Chapter 10
Land, Public and Private

Module 29
Land Use Concepts and Classification

After reading this module, you should be able to

- explain how human land use affects the environment.
- describe the various categories of public land used globally and in the United States.

Human land use affects the environment in many ways

- Every human use of land alters it in some way.

- People do not always agree on land use and management priorities.

To understand land use and management issues, environmental scientists use 3 concepts:

- Tragedy of the commons

- Externalities

- Maximum sustainable yield

    - WHAT ARE THESE? DOES ANYONE KNOW?

Tragedy of the Commons

- **Tragedy of the commons** The tendency of a shared, limited resource to become depleted because people act from self-interest for short-term gain.

- When many people share a common resource without agreement on or regulation of its use, it is likely to become overused very quickly. *No reason or incentive for any one user to protect the land or resource.*

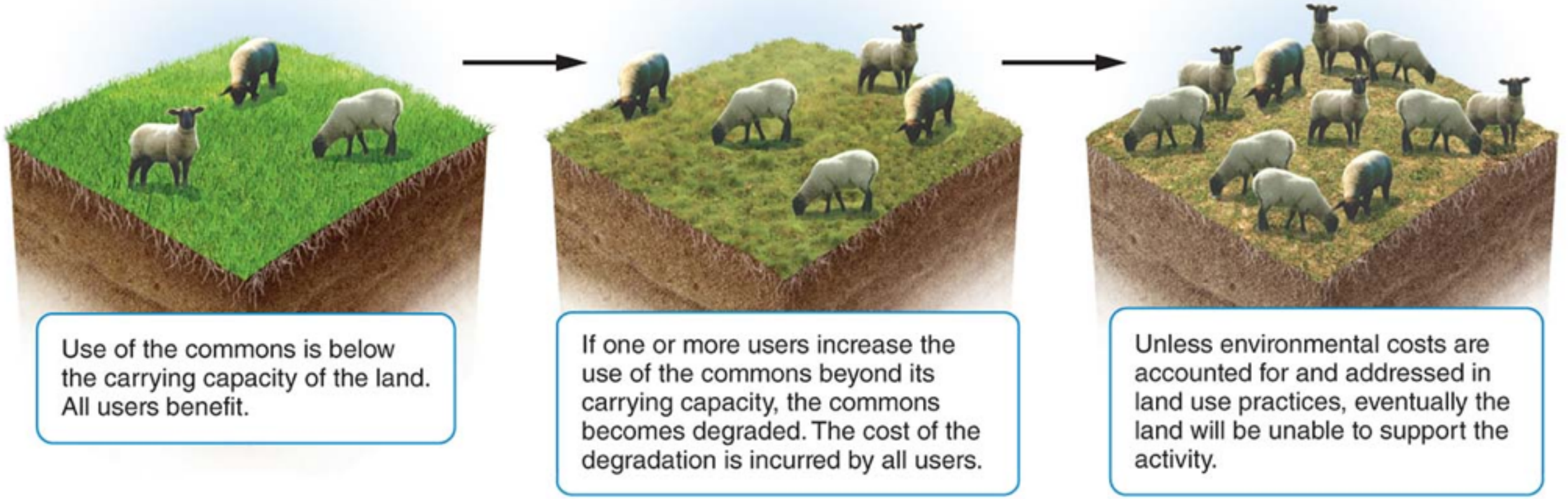

Figure 29.2
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The tragedy of the commons. If the use of common land is not regulated in some way—by the users or by a government agency—the land can easily be degraded to the point at which it can no longer support that use.

Externalities

- **Externality** The cost or benefit of a good or service that is not included in the purchase price of that good or service.

- Environmental scientists are concerned about negative externalities because of the environmental damage for which no one bears the cost.

- But externalities can be both positive and negative, you will have to identify them on the test

