

Chapter 11

Industry and Manufacturing

Key Issues

- Where is industry distributed?
- Why are situation and site factors important?
- Why does industry cause pollution?
- Why are situation and site factors changing?

Where Is Industry Distributed?

- Modern concept of industry means the manufacturing of goods in a factory.
 - Origin: northern England and southern Scotland in second half of 18th century.
- *Industrial Revolution* refers to improvements made in industrial technology that transformed the process of manufacturing goods.

Where Is Industry Distributed?

- Industrial Regions
 - Industry is concentrated in three regions
 - Europe
 - North America
 - East Asia
 - Each regions accounts for roughly $\frac{1}{4}$ of the world's total industrial output.
 - Brazil and India account for most of industrial output outside of the aforementioned regions.

Why Are Situation and Site Factors

- Geographers attempt to explain why one location may prove more profitable for a factory than others.
 - Companies ordinarily face two geographic costs.
 1. Situation factors – costs associated with the established transportation networks accessible from a specific place.
 2. Site factors – costs resulting from the unique characteristics of a location.

Why Are Situation and Site Factors Important?

- Situation Factors: Proximity to Inputs
 - The farther something is transported, the higher the costs, so a manufacturer tries to locate its factory as close as possible to its inputs and markets.
- Proximity to Input: optimal plant location is near the input.
 - Raw material transportation costs $>$ transportation costs of product to consumer
 - » *Bulk-reducing Industry*: Because inputs weigh more than the final products, plant location is near market to reduce transportation costs.
- Proximity to Market: optimal plant location is near the market.
 - Raw material transportation costs $<$ transportation costs of product to consumer

Why Are Situation and Site Factors Important?

- **Situation Factors: Proximity to Markets**
 - Critical locational factor for three types of industries.

1. Bulk-Gaining Industries

- Production of a product that gains volume or weight during its production. Plants typically located near market to reduce the costs of transportation.
- Examples
 - » Fabrication of parts and machinery from steel and other metals.
 - » Plants where beverages are bottled.

Why Are Situation and Site Factors Important?

- **Situation Factors: Proximity to Markets**
 - Critical locational factor for three types of industries cont' d.
 2. **Single-Market Manufacturers**
 - Specialized manufacturers with only one or two customers.
 - Optimal location for factories is often in close proximity to the customers.
 - Examples
 - » Producers of specialized components attached to clothing e.g. buttons, zippers, or pins.
 - » Makers of parts for motor vehicles.

Manufacturing Zippers



Why Are Situation and Site Factors Important?

- **Situation Factors: Proximity to Markets**
 - Critical locational factor for three types of industries cont' d.

3. Perishable Products

- Companies specializing in perishable products must be located in close enough proximity to their markets that the product does not spoil or become dated during transportation.
- Examples
 - » Food Products e.g. bakers and milk bottlers
 - » Time Sensitive Products e.g. printed newspapers

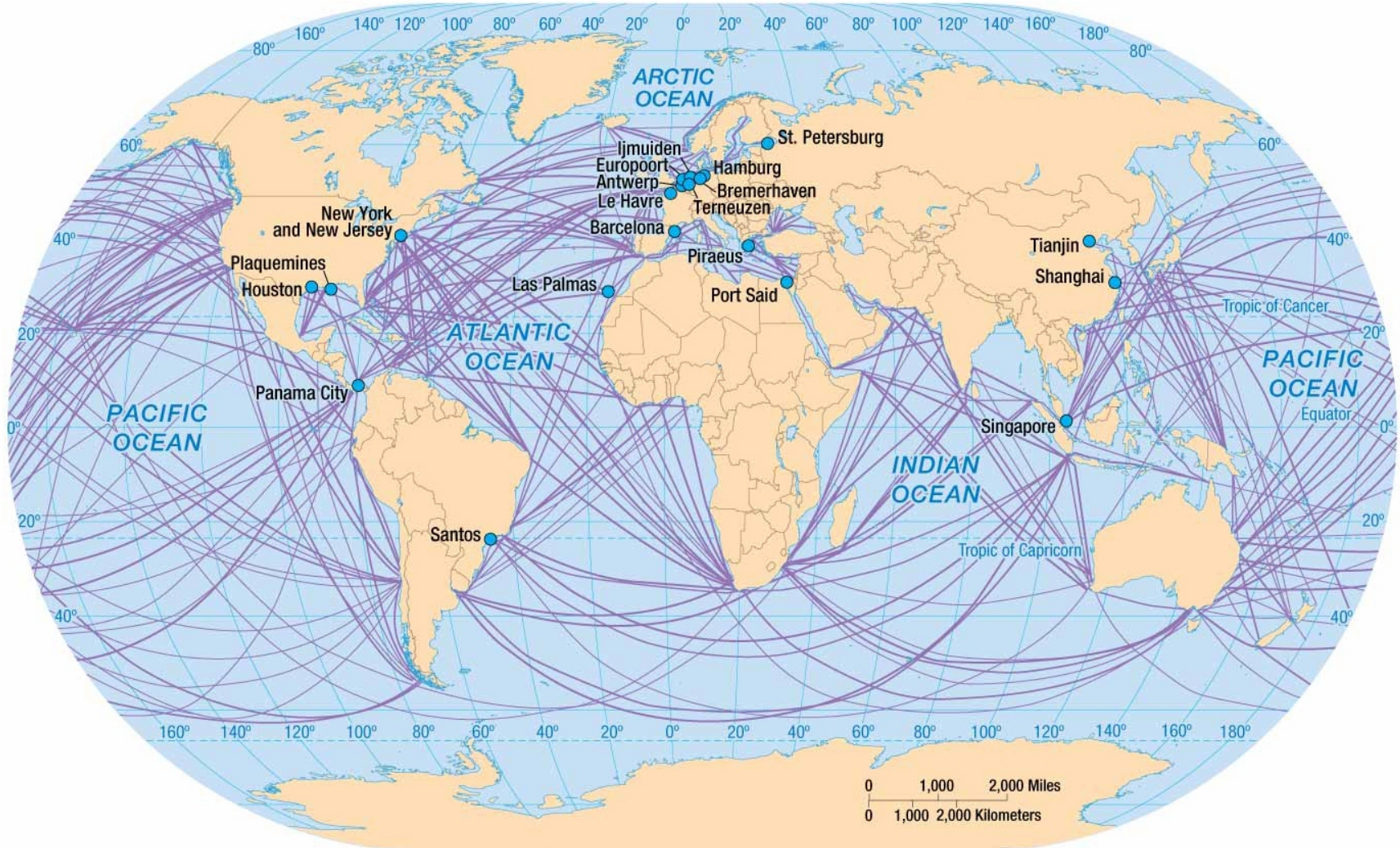
Perishable Products – Potato chips



Why Are Situation and Site Factors Important?

