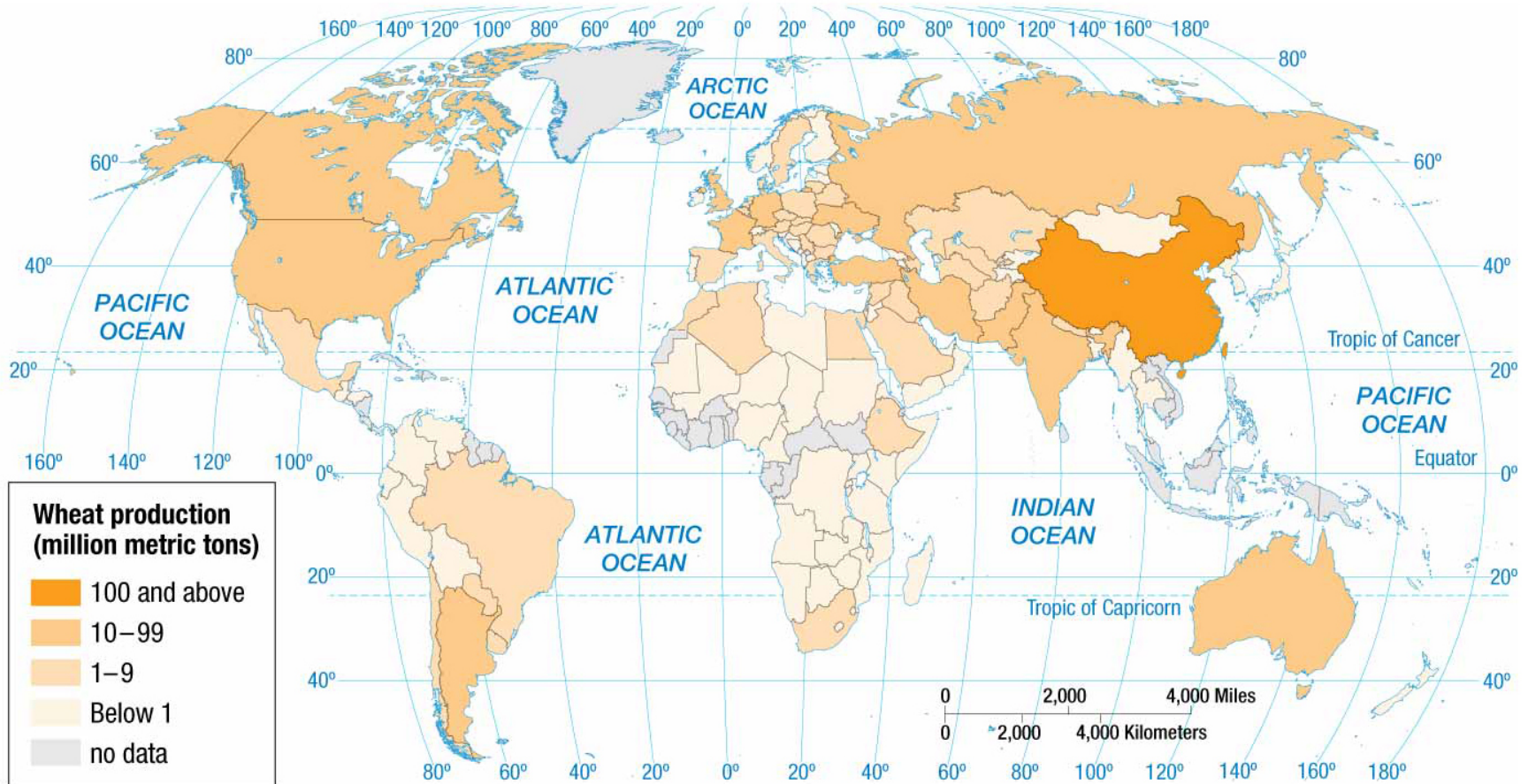
Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Commercial Gardening and Fruit Farming
 - Some of the fruits and vegetables are sold fresh to consumers, but most are sold to large processors for canning or freezing.
 - Truck farms are highly efficient large-scale operations that take full advantage of machines at all stages of the growing process.
 - Labor costs are kept down by hiring migrant farm workers.
 - Specialization in a few crops is common.

Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Grain Farming
 - Distinguished from mixed crop and livestock farming, because crops are grown primarily for human consumption.
 - Farms sell their output to manufacturers of food products, such as breakfast cereals and bread.
 - Characteristics of a Typical Grain Farm
 - Heavily mechanized
 - Farms large in areal extent
 - Oriented to consumer preferences

Wheat Production



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Where is Agriculture Distributed?

- Agriculture in Developed Regions
 - Mediterranean Agriculture
 - Every site practicing this form of agriculture borders a sea, and most are on west coasts of continents.
 - Prevailing sea winds provide moisture and moderate the winter temperatures.
 - Farmers derive a smaller percentage of income from animal products.
 - Most crops are grown for human consumption.
 - *Horticulture*, which is the growing of fruits, vegetables, and flowers, and tree crops form the commercial base.
 - Along the Mediterranean Sea, olives and grapes are two most important cash crops.
 - Approximately half of the land here is used to grow cereals.

Mediterranean Agriculture



Where is Agriculture Distributed?

- Agriculture in Developed Regions

- Livestock Ranching

- *Ranching* is the commercial grazing of livestock over an extensive area.
 - Well suited for semiarid or arid land
 - Practiced in developed countries where vegetation is too sparse and soil too poor to support crops.
 - Historically, ranchers sought to move their cattle from Texas to Chicago, because the cattle were worth more money farther north.
 - Today, ranching has become part of the meat-processing industry where new methods of breeding and sources of water and feed are embraced.

Ranching

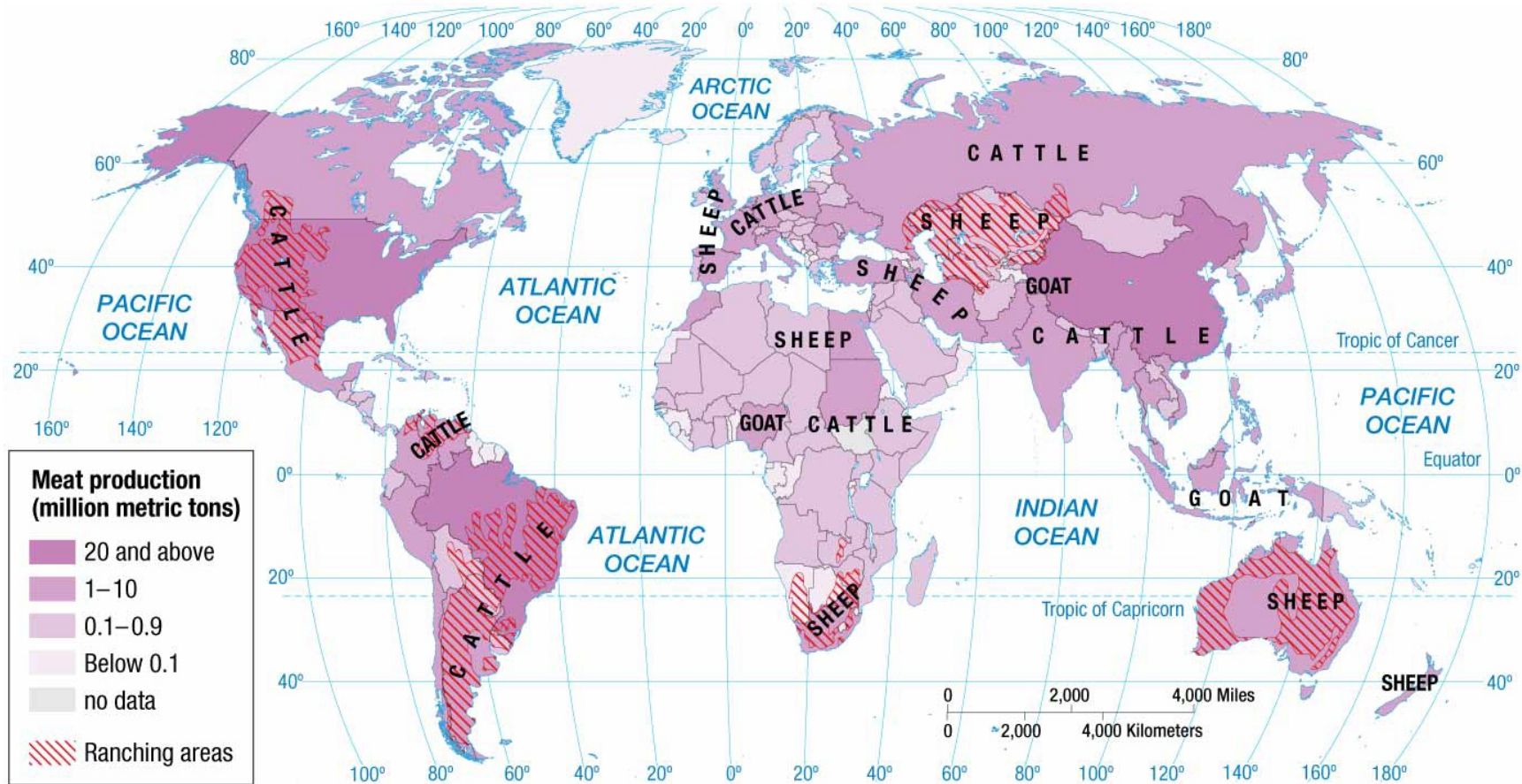


The Chisholm Trail



The Chisholm Trail was used to move cattle from Texas to railroad stations in Kansas during the 1860s and 1870s.

