



Land, Public and Private

The Tragedy of the Commons

- In 1968, ecologist Garrett Hardin described the “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.

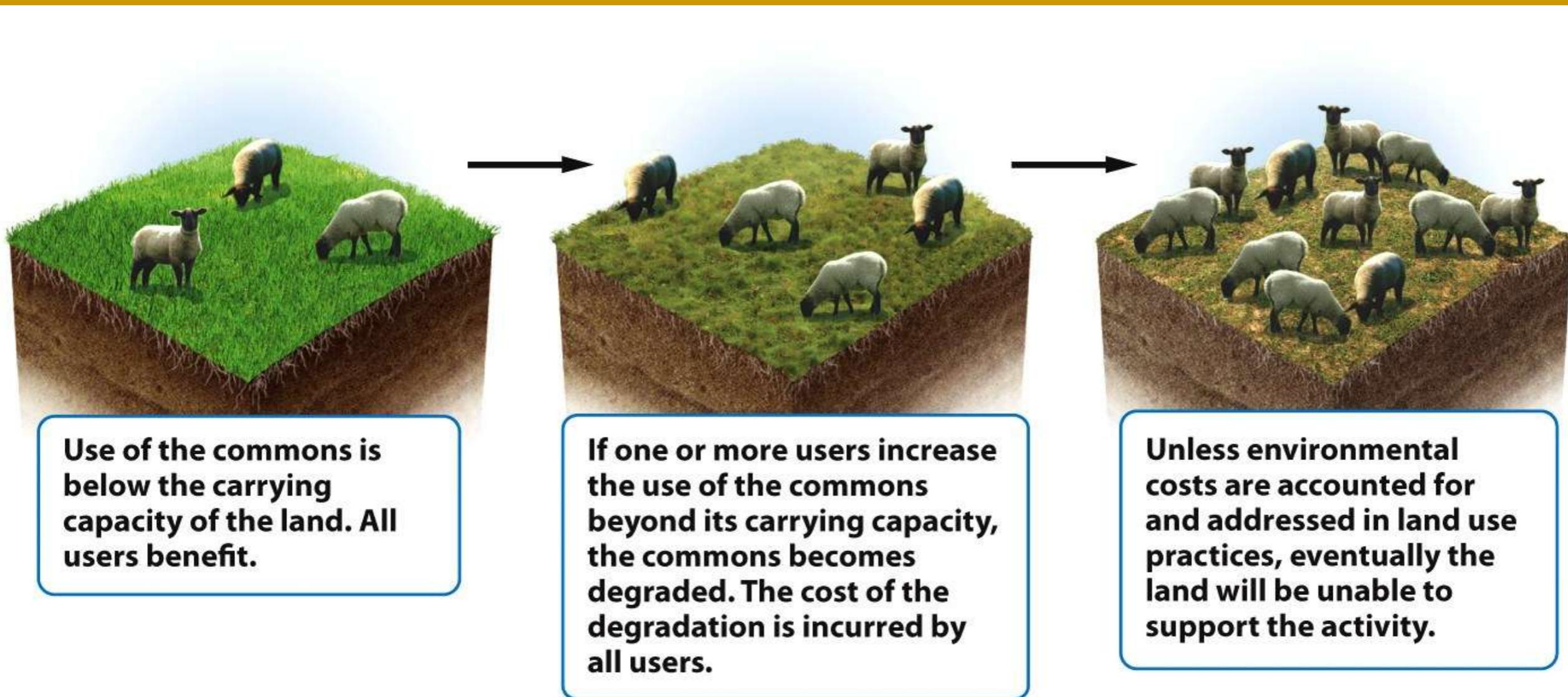


Figure 10.2

Environmental Science

© 2012 W. H. Freeman and Company

A Possible Essay Prompt

Thousands of acres of tropical rainforests are cut down each year, primarily for farming and wood products. Identify two negative environmental consequences of rainforest destruction. Explain the negative impact of each consequence.

Respond in the space provided in your Answer Document. (4 points)

Externalities

- Externalities- a cost or benefit of a good or service that is not included in the purchase price of the product or service.
- In environmental science we are concerned about negative externalities because of the environmental damage for which no one bears the cost.