- Ship, Rail, Truck, or Air?
 - Firms seek the lowest-cost mode of transport.
 - The cost per kilometer (mi.) decreases at different rates for each of the four modes, because loading and unloading expenses differ by mode of transportation.
 - Many companies that use multiple transport modes locate at a *break-of-bulk point*, which is a location where transfer among transportation modes is possible.
 - Examples include seaports and airports

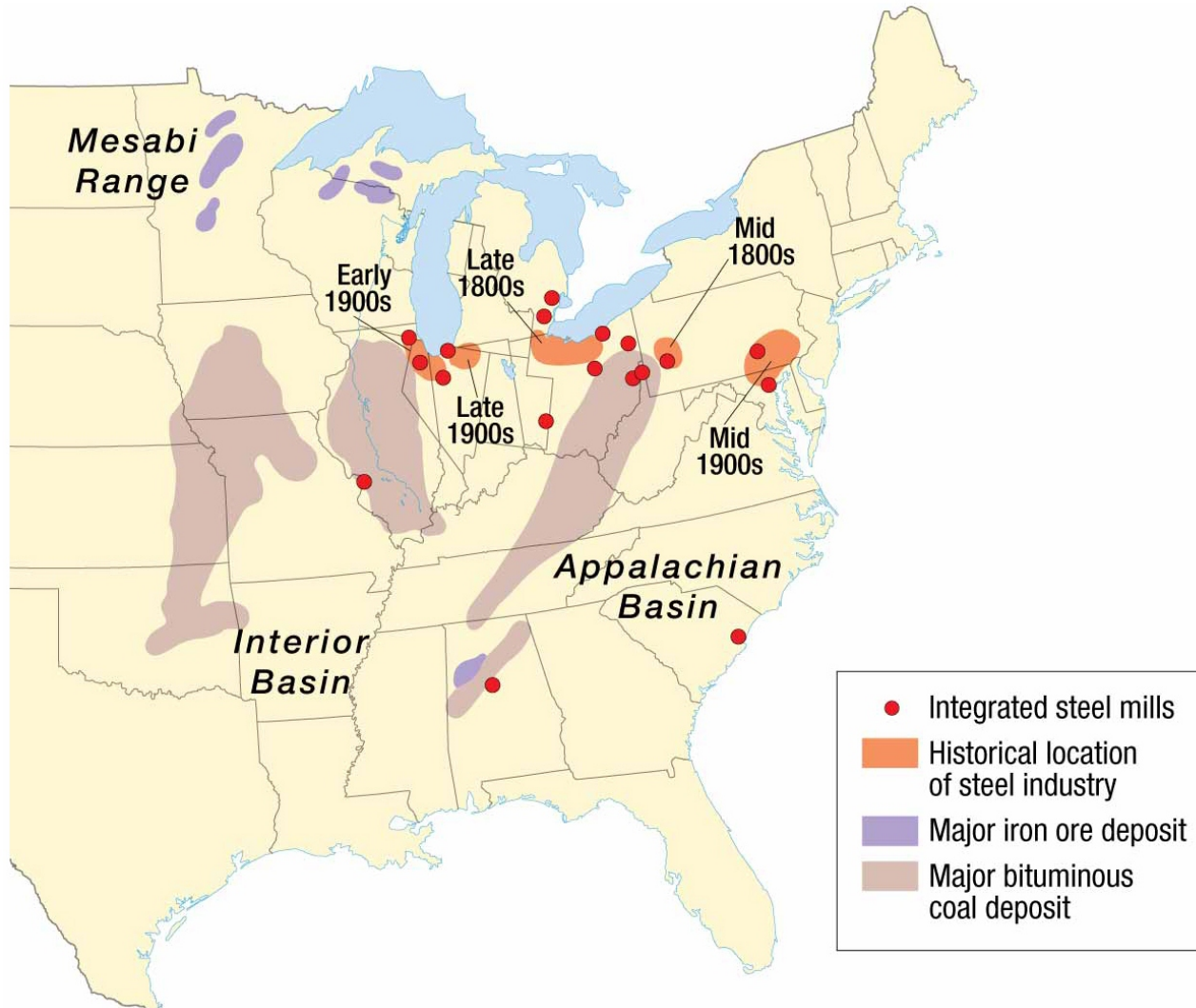
World Shipping Routes



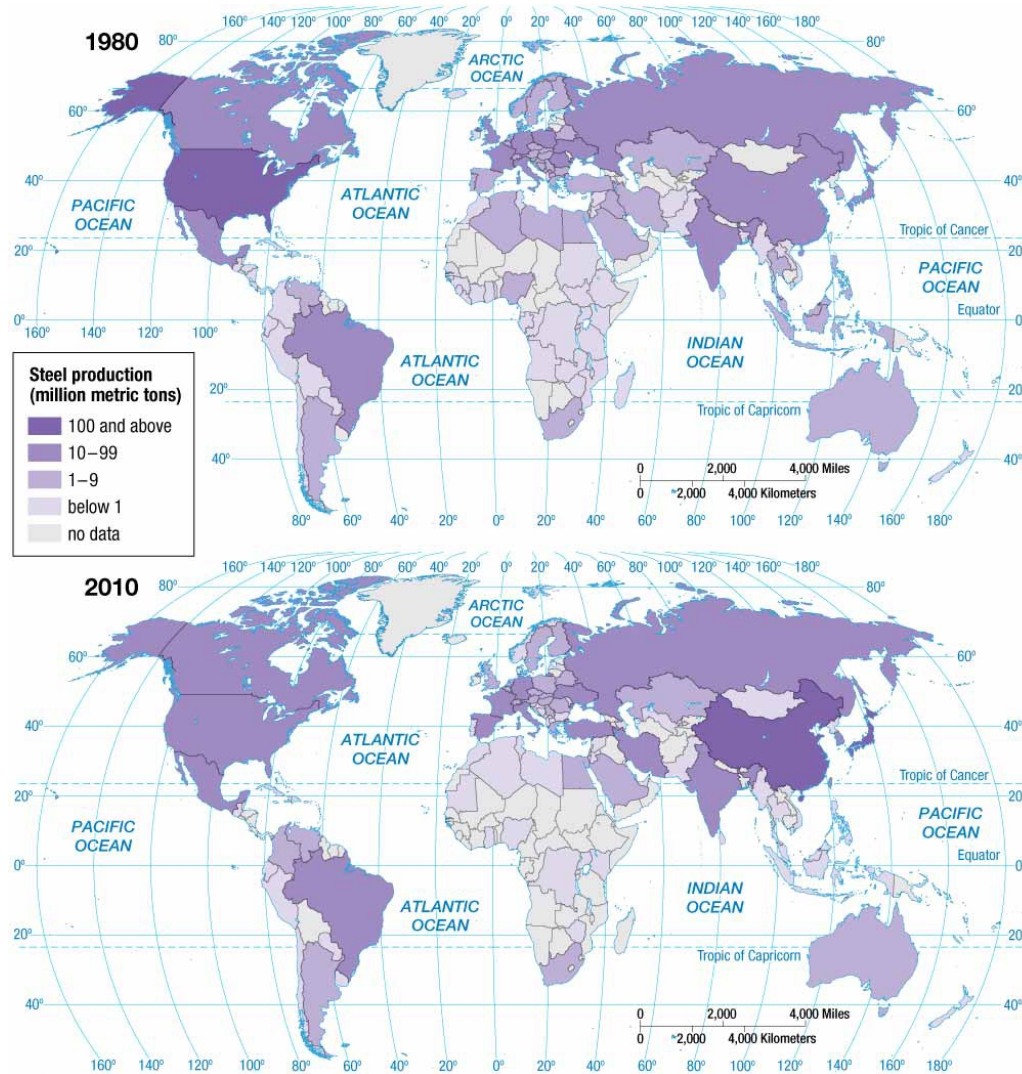
Why Are Situation and Site Factors Important?