Meat Production



Chapter 10

Key Issue 4:

Why Do Farmers Face Economic Difficulties?

Why Do Farmers Face Economic Difficulties?

- Challenges for Farmers in Developing Countries
 - Subsistence farmers must feed an increasing number of people because of rapid population growth in developing countries.
 - Food supply increased through intensification of production via new farming methods and leaving land fallow for shorter periods of time.

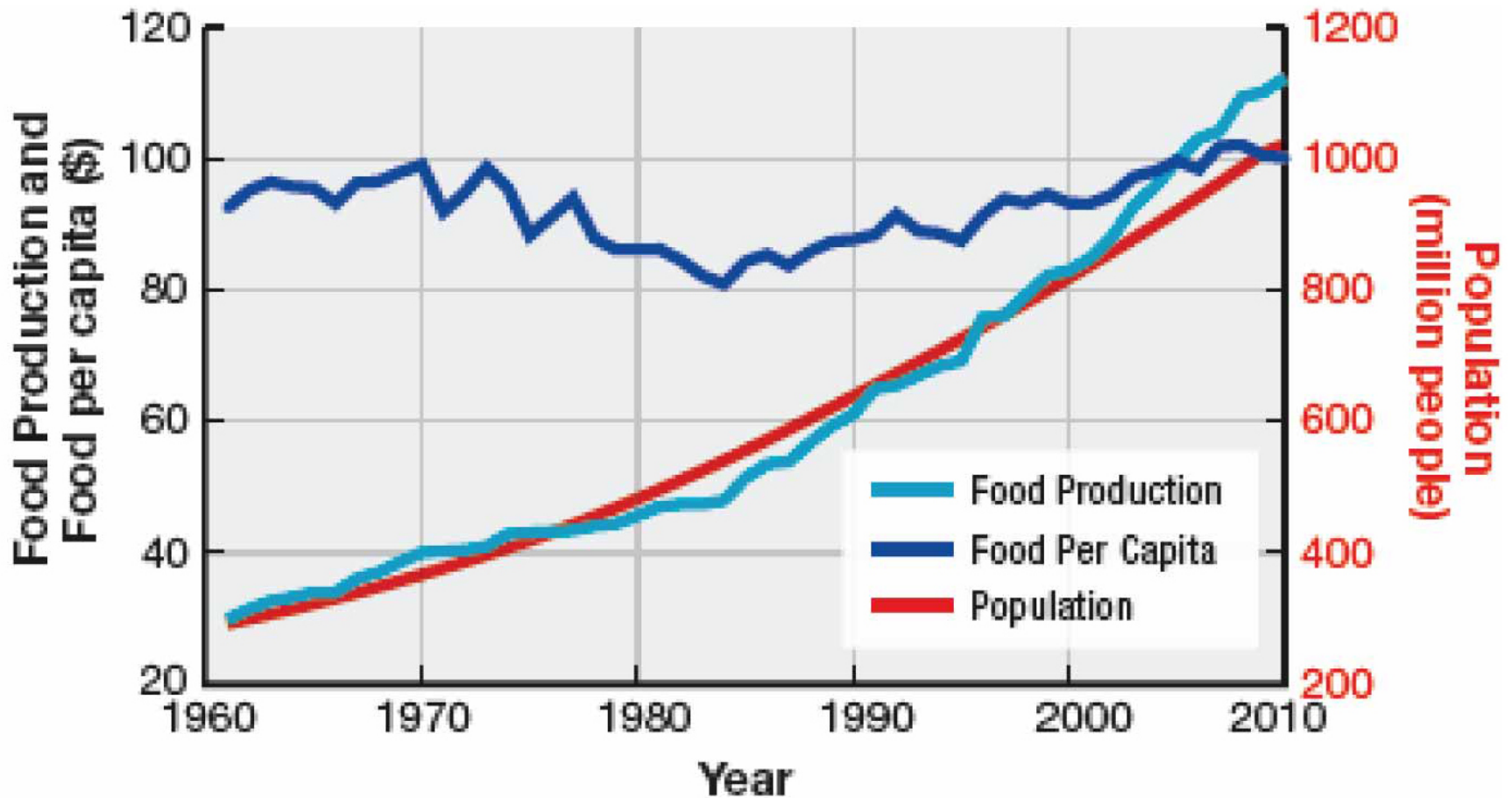
Intensive Farming Methods



Why Do Farmers Face Economic Difficulties?

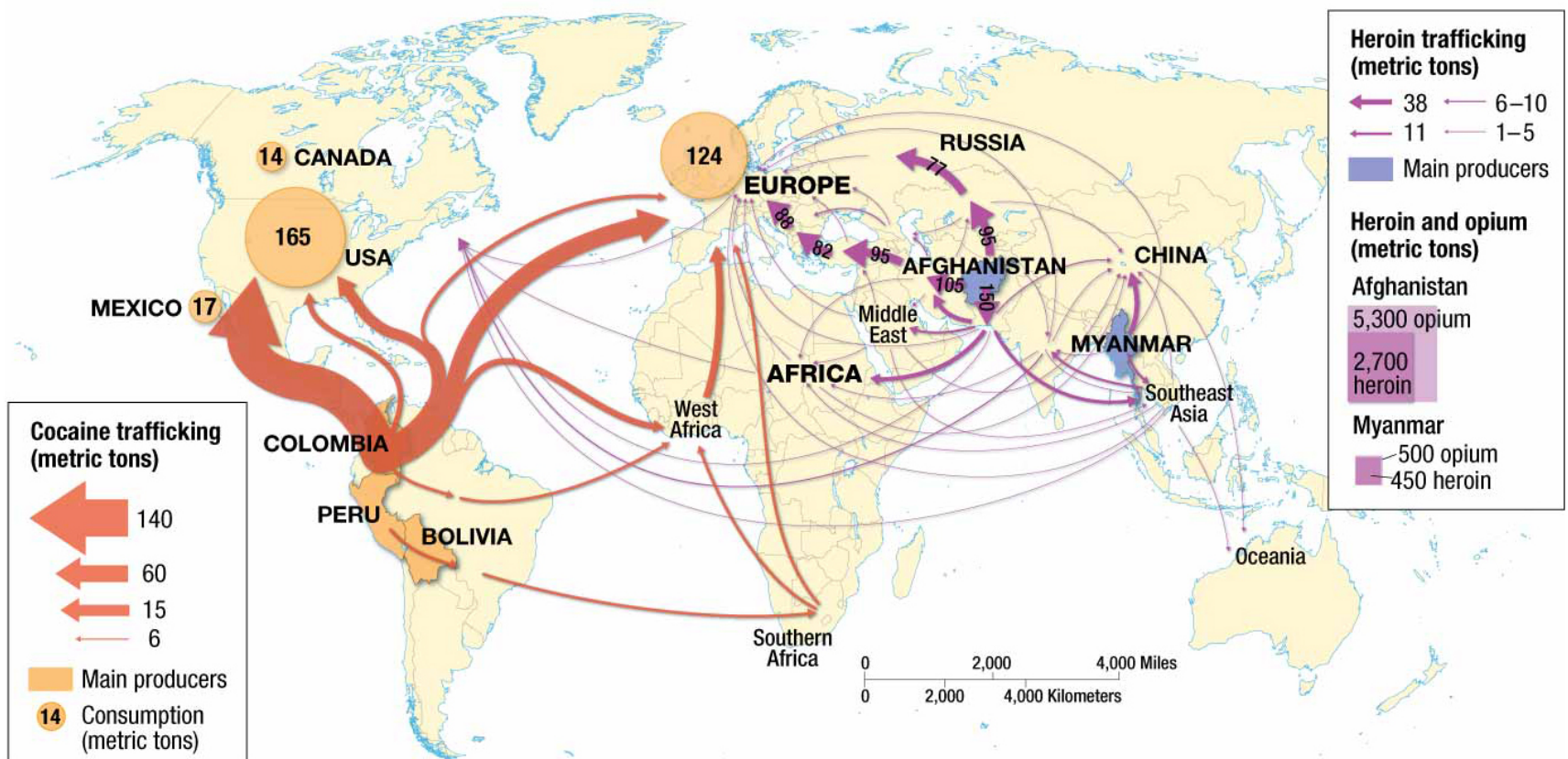
- Challenges for Farmers in Developing Countries
 - Subsistence farmers must grow food for export instead of for direct consumption due to the adoption of the international trade approach to development.
 - Consumers in developed countries are willing to pay high prices for fruits and vegetables that would otherwise be out of season locally.