Maximum Sustainable Yield

- The maximum amount of a renewable resource that can be harvested without compromising the future availability of that resource.

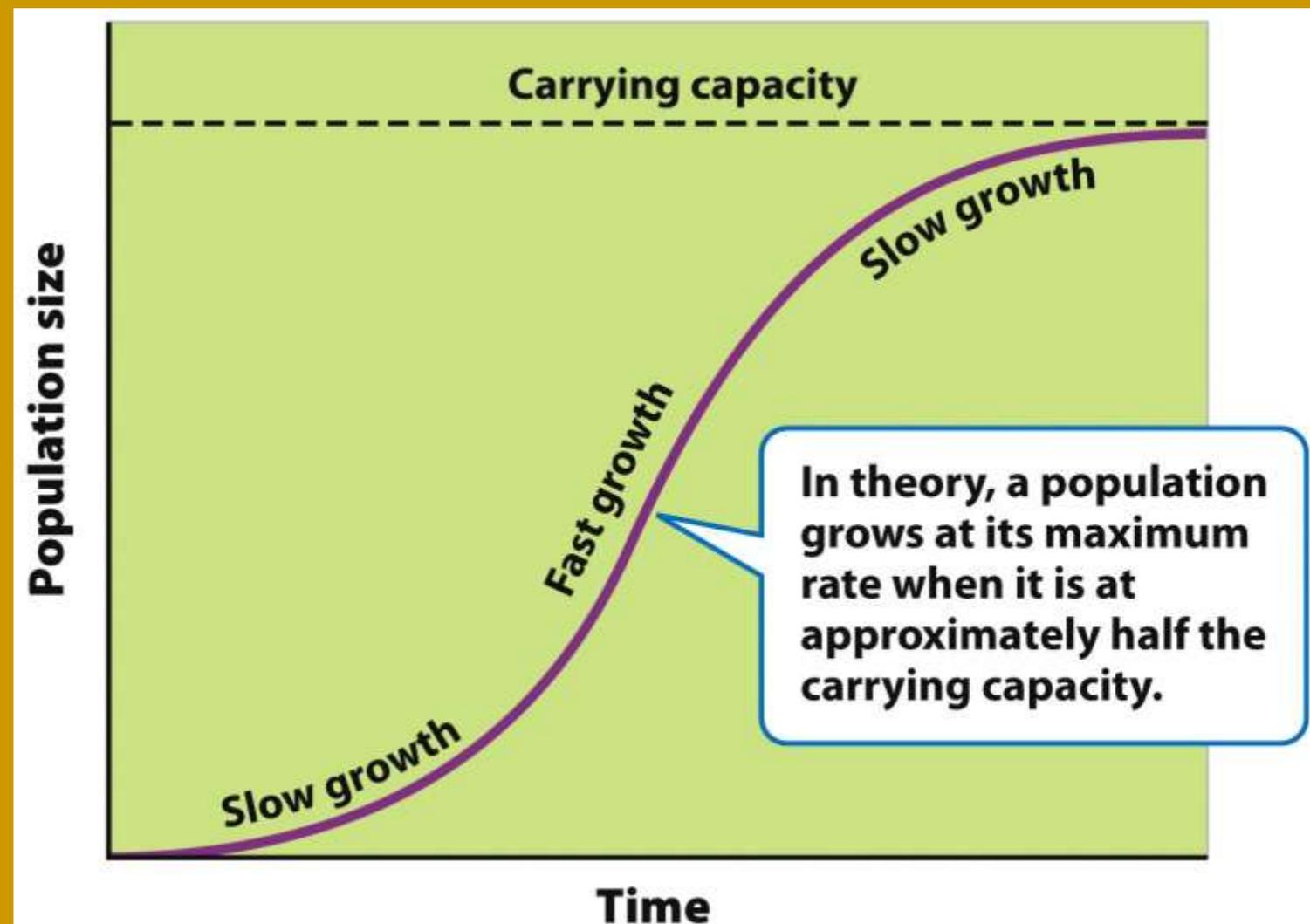


Figure 10.3
Environmental Science
© 2012 W. H. Freeman and Company

Timber Harvest Practices

- Clear-cutting- removing all, or almost all the trees in an area.
- Selective cutting- removing single trees or relatively small numbers of trees from a forest.