- Steel: Changing Inputs
 - Changing Distribution of the Steel Industry
 - Two changes in situation factors have influenced changes in the distribution of steel mills within the United States and world.
 1. Changes in relative importance of main inputs- iron ore and coal.
 2. Increasing importance of proximity to markets rather than proximity to inputs.
 - From the mid-19th through the early 20th century, steel mills were located near inputs.
 - Since the mid-20th century, proximity to markets has become more important than proximity to inputs.

Integrated Steel Mills in the Eastern USA



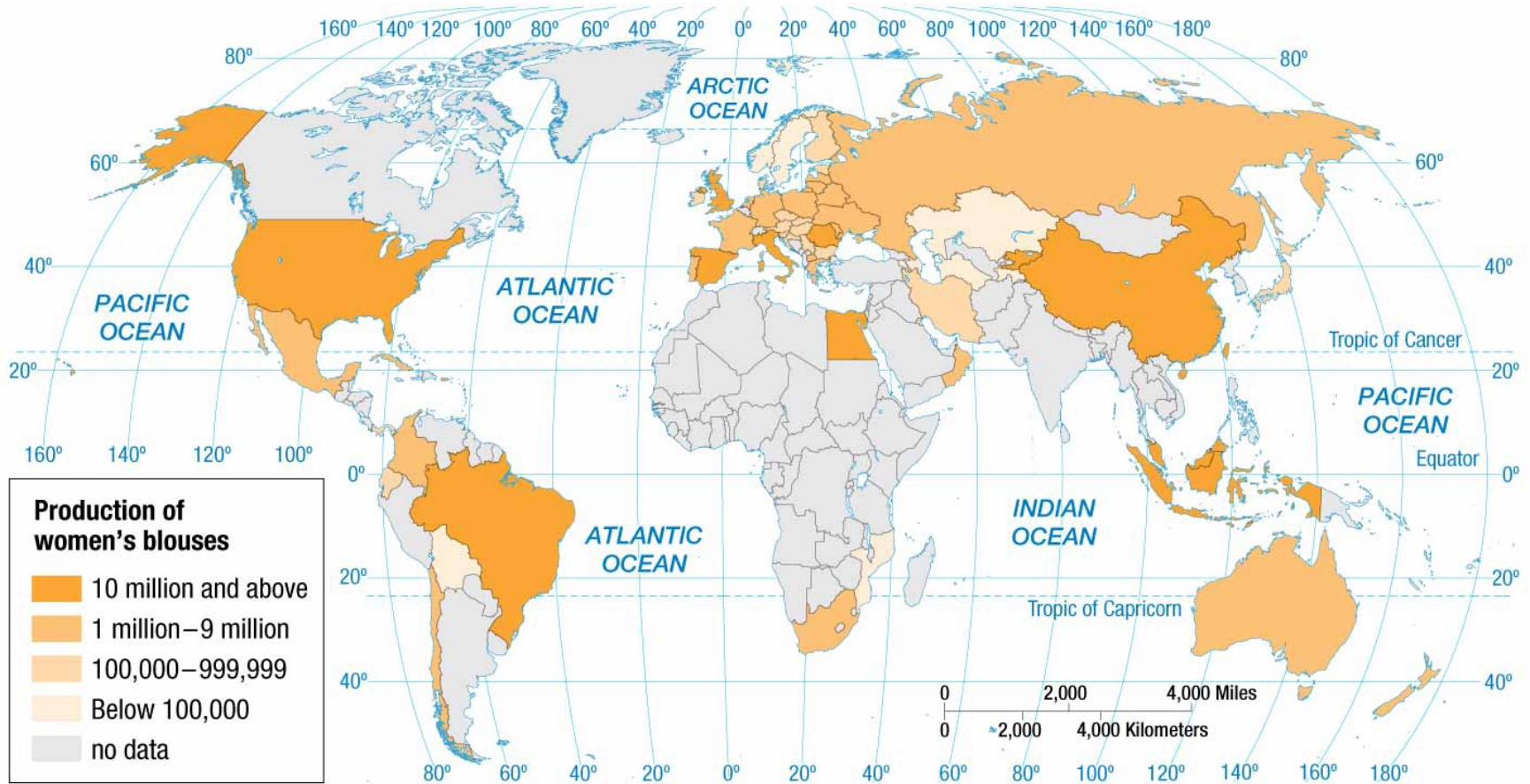
World Steel Production – 1800 and 1900



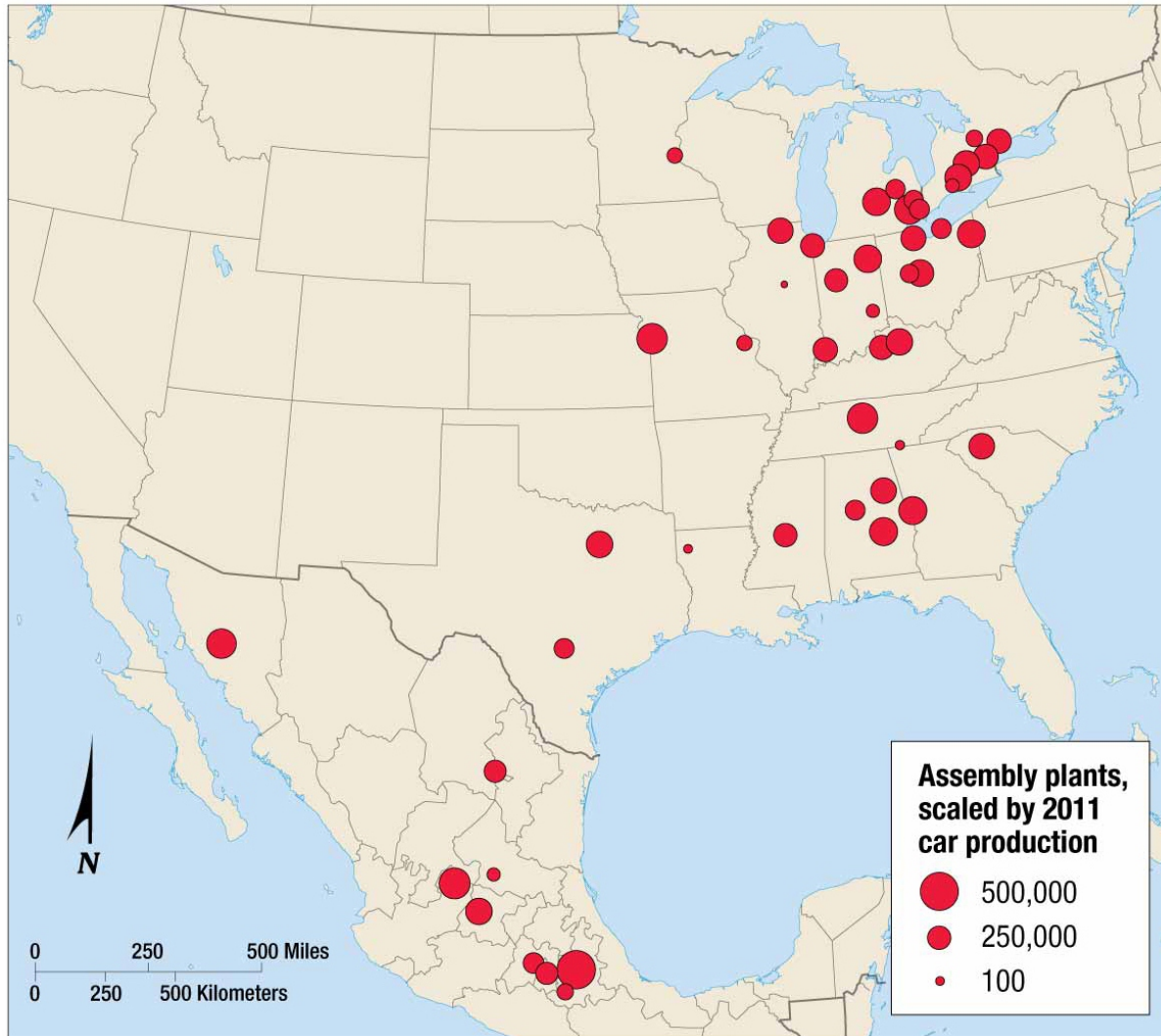
Why Are Situation and Site Factors Important?

- **Motor Vehicles: Changing Markets**
 - Motor vehicles are built near their markets.
 - Change in markets influences location of factories.
 - Final assembly plant of motor vehicles is an example of a bulk-gaining operation.
 - North America
 - “auto alley” located in interior of the U.S.
 - Central Mexico
 - Europe
 - Most located in an east-west corridor between the U.K. and Russia.
 - East Asia
 - China’s plants located in western China.