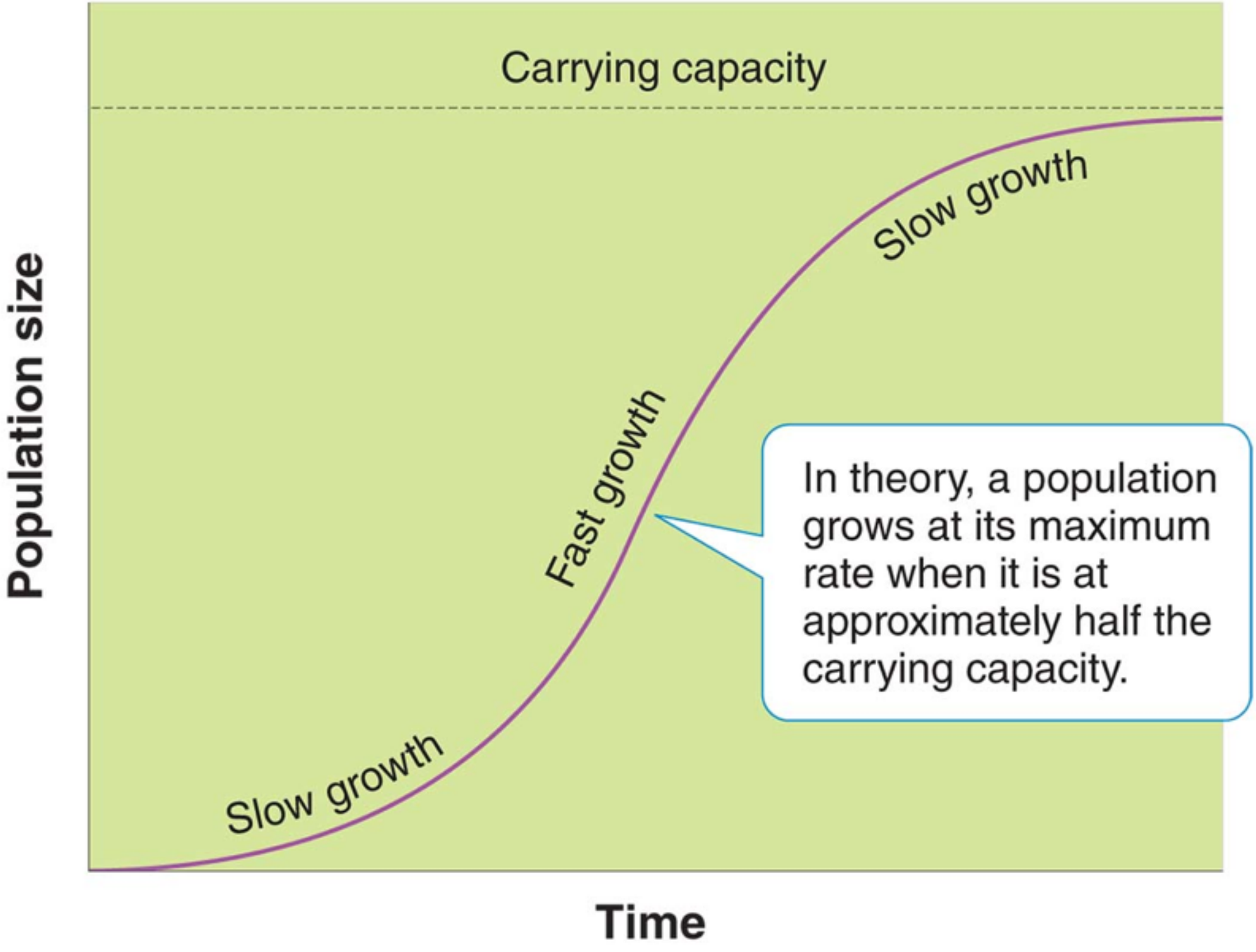
Maximum Sustainable Yield

- **Maximum sustainable yield (MSY)** The maximum amount of a renewable resource that can be harvested without compromising the future availability of that resource.

- Maximum sustainable yield varies case by case.

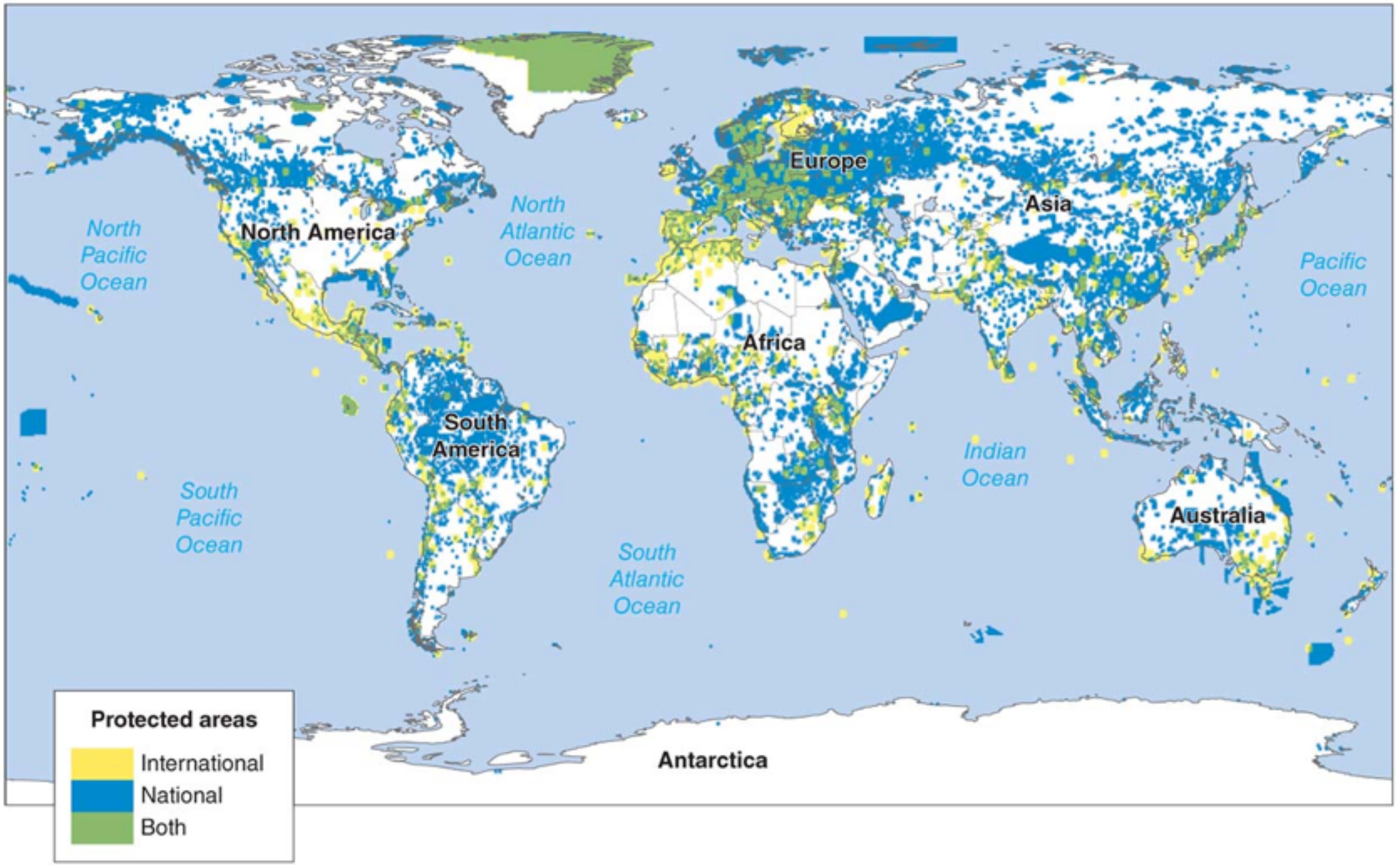
- In theory, harvesting the MSY should be sustainable. In reality it is very difficult to calculate MSY.

- Even when we do calculate MSY, it can take months or years to determine whether a yield is truly sustainable.



Maximum sustainable yield. Every population has a point at which a maximum number of individuals can be harvested sustainably. That point is often reached when the population size is about one-half the carrying capacity.

Public lands are classified according to their use



1.7 Billion Hectares or 11% land area

Protected land and marine areas of the world. Protected areas are distributed around the globe.

International Categories of Public Lands

The United Nations recognizes six categories of public lands:

- **National parks** are managed for scientific, educational, and recreational use, and sometimes for their beauty or unique landforms.