Population and Food in Africa



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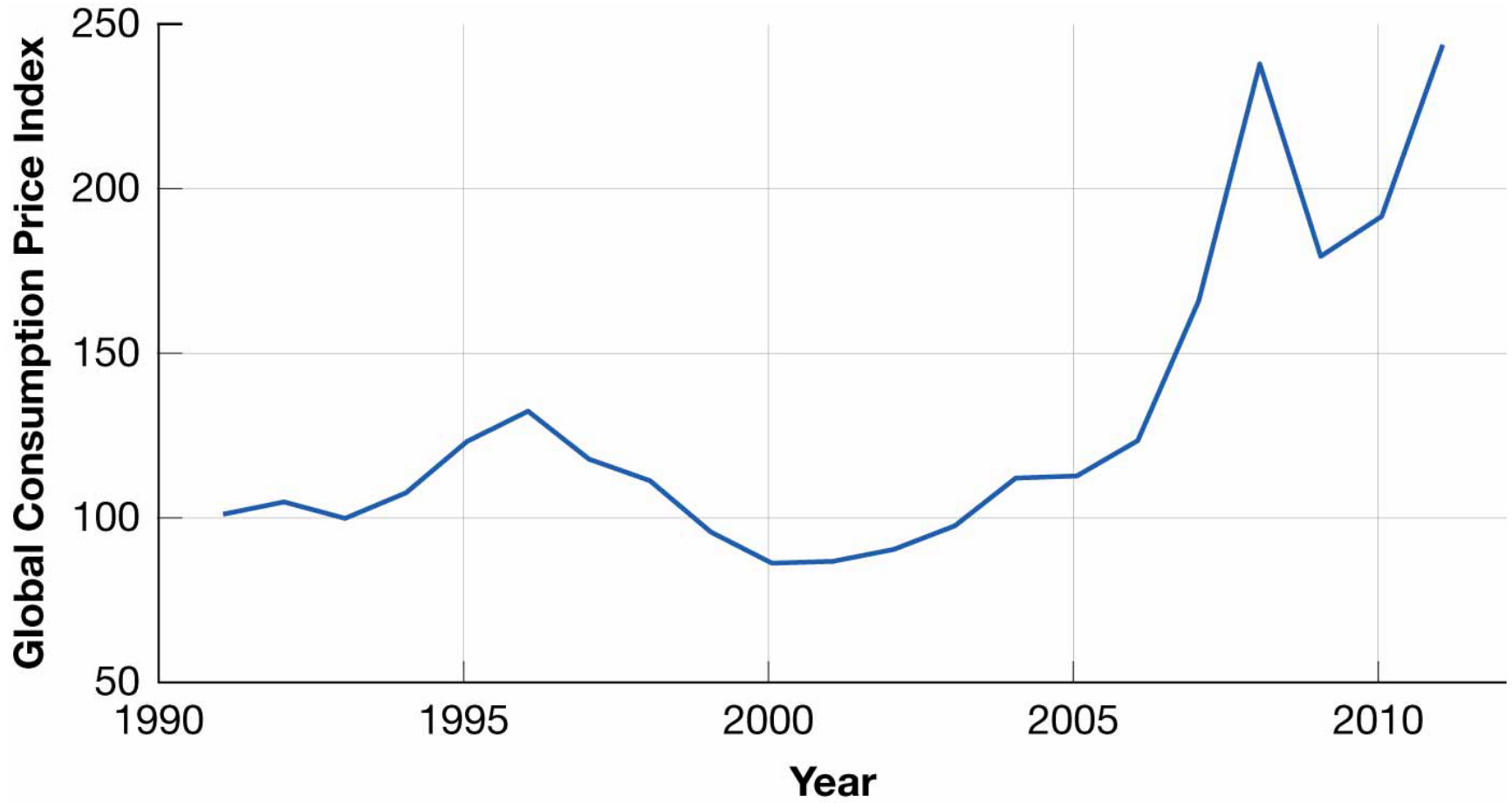
Drug Crops



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International drug trafficking. The export crop in some LDCs are those that can be converted into drugs.

Food Price Index



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Why Do Farmers Face Economic Difficulties?

- Challenges for Farmers in Developed Countries
 - Overproduction in Commercial Farming
 - Commercial farmers suffer from low incomes, because they are capable of producing more food than is demanded by consumers in developed countries.
 - Demand is stagnant in developed countries because of low population growth.

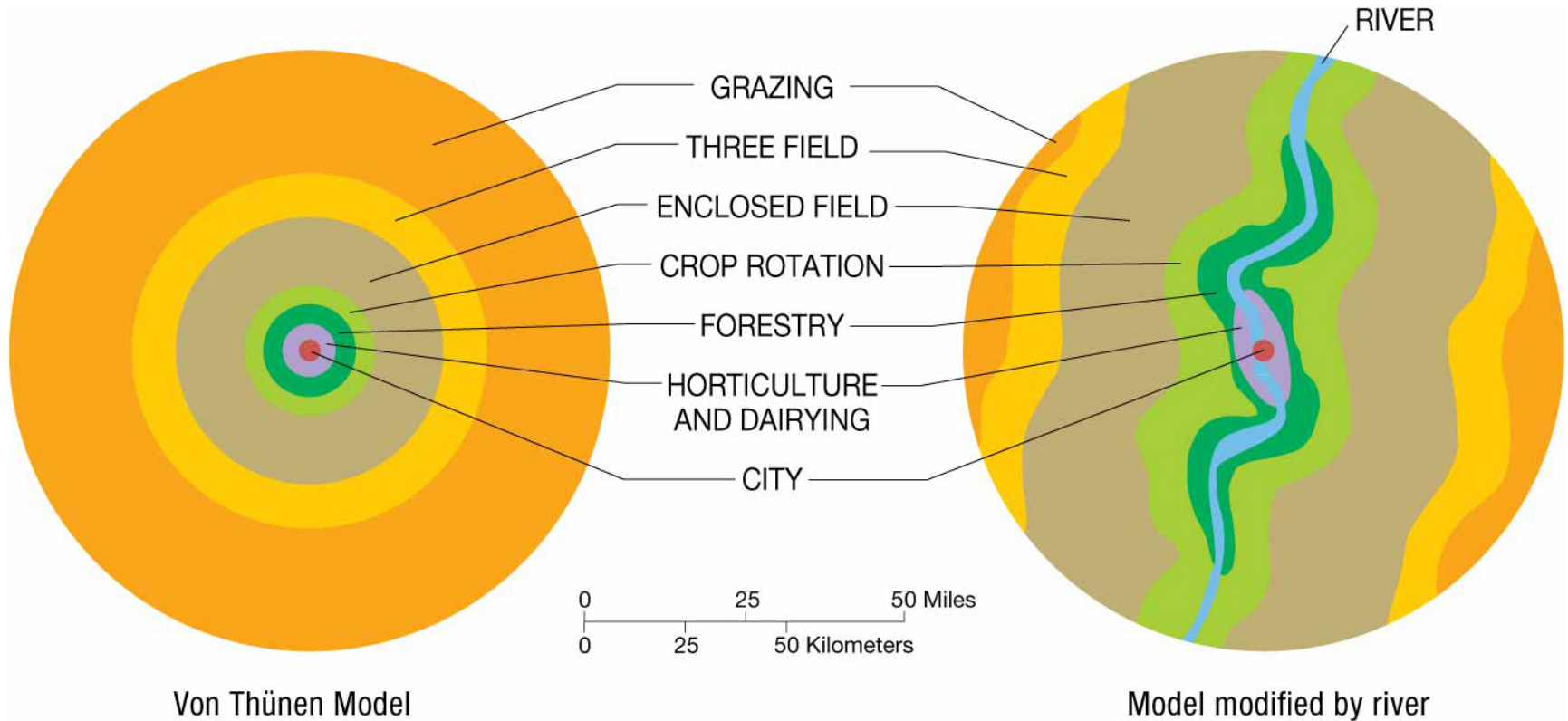
Why Do Farmers Face Economic Difficulties?

- Challenges for Farmers in Developed Countries
 - Overproduction in Commercial Farming
 - U.S. Government has formed policies that attempt to address excess production.
 - Farmers are encouraged to avoid producing crops that are in excess supply.
 - The government pays farms when certain commodity prices are low.
 - The government buys surplus production and sells or donates it to foreign governments.

Why Do Farmers Face Economic Difficulties?

- Challenges for Farmers in Developed Countries
 - Importance of Access to Markets
 - Geographers use the von Thünen model to help explain the importance of proximity to market in the choice of crops on commercial farms.
 - Specific crops are grown in different rings around cities
 - » 1st ring: Highly perishable foods e.g. milk
 - » 2nd ring: Items more difficult to transport e.g. wood
 - » 3rd ring: Various crops and pasture lands
 - » 4th ring: Spacious lands for animal grazing.
 - von Thünen's model can be scaled up for national and global markets.