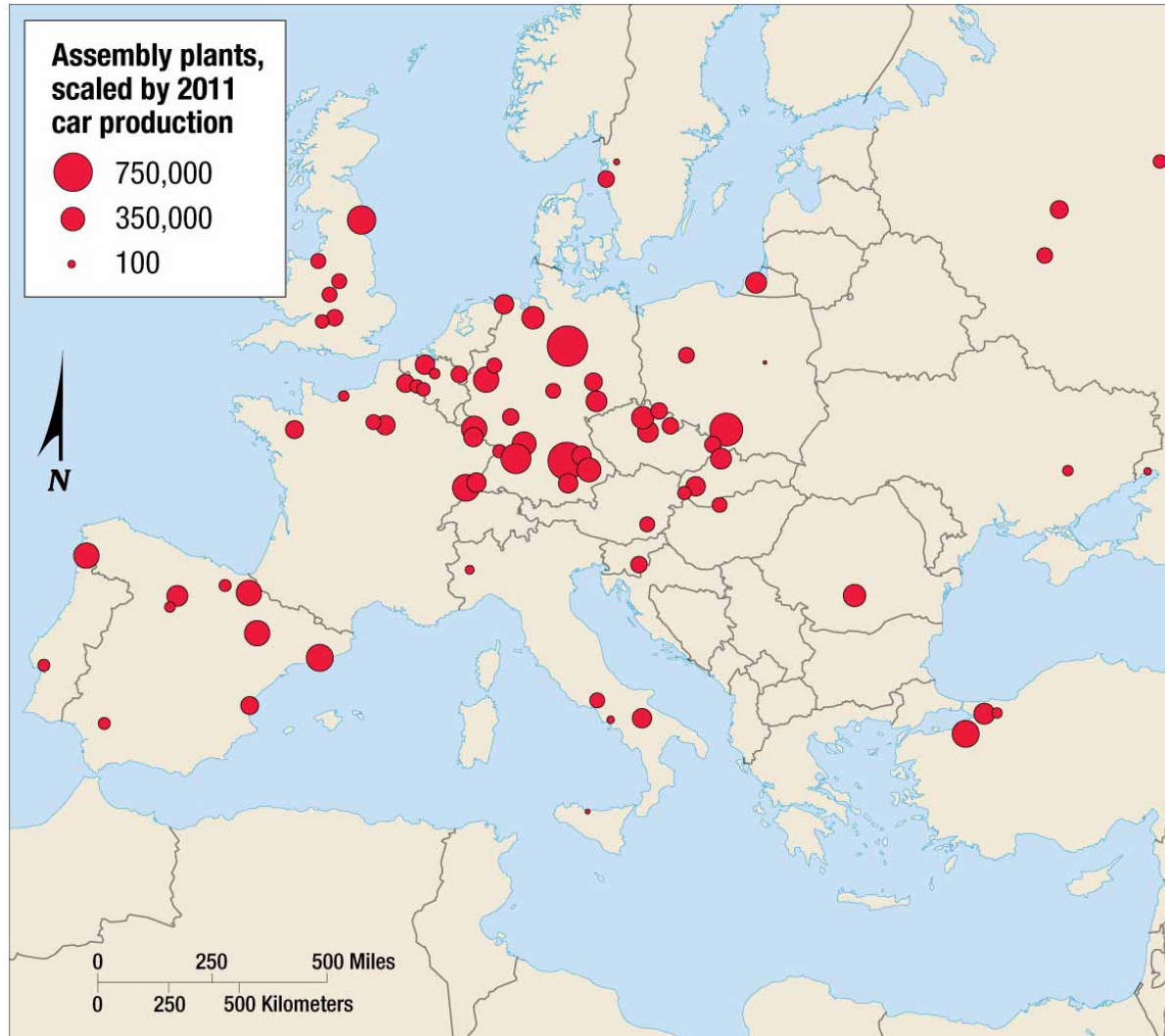
Production of Women's Blouses



Motor Vehicle Production in the USA



Motor Vehicle Production in the USA



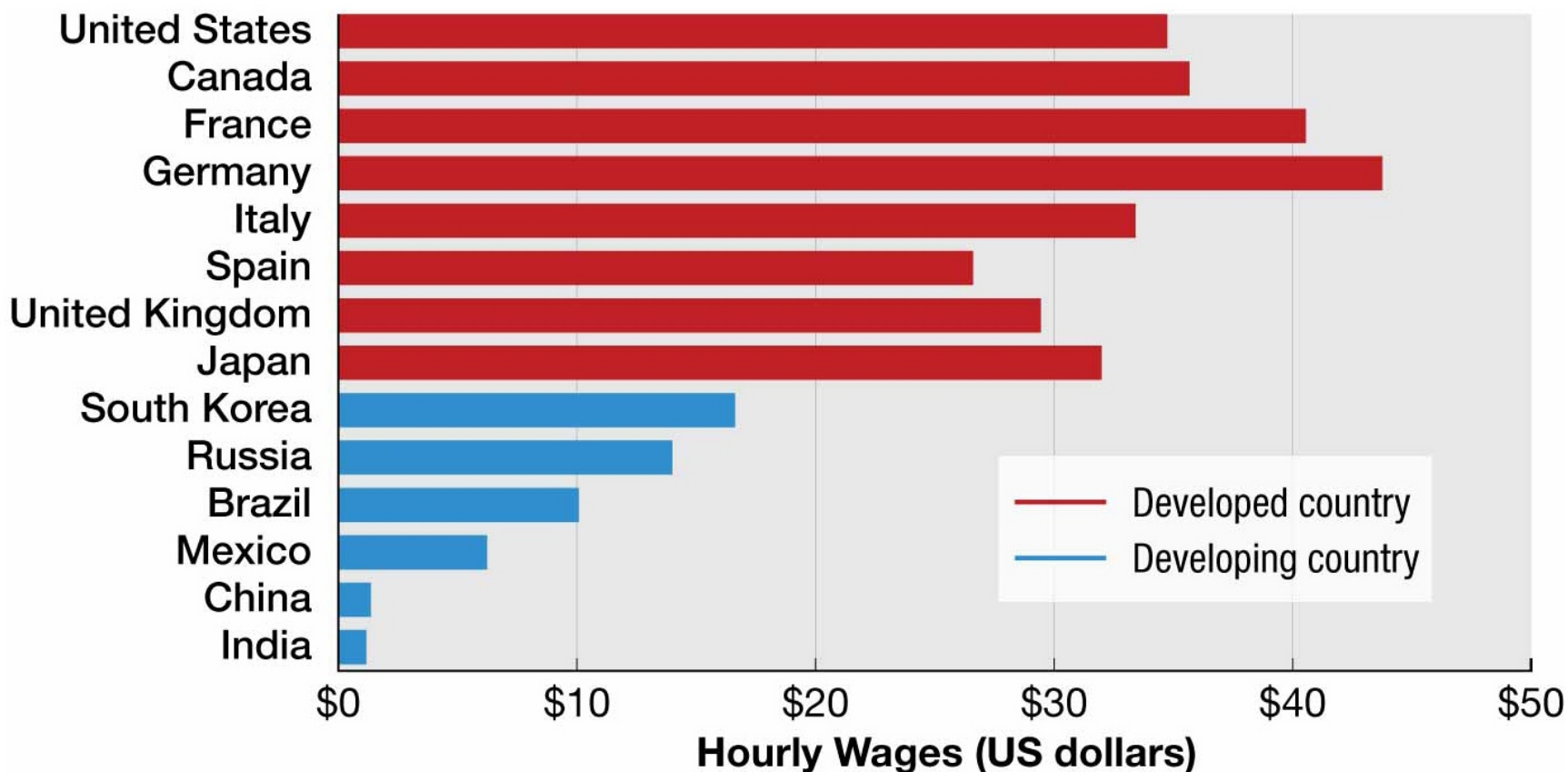
Why Are Situation and Site Factors Important?

- Site Factors

- Labor

- Most important factor on a global scale.