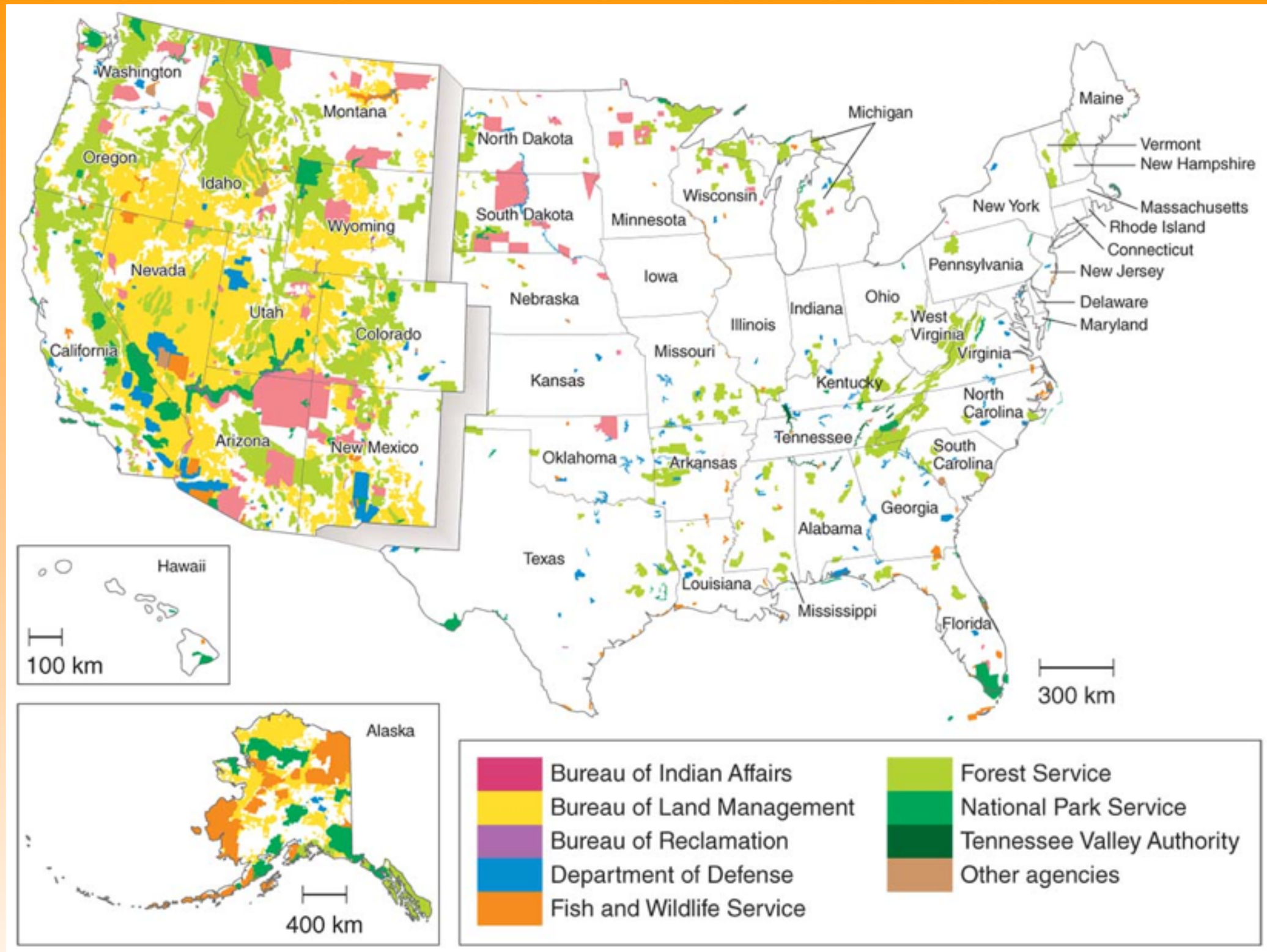
- **Managed Resource Protected Areas** are designated for the sustained use of biological, mineral, and recreational resources.

- **Habitat/Species Management Areas** are actively managed to maintain biological communities.

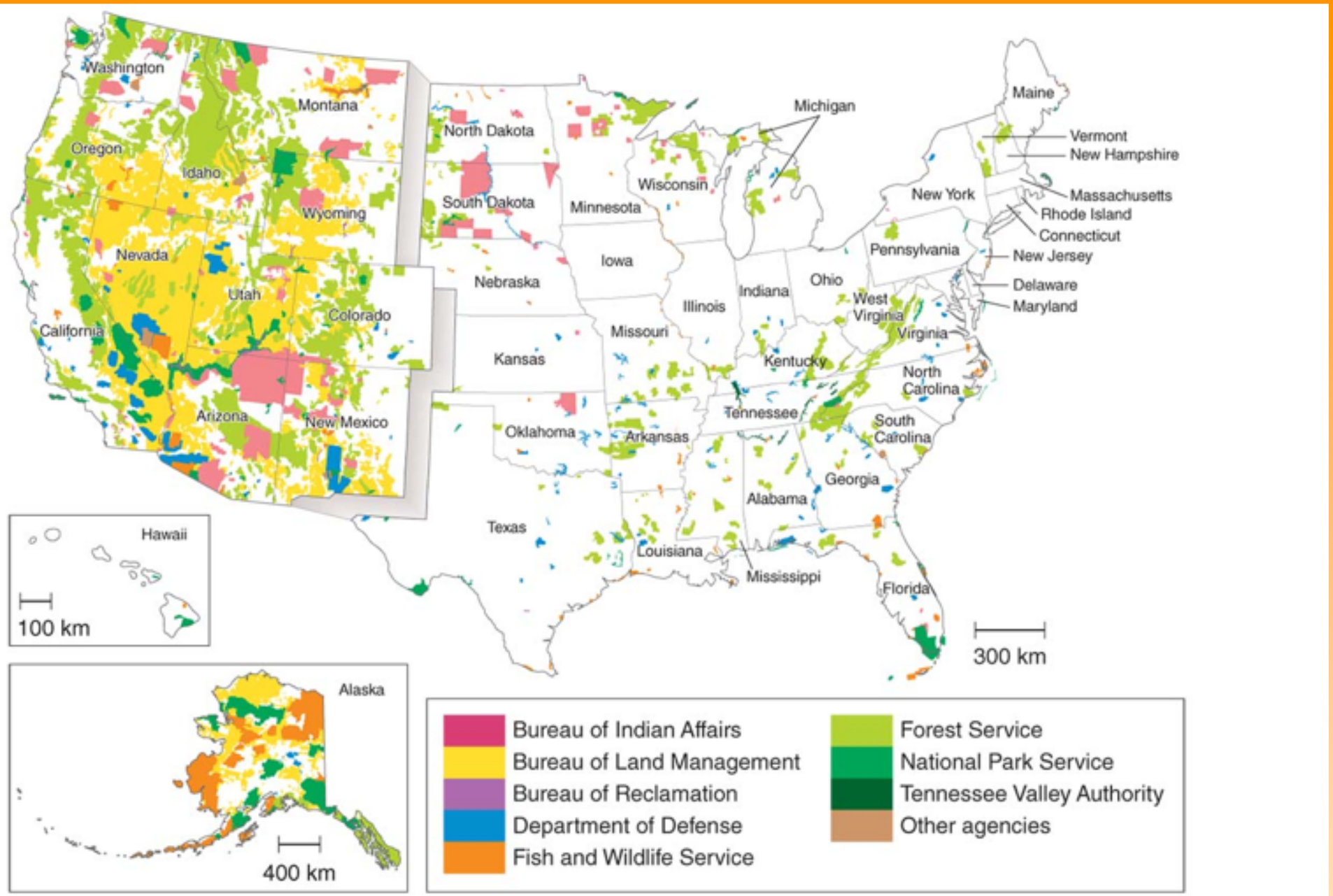
International Categories of Public Lands (Cont.)