Access to Markets – Von Thunen Model



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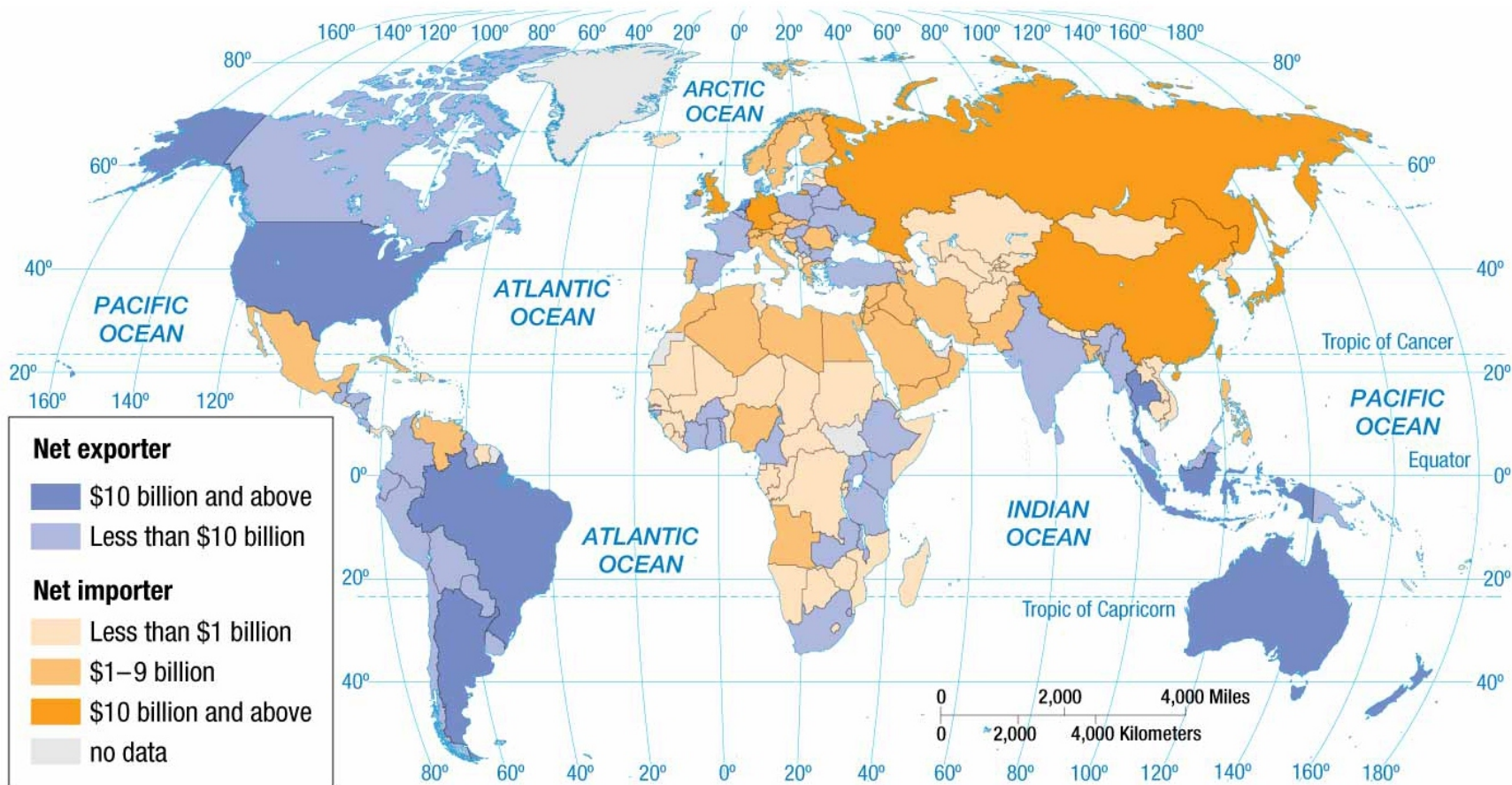
Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Four strategies are being employed to distribute food to everyone in the world:
 - Increasing exports from countries with surpluses
 - Expanding the land area used for agriculture
 - Expanding fishing
 - Increasing the productivity of land now used for agriculture

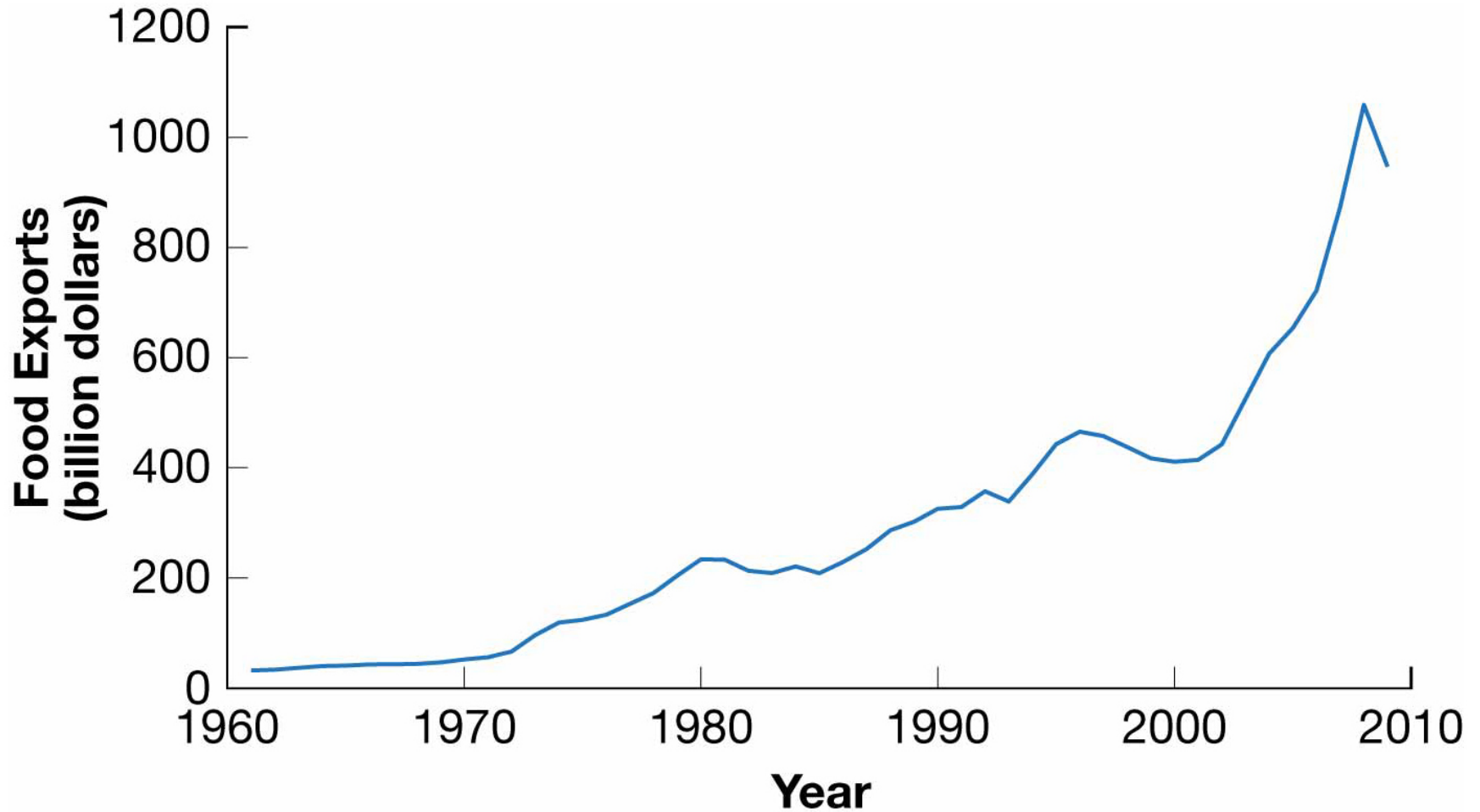
Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Increasing Exports from Countries with Surpluses
 - On a global scale, agricultural products are moving primarily from the Western Hemisphere to the Eastern Hemisphere.
 - U.S. remains the world's leading exporter of grain
 - » ½ of the world's maize (corn) exports.
 - » Global share has decreased from 18 to 19 percent in the 1970s to 10 to 11 percent in the 21st century because of more rapid increased in agricultural exports from Latin America and Southeast Asia.