 - Minimizing labor costs, which vary around the world, is extremely important to some industries.
 - A *labor-intensive industry* is an industry in which wages and other compensation paid to employees constitute a higher percentage of expenses.

Hourly wages - 2010



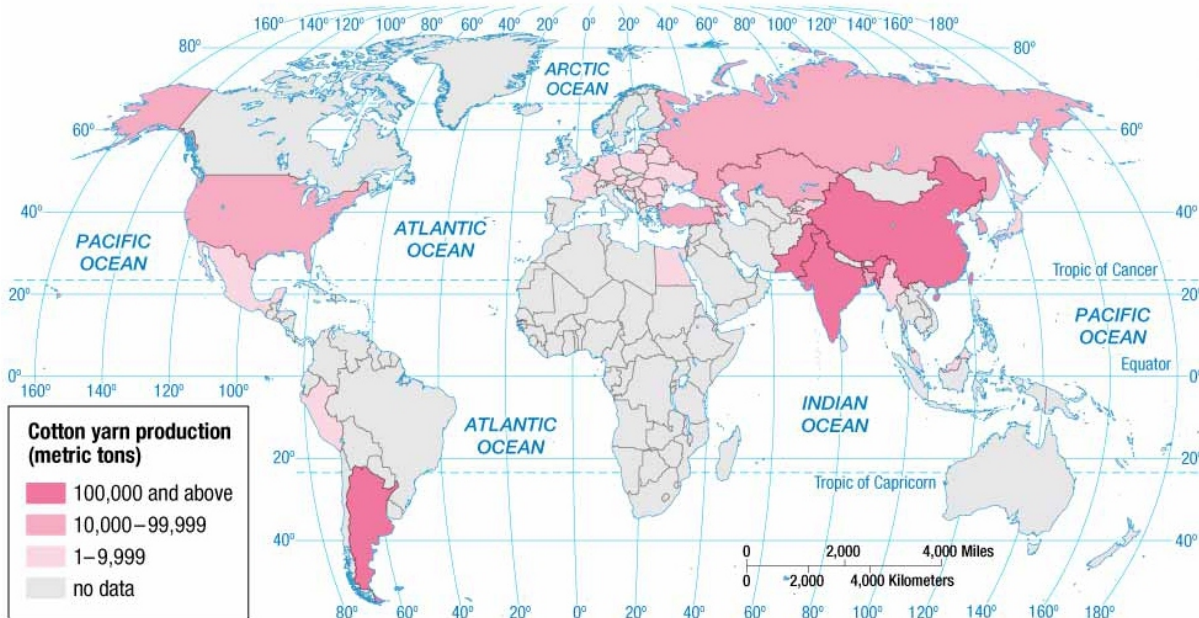
Why Are Situation and Site Factors Important?