- **Strict Nature Reserves and Wilderness Areas** are set aside to protect species and ecosystems.
- **Protected Landscapes and Seascapes** permit nondestructive use of natural resources while allowing for tourism and recreation.
- **National Monuments** are designated to protect unique sites of special natural or cultural interests.

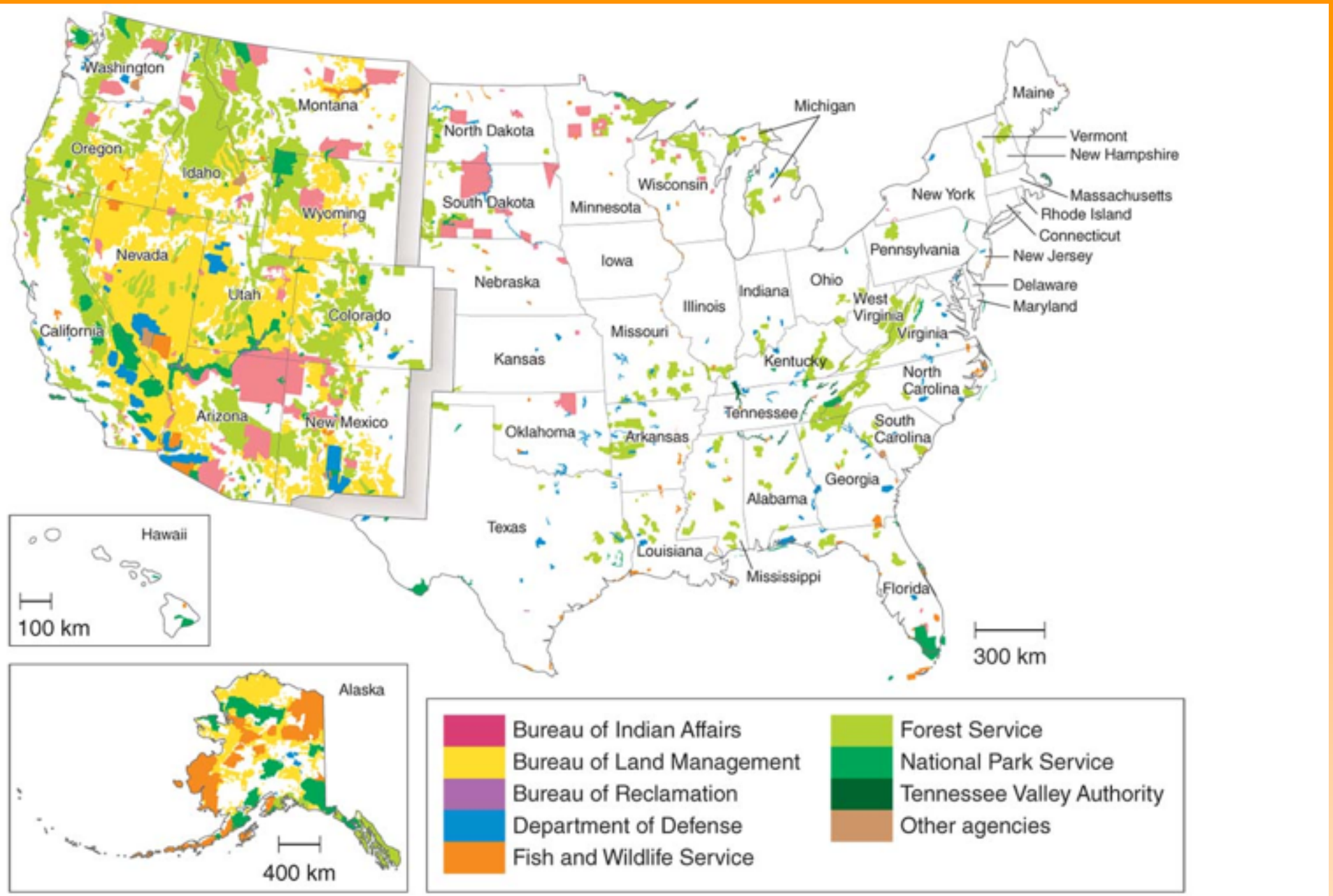
Public Lands in the United States



Federal lands in the United States. Approximately 42 percent of the land in the United States is publicly owned, with 25 percent of the nation's land owned by the federal government. Highest of any nation.



Do you observe any patterns in the location of federal lands?



Why do most of the federal lands in the U.S. occur in the west?

Public Lands in the United States

- **Resource conservation ethic** The belief that people should maximize use of resources, based on the greatest good for everyone.

- **Multiple-use lands** A U.S. classification used to designate lands that may be used for recreation, grazing, timber harvesting, and mineral extraction.

What are the main uses of public and private land in the U.S.?