Trade in Agricultural Products



Growth in Agricultural exports



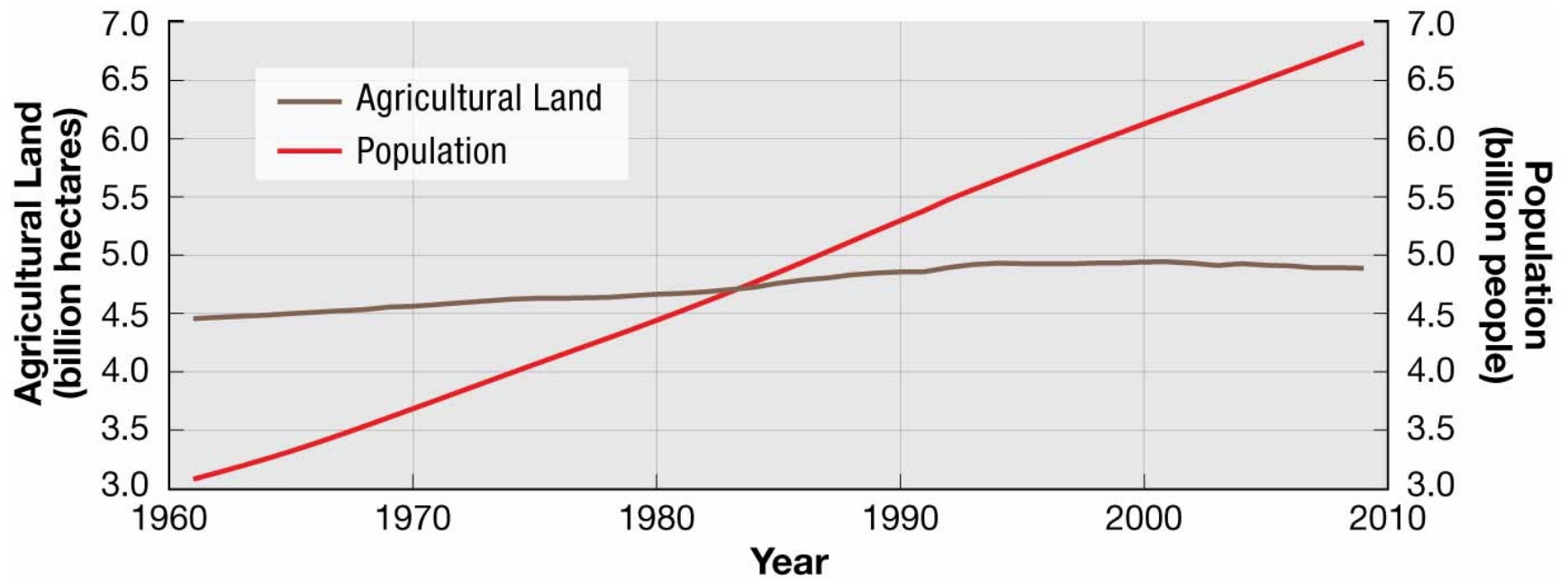
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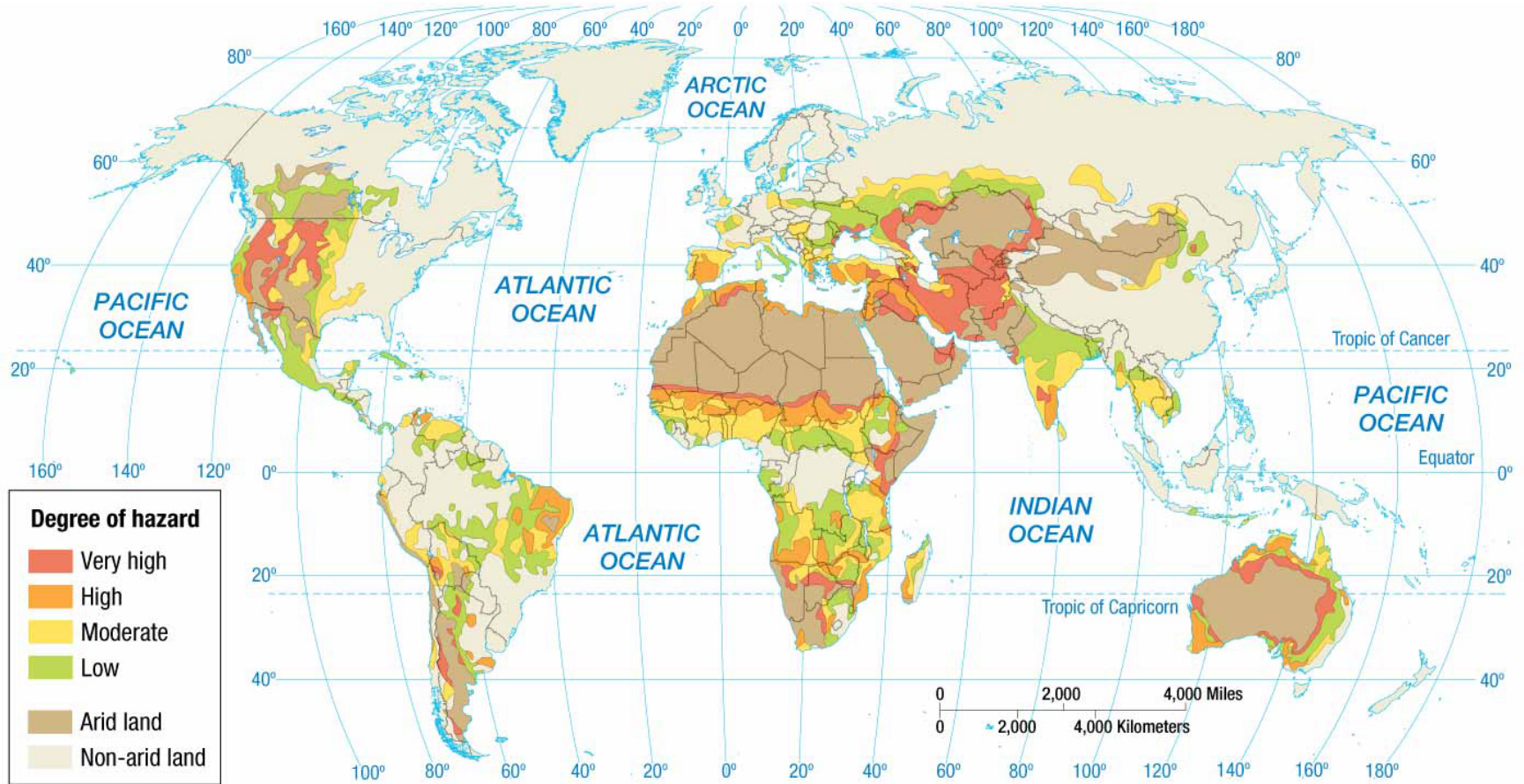
Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Expanding Agricultural Land
 - Today, few scientists believe that further expansion of agricultural land can feed the growing world population.
 - Farmland in some regions is being abandoned for lack of water.
 - Other land degradation that makes land resemble a desert-like state caused by humans is known as *desertification*.