↓ Regrowth



(a) Clear-cutting



↓ Regrowth



(b) Selective cutting

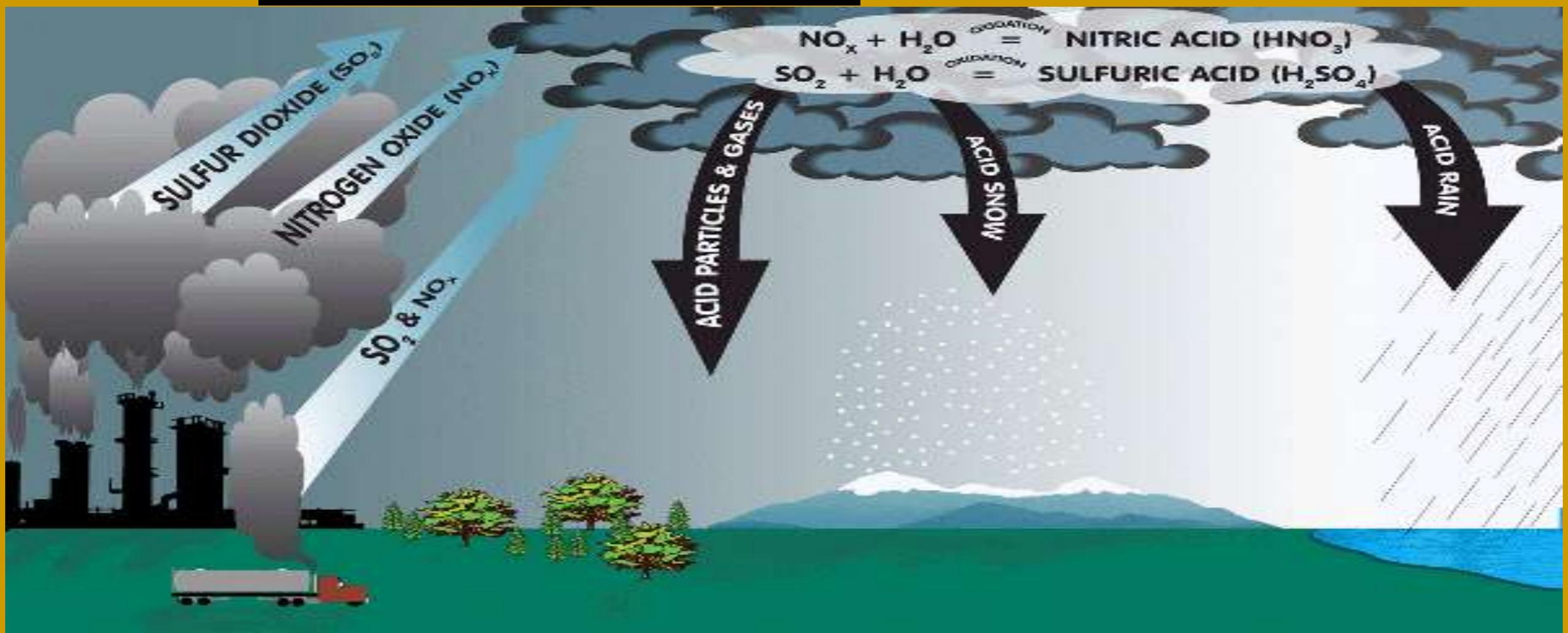
Figure 10.8

Environmental Science

© 2012 W. H. Freeman and Company

Threats to Forests

A. Acid Precipitation caused by emissions from industrial areas, harms the canopy as well as the soil.



Threats to Forests

B. Forest Fires: 48% caused by lightning, fairly remote areas, 52% caused by people near settled areas.



Prescribed Burning



A. Prescribed burning is a forest management practice that benefits certain forests by reducing the amount of leaves, branches and dead trees accumulated on the forest floor that could fuel a wildfire.