- Site Factors cont' d
 - Capital
 - Manufacturers typically borrow the funds needed to establish new factories or expand existing ones.
 - Ability to borrow money has greatly influenced the distribution of industry in developing countries.
 - Land
 - Lots must be large enough to accommodate efficient, contemporary one-story buildings.
 - Mostly available in suburban and rural locations and tends to be relatively cheaper than land in the city.

Why Are Situation and Site Factors Important?

- Site Factors cont' d
 - Textiles and Apparel: Changing Inputs
 - Production of *textiles* (woven fabrics) and *apparel* (clothing) generally requires less-skilled, low-cost labor.
 - Majority of spinning, which is a process to make cotton, is done primarily in low-wage countries.
 - China: Produces 2/3 of the world' s cotton thread.
 - Majority of apparel weaving is highly clustered in low-wage countries.
 - China: Produces 60% of fabric worldwide.
 - India: Produces 30% of fabric worldwide.

Cotton Spinning



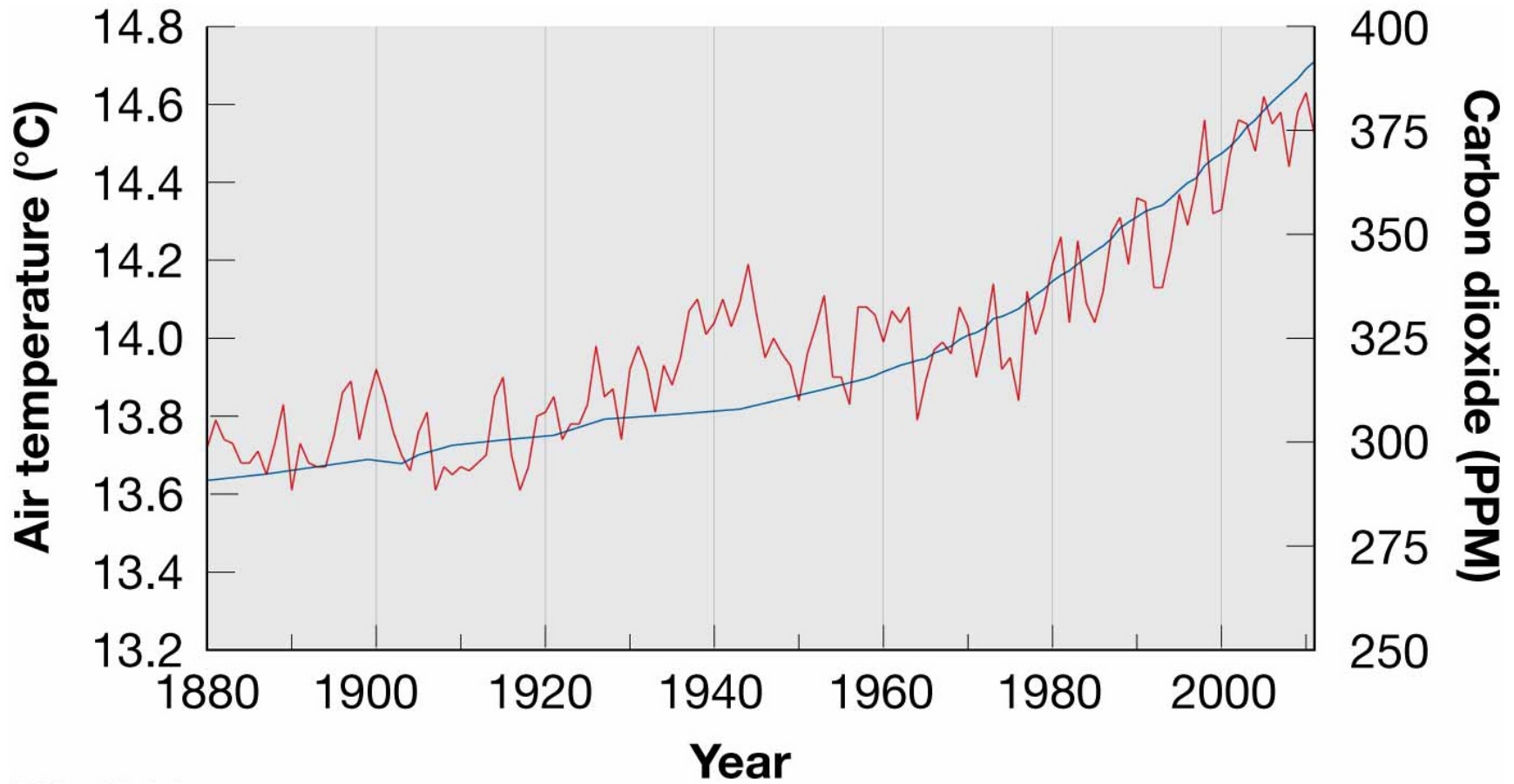
Chinese woman spinning cotton

Where Does Industry Cause Pollution?

- Air Pollution

- *Air pollution* is concentration of trace substances at a greater level than occurs in average air.
- Air pollution can block or delay the return of some of the heat leaving Earth, thereby raising its temperatures.
- Burning fossil fuels discharges one of the trace gases, carbon dioxide.
 - CO₂ levels in the atmosphere have risen by over 25% in the last 200 years.
 - Anticipated rise in Earth's temperature because of rising CO₂ levels is called the *greenhouse effect*.

Global warming and CO₂ Concentrations



Where Does Industry Cause Pollution?

- Air Pollution

- Potential Implications of Global Warming

- Melting of polar ice sheets
 - Rising sea levels
 - Shifting of global precipitation patterns

- Ozone Depletion

- Earth's ozone layer in the atmosphere protects the planet from dangerous ultraviolet (UV) rays emitted by the sun.
 - Earth's protective ozone layer is threatened by pollutants called chlorofluorocarbons (CFCs).
 - By 2030, all countries have agreed to cease using products containing CFCs.

Where Does Industry Cause Pollution?

- Regional-Scale Air Pollution
 - Air pollution may damage a region's vegetation and water supply through *acid deposition*- tiny droplets of sulfuric acid and nitric acid that form from burning fossil fuels and fall to Earth's surface.
 - Mixing of acid deposition with water produces *acid precipitation* that manifests itself as rain, snow, or fog.
 - Geographers are interested in acid precipitation, because it typically does not fall over where it is emitted.

Where Does Industry Cause Pollution?

- Local-Scale Air Pollution
 - Air pollution is especially severe in places where emission sources are concentrated, such as in urban areas.
 - Urban air pollution has three basic components
 - Carbon monoxide
 - Hydrocarbons
 - Particulates
 - Worst urban air pollution occurs when winds are slight, skies are clear, and a temperature inversion exists.