Agricultural Land and Population Growth



Desertification

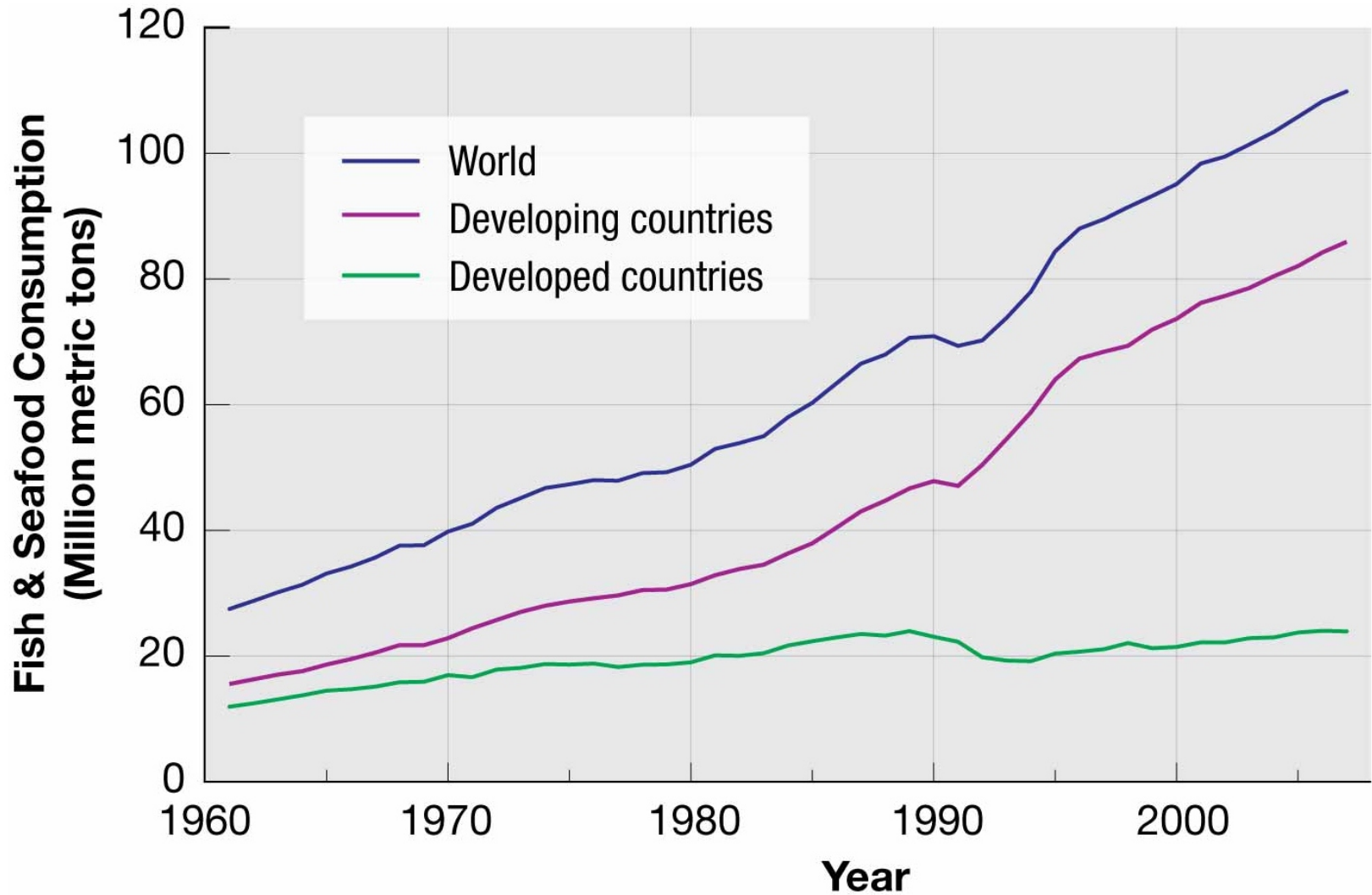


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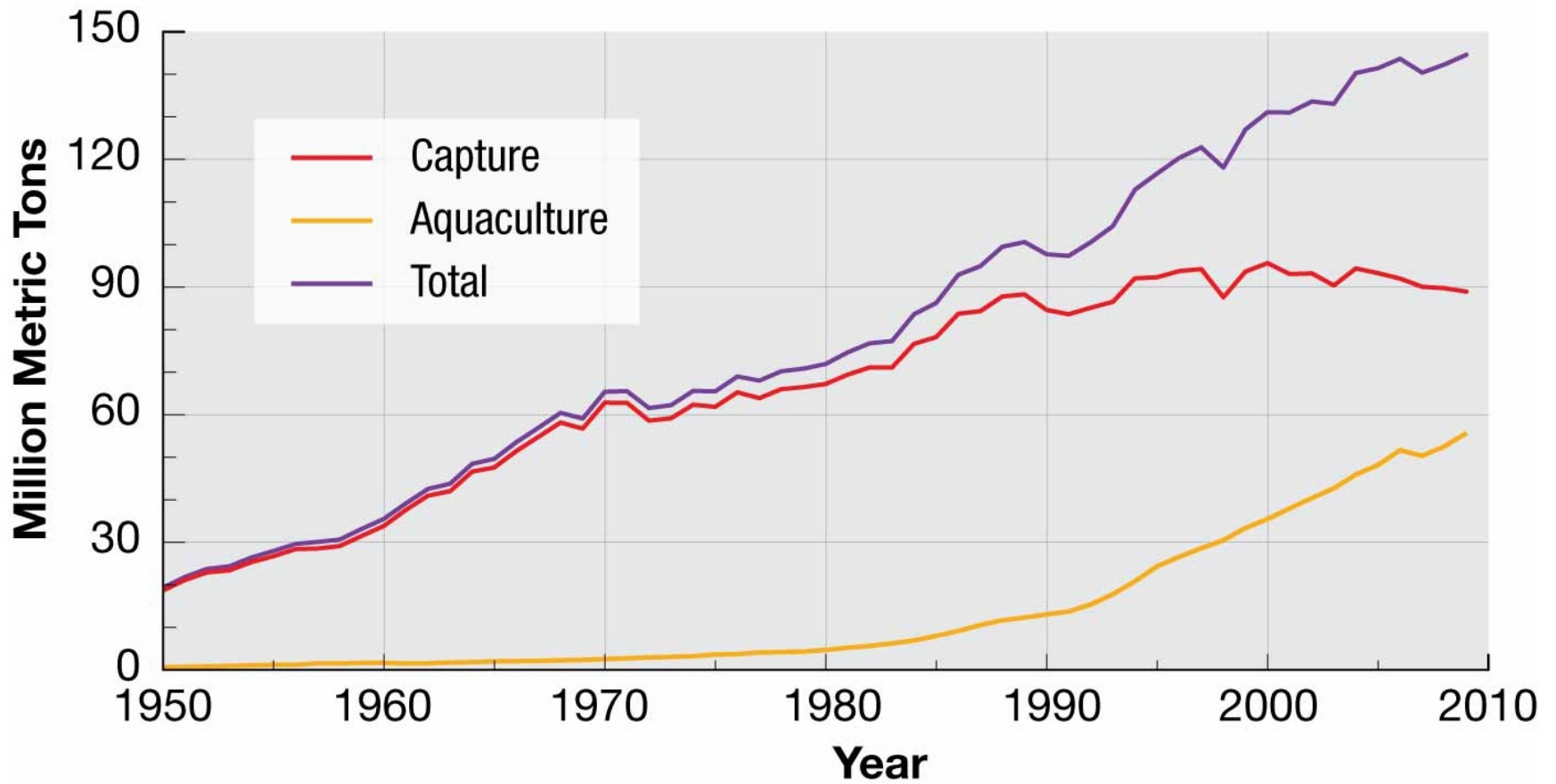
Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Expanding Fishing
 - *Aquaculture*, or *aquafarming* is the cultivation of seafood under controlled conditions, whereas fishing is the capture of wild fish and other seafood.
 - Human consumption of fish and seas has increased from 27 million metric tons in 1960 to 110 million metric tons in 2010.
 - Global fish production has increased from approximately 36 to 145 million metric tons.
 - Only 2/3 of fish caught from the ocean is consumed directly by humans.