Public Lands in the United States

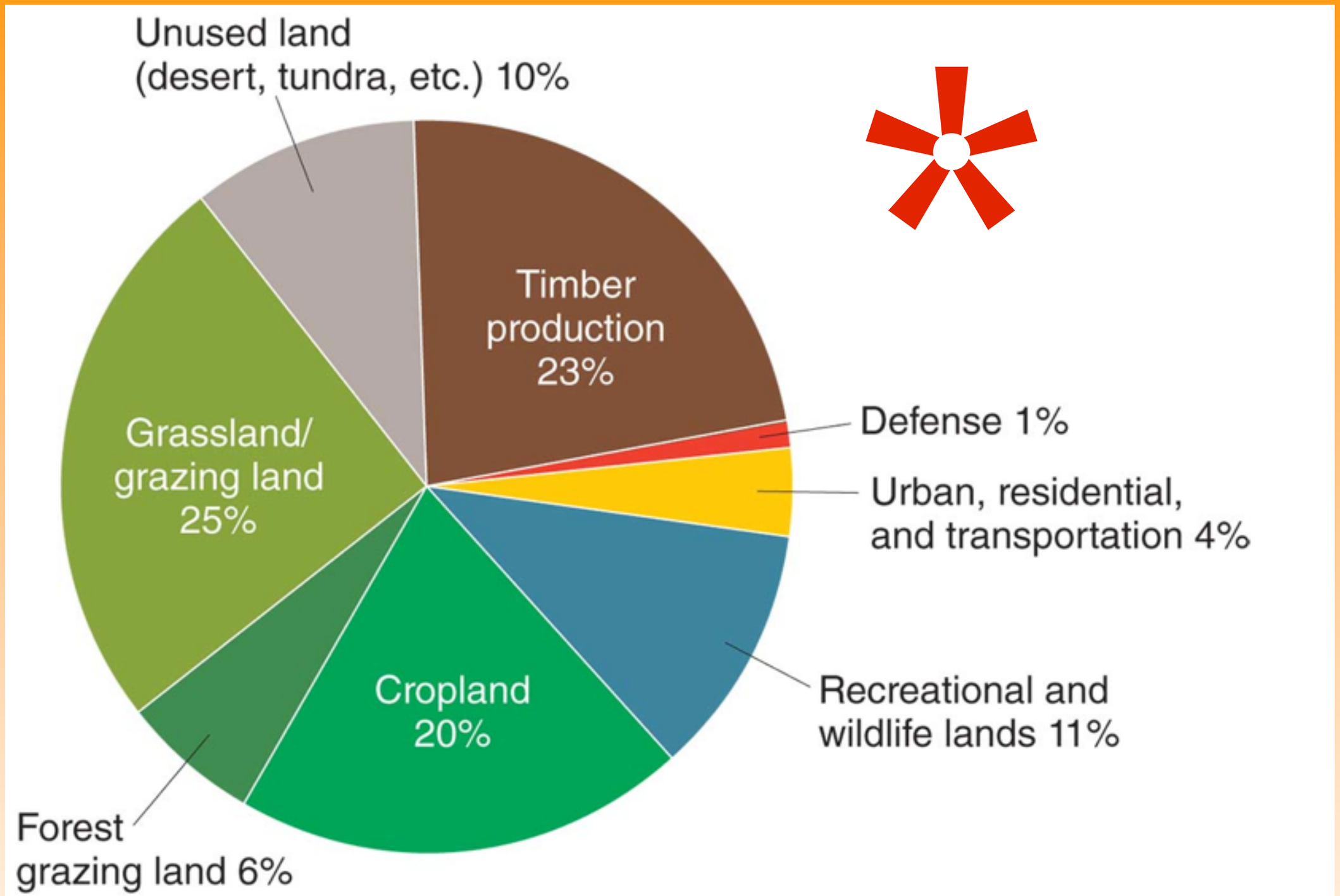


Figure 29.6
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Data from R. N. Lubowski et al., Major Land Uses in the United States, Economic Research Service, USDA, 2002

Land use in the United States. Public and private land in the United States is used for many purposes.

Public Lands in the United States

More than 95 percent of all federal lands are managed by four federal agencies.

- Bureau of Land Management (BLM): grazing, mining, timber harvesting and recreation

- U.S. Forest Service (USFS): timber harvesting, grazing, and recreation

- National Park Service (NPS): recreation and conservation.

- Fish and Wildlife Service (FWS): conservation, hunting, and recreation

Module 30
Land Management Practices

After reading this module, you should be able to

- explain specific land management practices for rangelands and forests.
- describe contemporary problems in residential land use and some potential solutions.

Land management practices vary according to land use

Management issues differ for rangelands, forests, and parks.

Rangelands

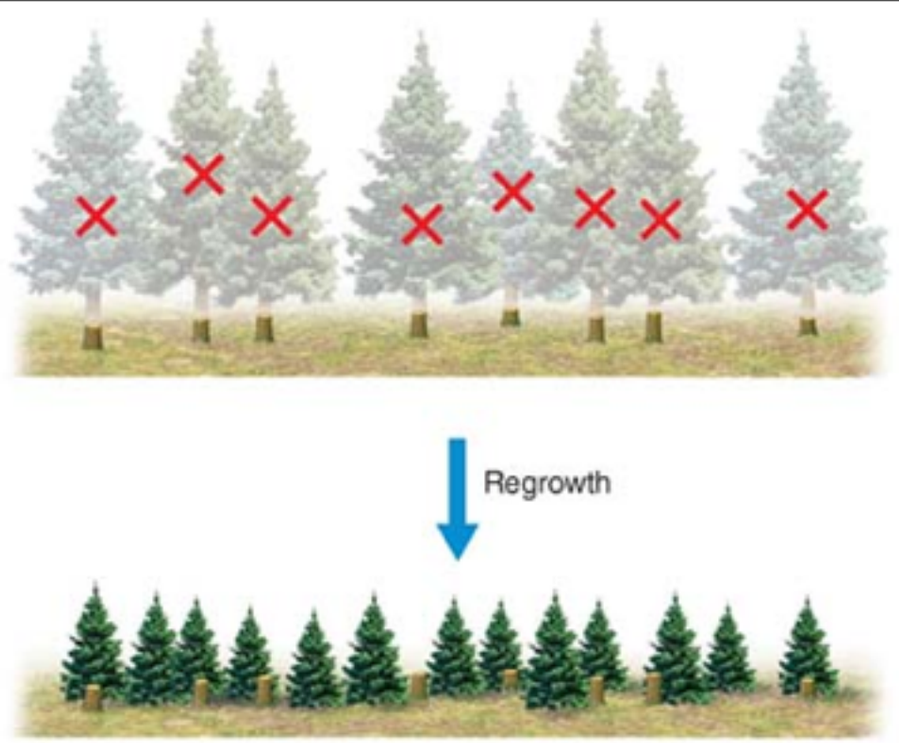
- **Rangeland** A dry open grassland primarily used for the grazing of cattle. (most common use of land in the U.S.)

- Grazing too many animals can quickly denude a region of vegetation. Loss of vegetation can lead to land exposed to wind and water erosion.

Forests

- **Forest** Land dominated by trees and other woody vegetation and sometimes used for commercial logging.
- Approximately 73 percent of the forests used for commercial timber operations in the U.S. are privately owned.
- Timber harvest practices include clear-cutting and selective cutting
- **Clear-cutting** A method of harvesting trees that removes all or almost all trees in an area.
- **Selective cutting** The method of harvesting trees that involves removing single trees or a small number of trees from many in a forest.