Where Does Industry Cause Pollution?

- Solid Waste Pollution
 - About 2 kilograms (4 pounds) of solid waste per person is generated daily in the U.S.
 - 60% from residences
 - 40% from businesses
 - Paper products account for the largest percentage of solid waste in the U.S.
 - Using a *sanitary landfill* is the most common strategy for disposal of solid waste in the U.S.

Where Does Industry Cause Pollution?

- Water Pollution

- Sources of water pollution can be divided into two categories.

1. *Point-source pollution* enters a body of water at a specific location.

- Tend to be smaller in quantity and easier to control

- Main sources of pollution are manufacturers and municipal sewage systems.

2. *Nonpoint-source pollution* comes from a large, diffuse area.

- Usually pollute in greater quantities and harder to control.

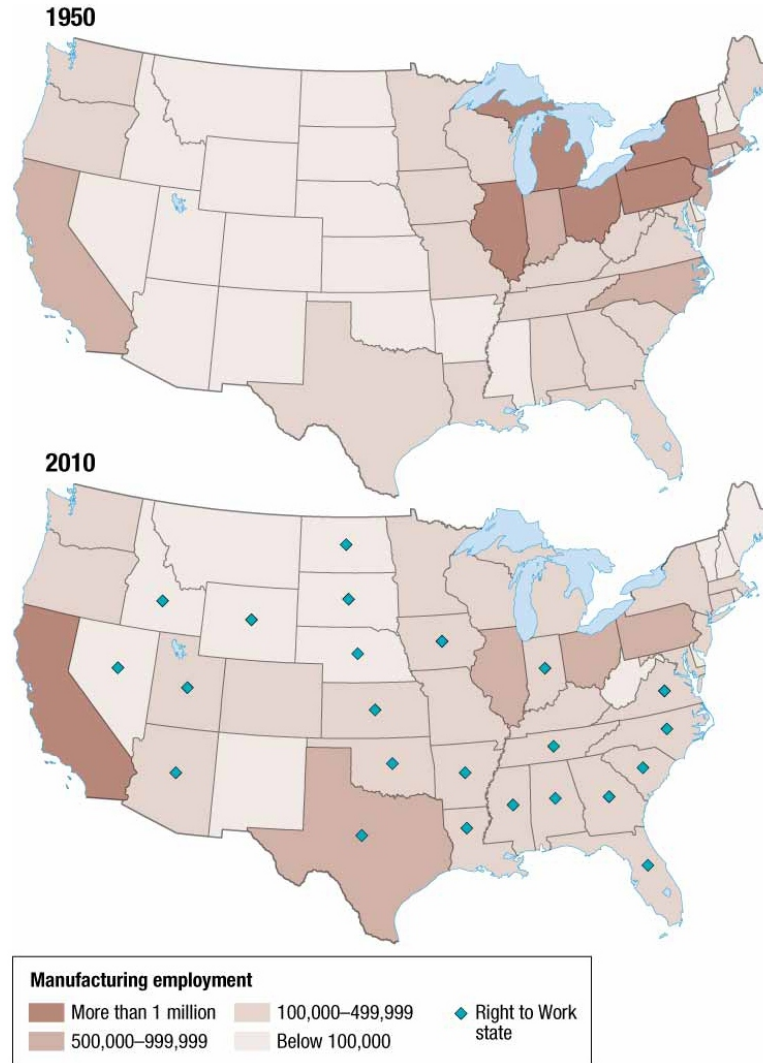
- Principal nonpoint source is agriculture.

- » Fertilizers and pesticides spread on fields are carried into rivers and lakes by runoff.

Why Are Situation and Site Factors Changing?

- Changes within Developed Regions
 - Shifts within the U.S.
 - Industrialization during the late 19th and early 20th centuries largely bypassed the South, because they lacked the needed infrastructure. e.g. transportation network and electricity.
 - More recently, manufacturers have been lured by *right-to-work laws*- legislation that requires a factory to prohibit workers from being forced to join a union.
 - Essentially, industry in the U.S. over time has shifted from the Northeast toward the South and West.