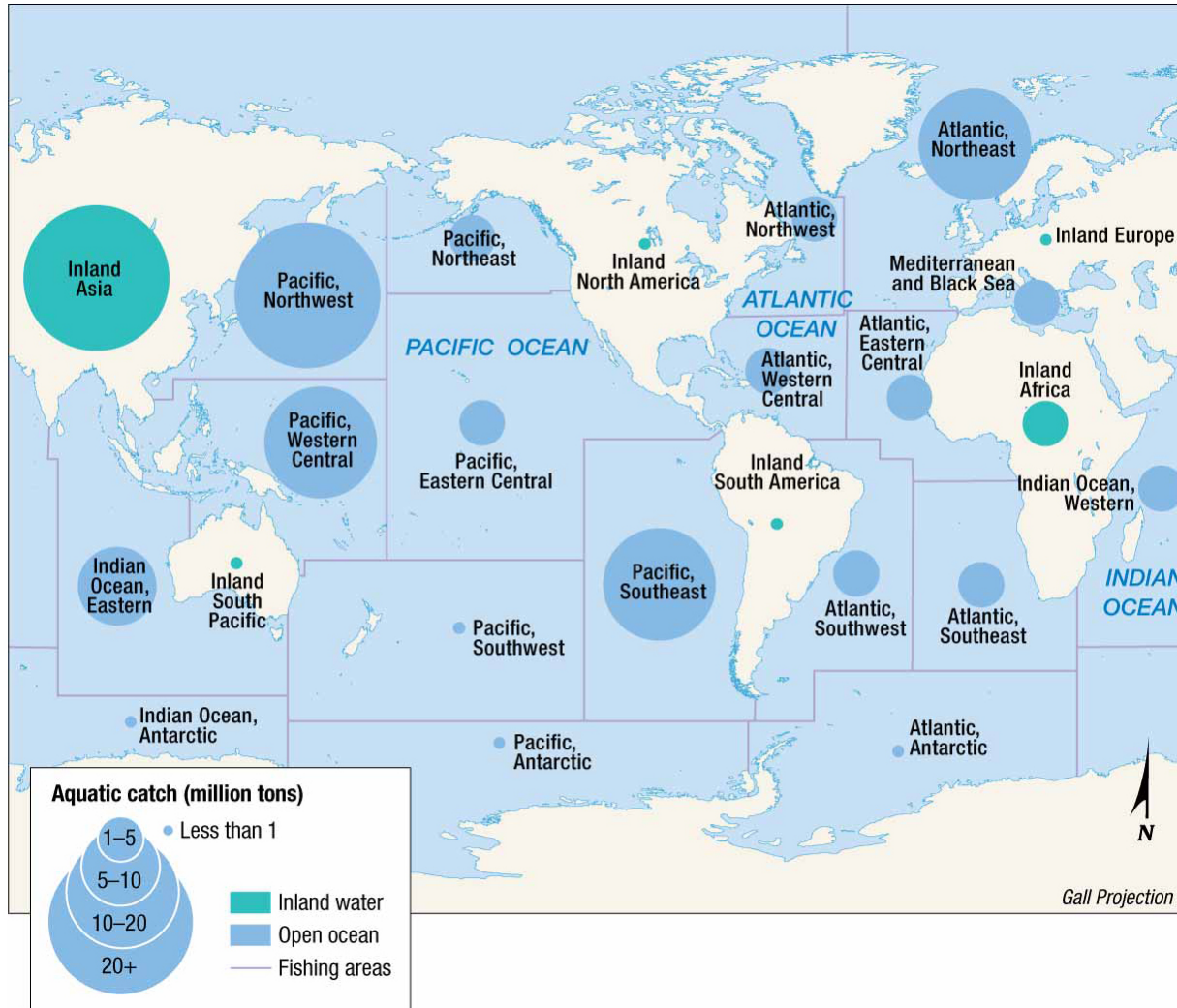
Growth in Human Consumption of Fish



Growth in Fish Production

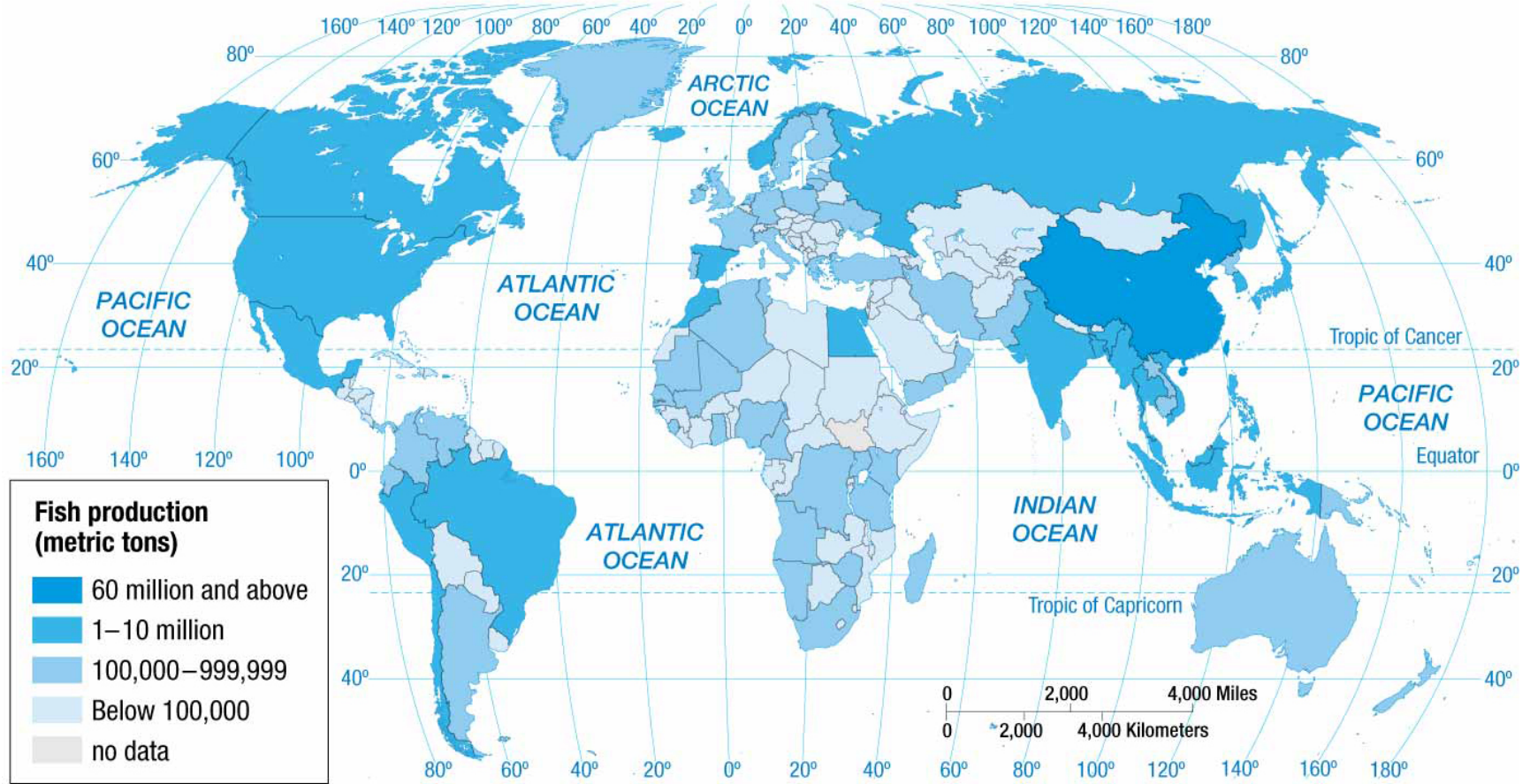


Major Fishing Regions



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Fish Production

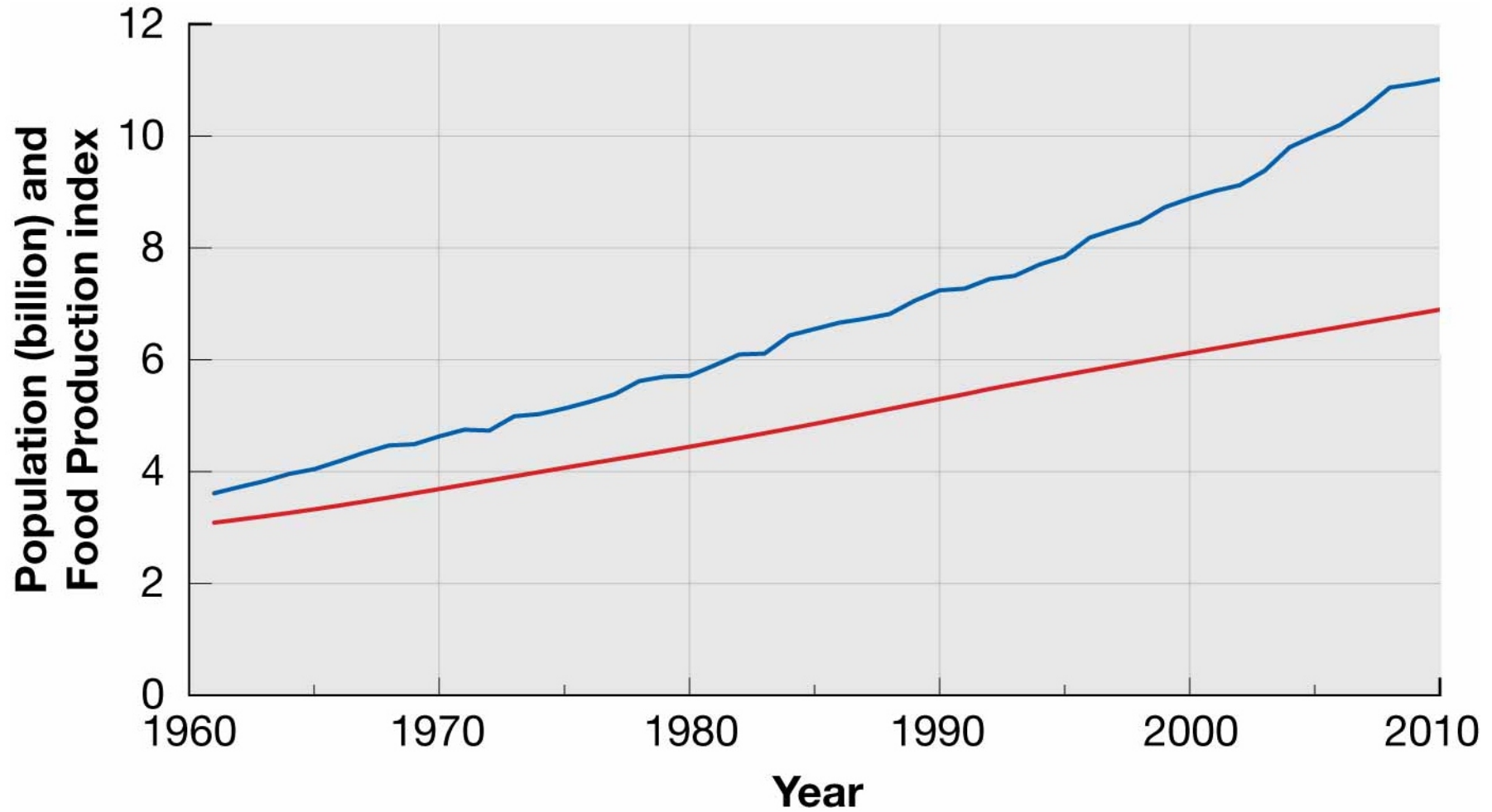


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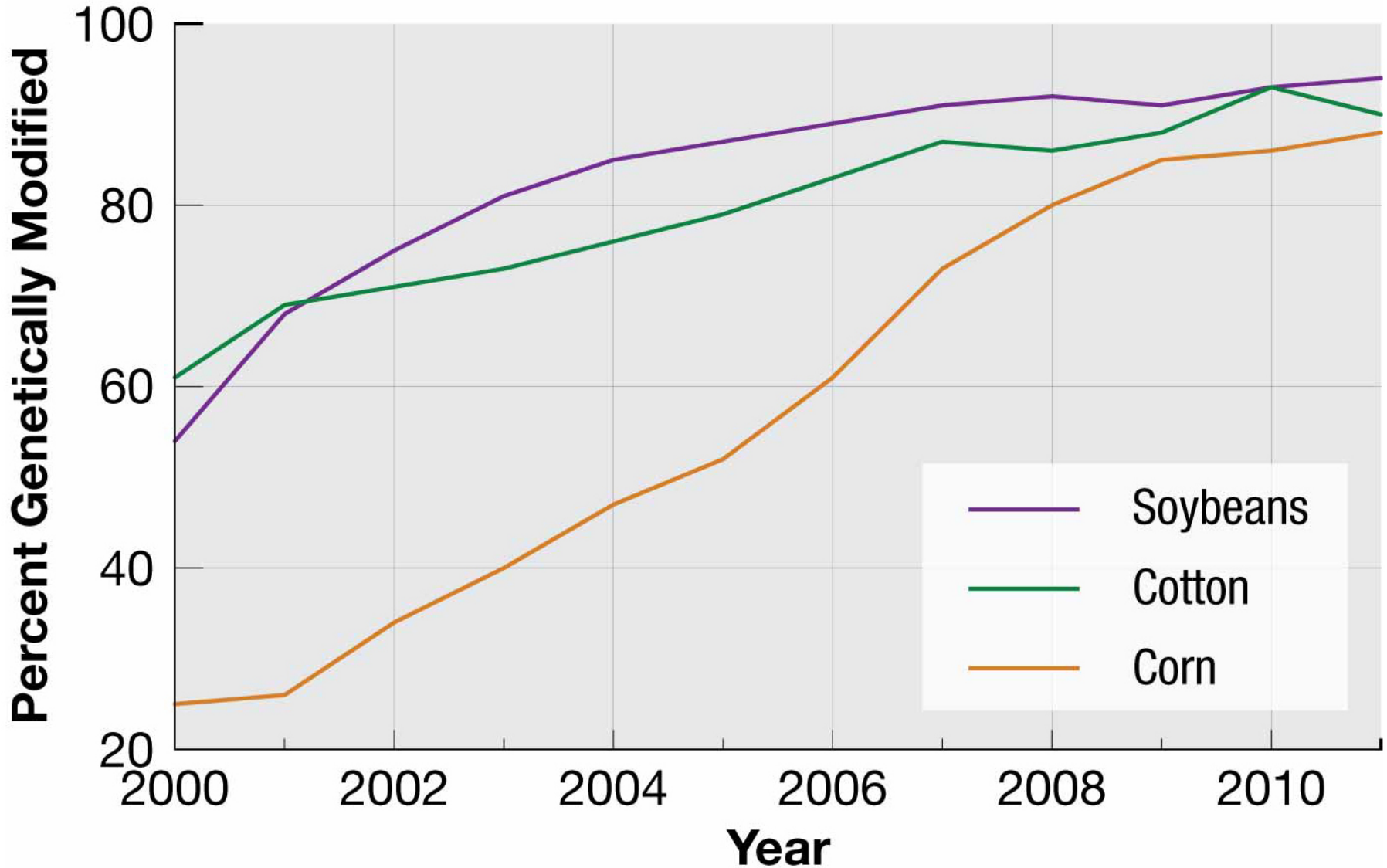
Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Increasing Productivity
 - Invention and rapid diffusion of more productive agricultural techniques during the 1970s and 1980s is called the *green revolution*.
 - Introduced new higher-yield seeds
 - Expanded use of fertilizers
 - Green revolution allowed agricultural productivity to outpace population growth.
 - “miracle wheat seed”
 - “miracle rice seed”
 - “miracle high-yield maize (corn)”

Population and Food Production



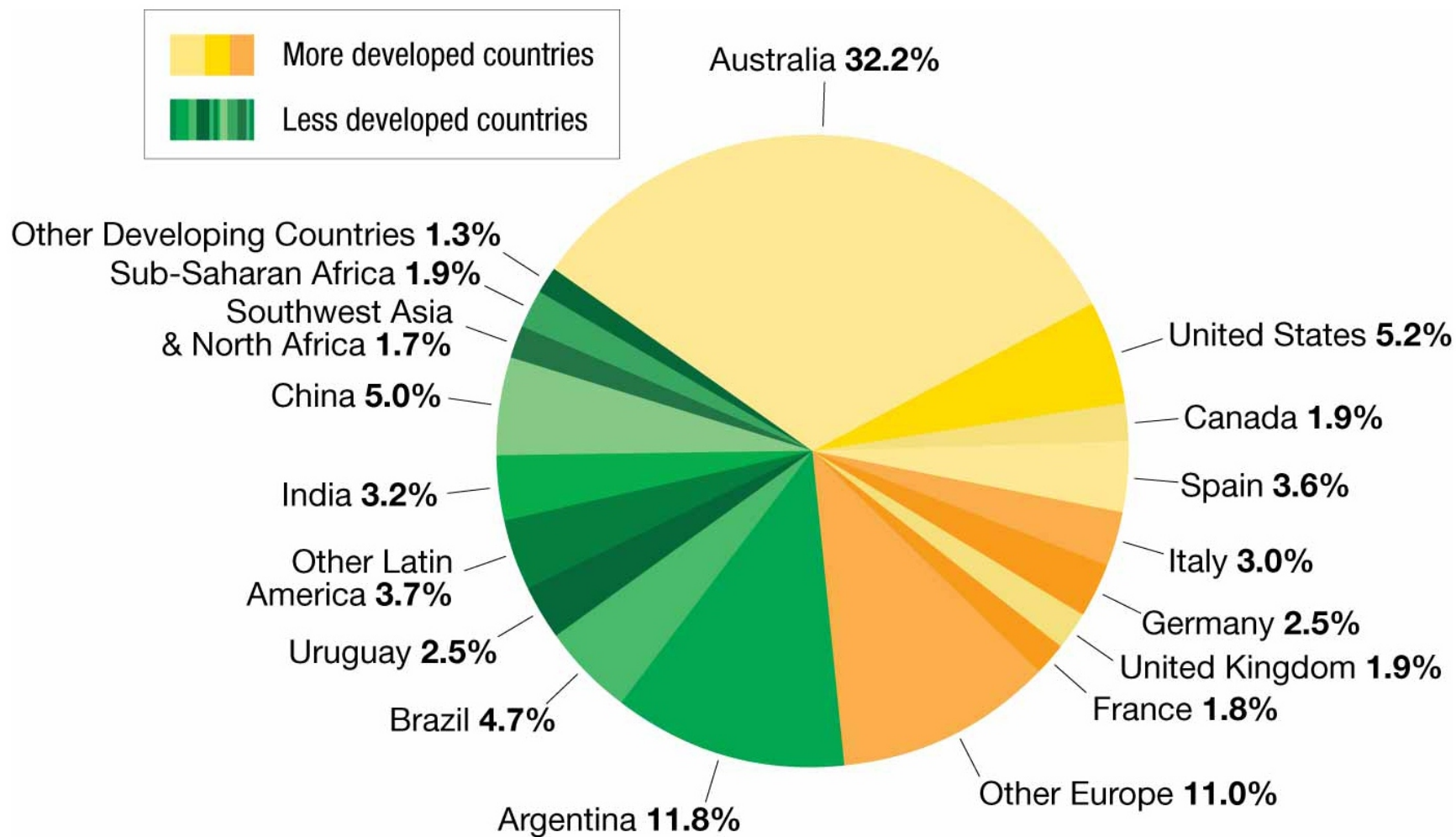
Genetically Modified Crops in the US



Why Do Farmers Face Economic Difficulties?

- Strategies to Increase the World's Food Supply
 - Sustainable Agriculture
 - *Sustainable agriculture* are agricultural practices that preserve and enhance environmental quality.
 - Three principal practices distinguish sustainable picture (and, at its best, organic farming) from conventional agriculture:
 - Sensitive land management
 - Limited use of chemicals
 - Better integration of crops and livestock

Distribution of Organic Farming



Summary

- Prior to the development of agriculture, people survived by hunting animals, gathering wild vegetation, and fishing. Current agricultural practices vary between developed and developing countries.
- Everyone needs food to survive. The amount of food and dietary composition of the food vary between developed and developing countries.

Summary

- Most people in developing countries are subsistence farmers, growing crops primarily to feed themselves. Commercial farming is primarily practiced in developed countries.
- Farmers face many challenges to meeting the dietary needs of a rapidly growing population when they are forced to rely on poorer quality land to farm, as a result of land degradation processes and suburban sprawl taking away prime farmland.