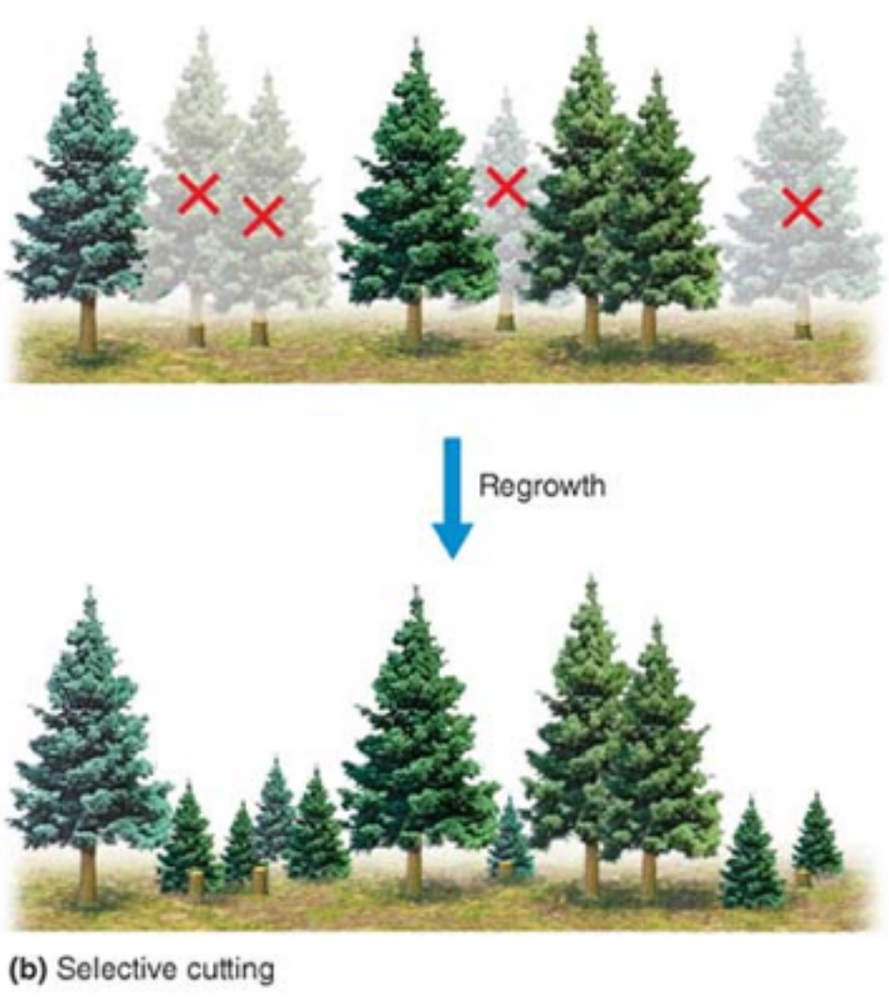
Timber Harvest Practices



(a) Clear-cutting

(a) Clear-cutting removes most, if not all, trees from an area and is often coupled with replanting. The resulting trees are then all the same age.

Know (+) and (-) effects



(b) Selective cutting

(b) In selective cutting, single trees or small numbers of trees are harvested. The resulting forest consists of trees of varying ages.

Timber Harvest Practices

- A third approach to logging—ecologically sustainable forestry—has a goal of maintaining both plants and animals in as close to a natural state as possible.

- **Ecologically sustainable forestry** An approach to removing trees from forests in ways that do not unduly affect the viability of other trees.

Timber Harvest Practices

- Define clear cutting and selective cutting.
- Does either clear cutting or selective cutting provide more economic value?
- Which timber harvesting practice affects the environment more and why?
- Which timber harvesting practice reduces biodiversity the most?

Reforestation

- Timber production presents ecological challenges.
- All logging disrupts habitat.
- Logging often replaces complex forest ecosystems with tree plantations.
- **Tree plantation** A large area typically planted with a single rapidly growing tree species.

Fire Management

- In many ecosystems fire is a natural process for recycling nutrients.

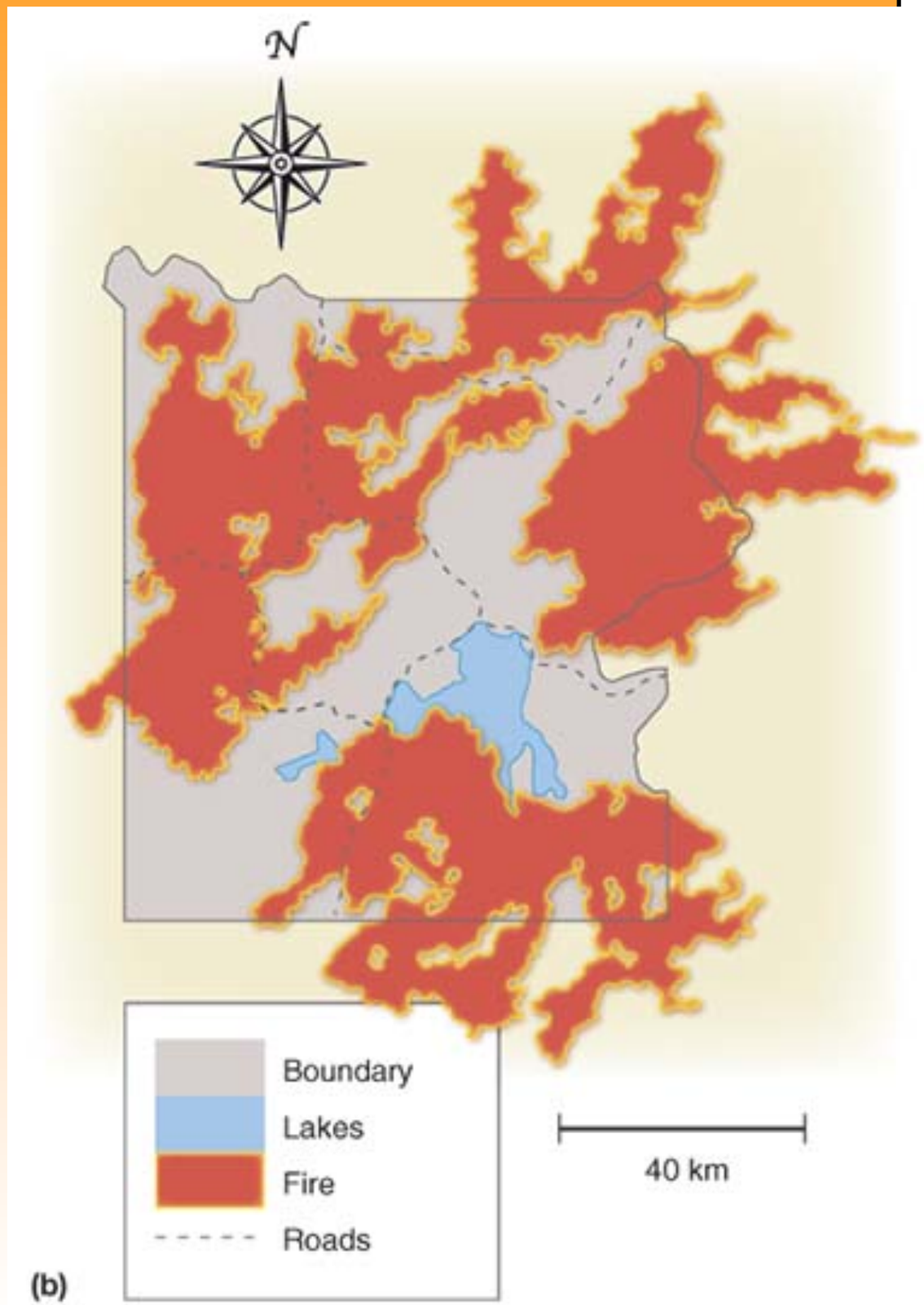
- Humans have followed a number of fire management policies.