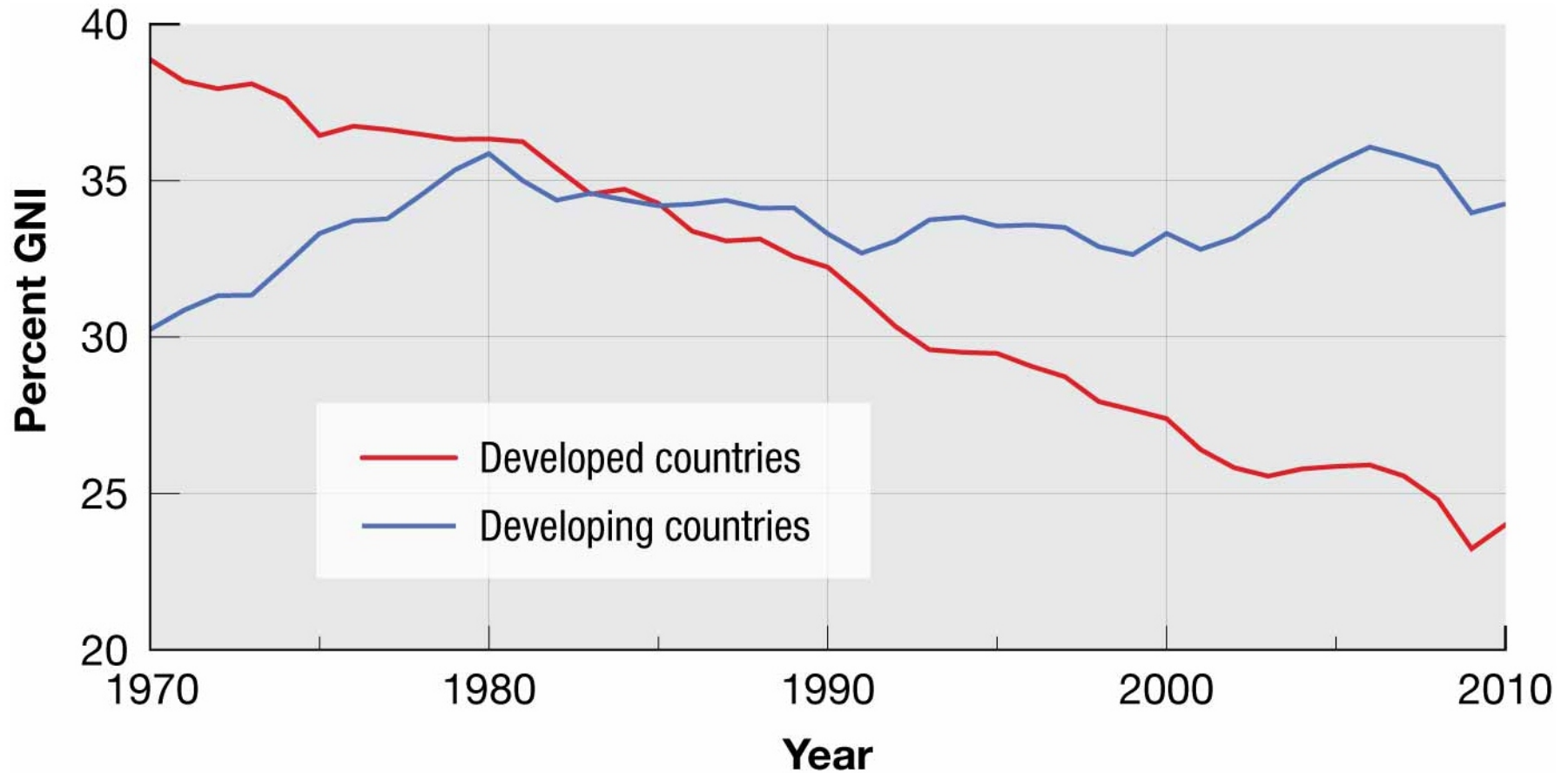
Changing USA Manufacturing



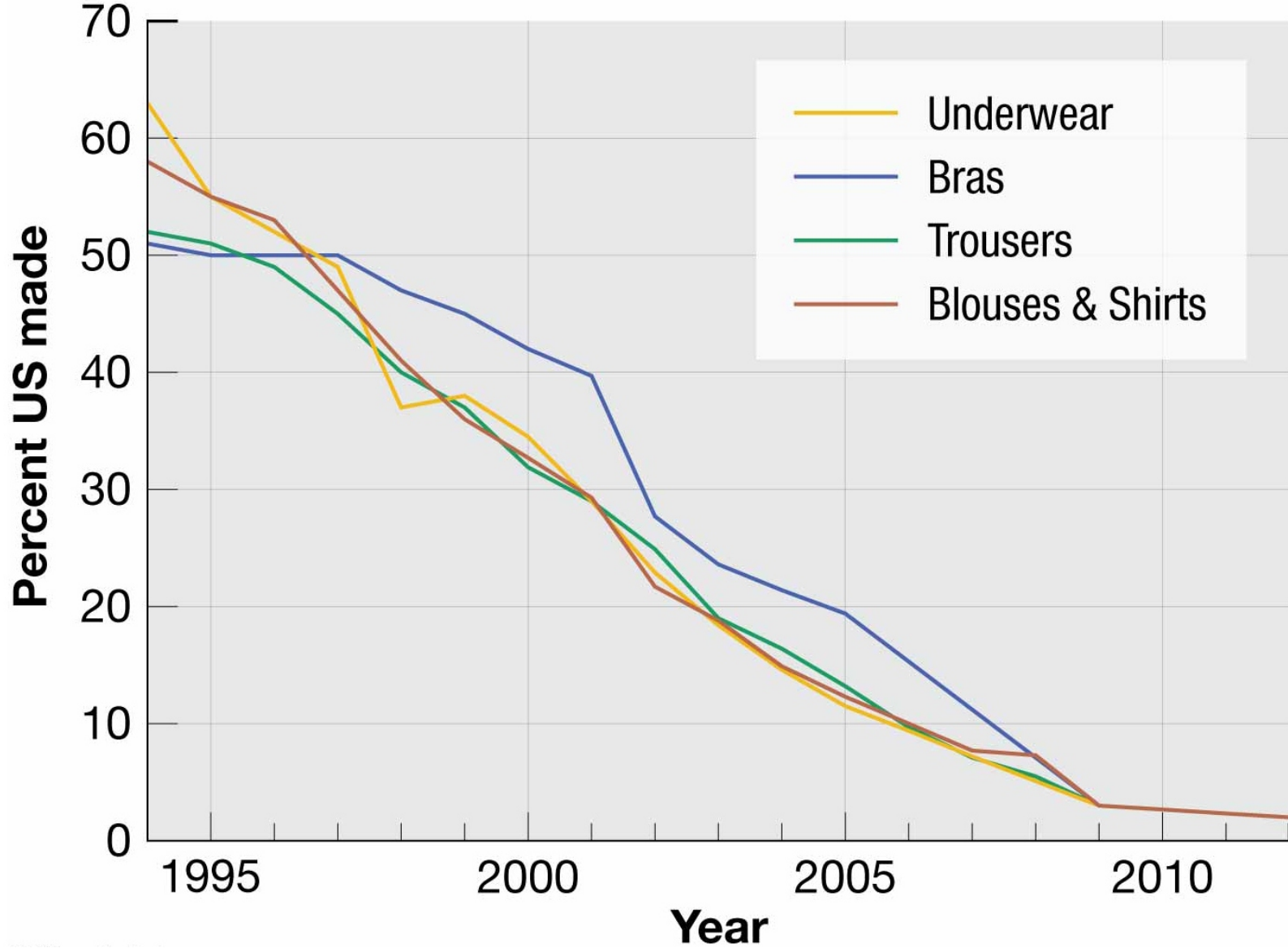
Why Are Situation and Site Factors Changing?

- Emerging Industrial Regions
 - Some manufacturers are locating in places where prevailing wage rates are lower than in traditional industrial regions.
 - Transnational corporations have embraced using low-cost labor in developing countries.
 - *New international division of labor* refers to selective transfer of production operations requiring highly skilled workers to factories located in developed countries and those requiring little skill to factories located in developing countries.

Manufacturing Value as a percentage of GNI



US Clothing manufacturing



Why Are Situation and Site Factors Changing?

- Emerging Industrial Regions
 - Mexico and NAFTA
 - The North Atlantic Free Trade Agreement (NAFTA) eliminated most barriers to moving goods among Mexico, the U.S., and Canada since 1994.
 - Mexico attracts labor-intensive industries because of its relatively low-cost labor and its proximity to the U.S.
 - Plants in Mexico near the U.S. border are known as *maquiladoras*.

Why Are Situation and Site Factors Changing?

- Renewed Attraction of Traditional Industrial Regions
 - Two location factors influence industries to remain in traditional industrial regions:
 1. Availability of Skilled Labor
 - Asset found principally in traditional industrial regions.
 2. Rapid Delivery to Market
 - Proximity to market has become more important since the advent of *just-in-time delivery*- the delivery method where parts and materials arrive at a factory moments before they are needed.

Summary

- The concept of manufacturing goods in a factory originated with the Industrial Revolution in the U.K. and later diffused to other present-day developed countries.
- Manufacturers select location for factories based on assessing a combination of situation and site factors.
- Industry is a major polluter of air, land, and water, because the production of goods and services also produce some degree of waste.

Summary

- Industry is on the move within developed countries, as well as to emerging developing countries, because firms are always looking to gain a competitive edge over the competition and increase their profit margins.