- **Prescribed burn** A fire deliberately set under controlled conditions in order to reduce the accumulation of dead biomass on a forest floor.

- Prescribed burns help reduce the risk of uncontrolled natural fires.

Fire Management

Identify two characteristics of forests that develop when fires are suppressed and explain why fire suppression increases the risk of fires



Yellowstone fires of 1988. As can be seen from the map, extensive areas of the park were burned in this exceptionally hot and dry year.

National Parks

- National Parks are managed for scientific, educational, aesthetic, and recreational use.
- Human overuse can harm the environmental features that attract visitors.

National Park Project

- Describe the park. (size, geography, waterways)
- What year was it created?
- Describe the climate? Does it have one or more biomes?
- Describe its flora and fauna. Is it a breeding ground for other organisms?
- Choose a plant or animal found in the park and describe its role in the park's ecosystem.

Wildlife Refuges and Wilderness Areas

- **National wildlife refuge** A federal public land managed for the primary purpose of protecting wildlife.

- **National wilderness area** An area set aside with the intent of preserving a large tract of intact ecosystem or a landscape.

Federal Regulation of Land Use

- **National Environmental Policy Act (NEPA)** A 1969 U.S. federal act that mandates an environmental assessment of all projects involving federal money or federal permits.

- **Environmental impact statement (EIS)** A document outlining the scope and purpose of a development project, describing the environmental context, suggesting alternative approaches to the project, and analyzing the environmental impact of each alternative.

- **Environmental mitigation plan** A plan that outlines how a developer will address concerns raised by a project's impact on the environment.

- **Endangered Species Act** A 1973 U.S. act designed to protect species from extinction

Residential land use is expanding

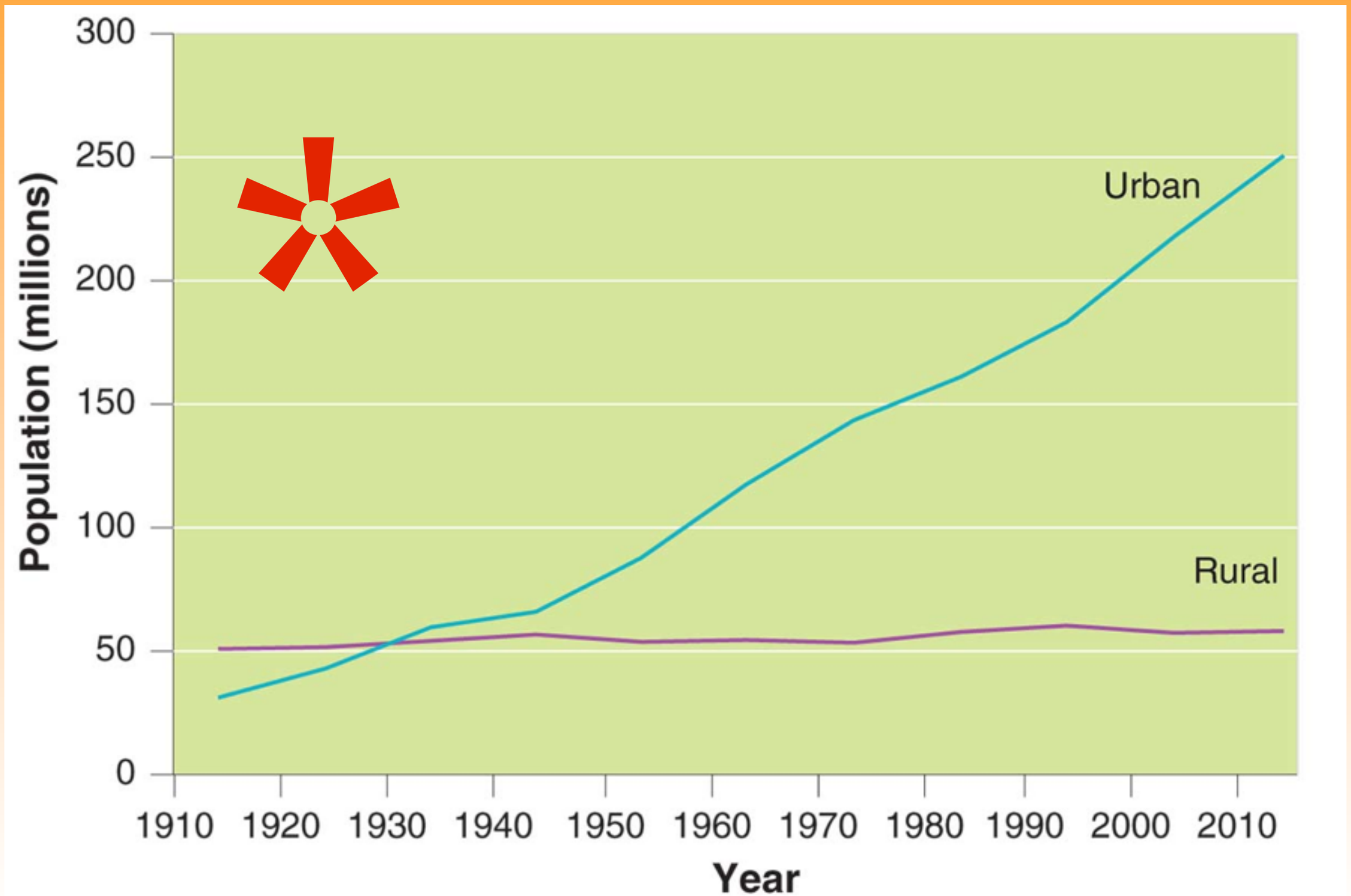
- **Suburb** An area surrounding a metropolitan center, with a comparatively low population density.

- **Exurb** An area similar to a suburb, but unconnected to any central city or densely populated area.

- Since 1950 more than 90 percent of the population growth in metropolitan areas has occurred in suburbs, and two out of three people now live in suburban or exurban communities.

Residential Land Use

Distribution of urban and rural populations in the United States between 1910 and 2012. This graph shows a dramatic shift in the population from rural to urban areas.



Causes and Consequences of Urban Sprawl

- **Urban sprawl** Urbanized areas that spread into rural areas, removing clear boundaries between the two.

Urban sprawl has four main causes or sources of:

- Automobiles and highway construction
- Living costs
- Urban blight
- Government policies
- **Urban blight** The degradation of the built and social environments of the city that often accompanies and accelerates migration to the suburbs.

Urban Blight

Urban blight.
As people move away from a city to suburbs and exurbs, the city often deteriorates, which causes yet more people to leave. This cycle is an example of a positive feedback system. The green arrow indicates the starting point of the cycle.

Urban Sprawl

Urban sprawl has been enhanced by federal and local laws and policies:

- **Highway Trust Fund** A U.S. federal fund that pays for the construction and maintenance of roads and highways.

- **Induced demand** The phenomenon in which an increase in the supply of a good causes demand to grow.

- **Zoning** A planning tool used to separate industry and business from residential neighborhoods.

- **Multi-use zoning** A zoning classification that allows retail and high-density residential development to coexist in the same area.

Urban Sprawl

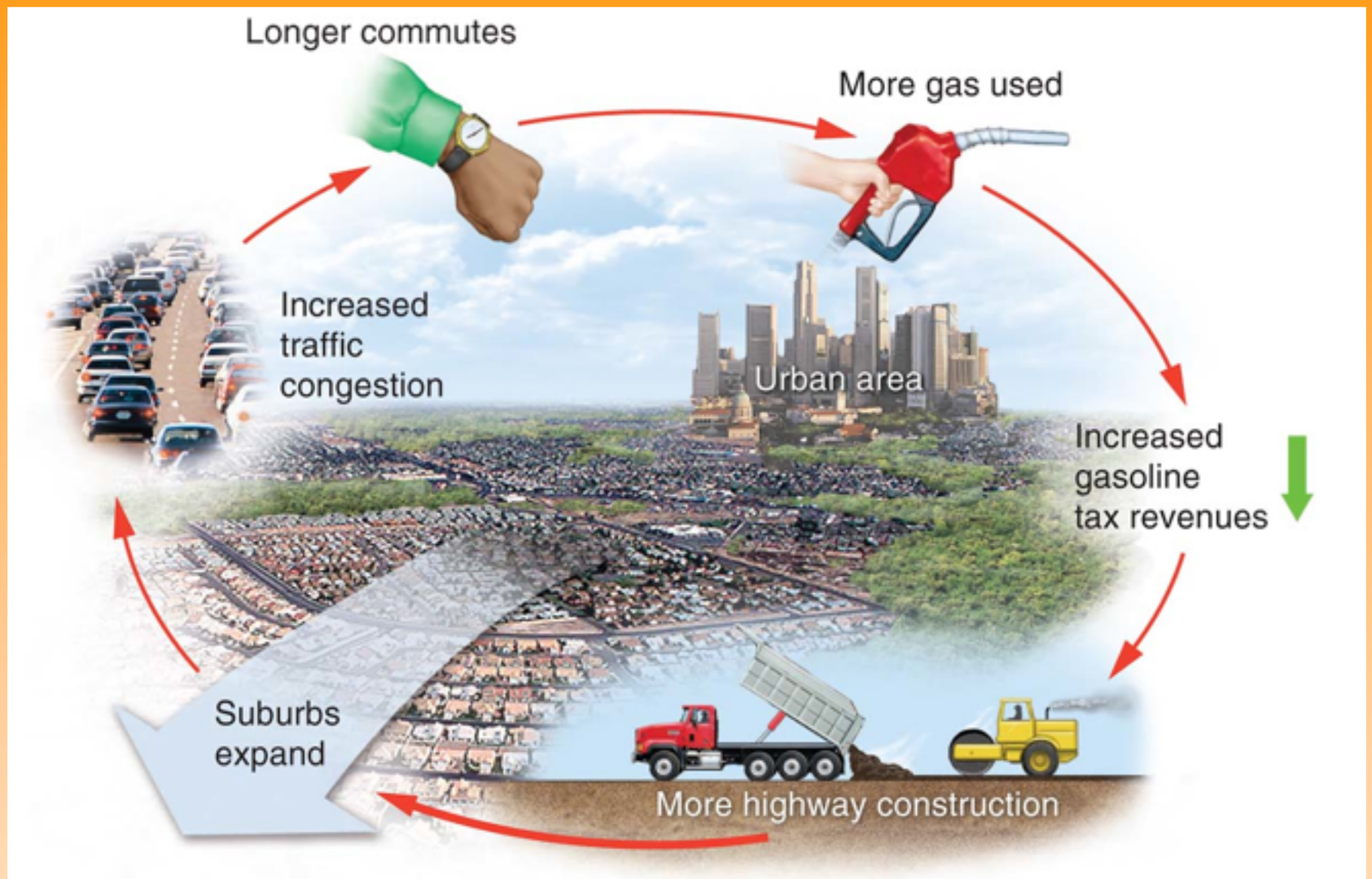


Figure 30.9
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Induced demand as a cause of traffic congestion and urban sprawl. The use of gasoline tax money to build highways leads to the development of suburbs and traffic congestion, at which point yet more money is spent on highways to alleviate the congestion. The green arrow indicates the starting point of the cycle.

Activity

- 10 groups
- Each group gets one of the ten principles of smart growth
- 3-5 minute presentation

Smart Growth

- **Smart growth** A set of principles for community planning that focuses on strategies to encourage the development of sustainable, healthy communities.

Smart growth follows ten principles :

- 1. Create mixed land uses.
- 2. Create a range of housing opportunities and choices.
- 3. Create walkable neighborhoods.
- 4. Encourage community and stakeholder collaboration in development decisions.
- **Stakeholder** A person or organization with an interest in a particular place or issue.

Smart Growth

- 5. Take advantage of compact building design.
- 6. Foster distinctive, attractive communities with a strong sense of place.
- **Sense of place** The feeling that an area has a distinct and meaningful character.
- 7. Preserve open space, farmland, natural beauty and critical environmental areas.

Smart Growth

- 8. Provide a variety of transportation choice.
- **Transit-oriented development (TOD)** Development that attempts to focus dense residential and retail development around stops for public transportation, a component of smart growth.
- 9. Strengthen and direct development toward existing communities
- **Infill** Development that fills in vacant lots within existing communities.
- **Urban growth boundary** A restriction on development outside a designated area.
- 10. Make development decisions predictable, fair and cost-effective