Prescribed Burning

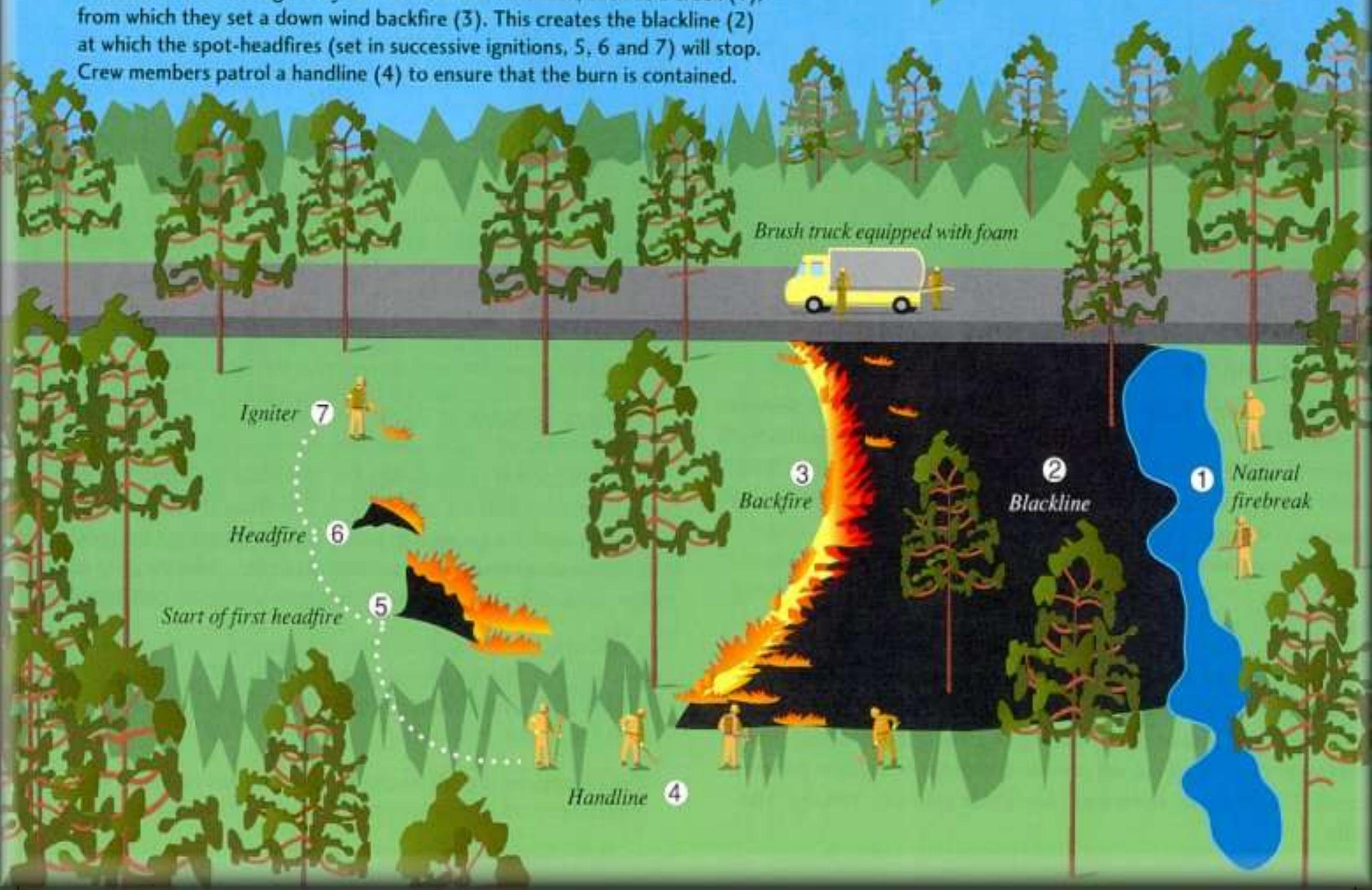


B. In addition to helping control the spread of wildfire, removal of this "litter layer" also promotes the growth of new forage and succulent plants, which are important sources of food for many wildlife species including rabbits and deer.

Anatomy of a Prescribed Burn

WIND DIRECTION

Prescribed burn managers try to find a natural firebreak, such as a creek (1), from which they set a down wind backfire (3). This creates the blackline (2) at which the spot-headfires (set in successive ignitions, 5, 6 and 7) will stop. Crew members patrol a handline (4) to ensure that the burn is contained.



Brush truck equipped with foam

Igniter 7

Headfire 6

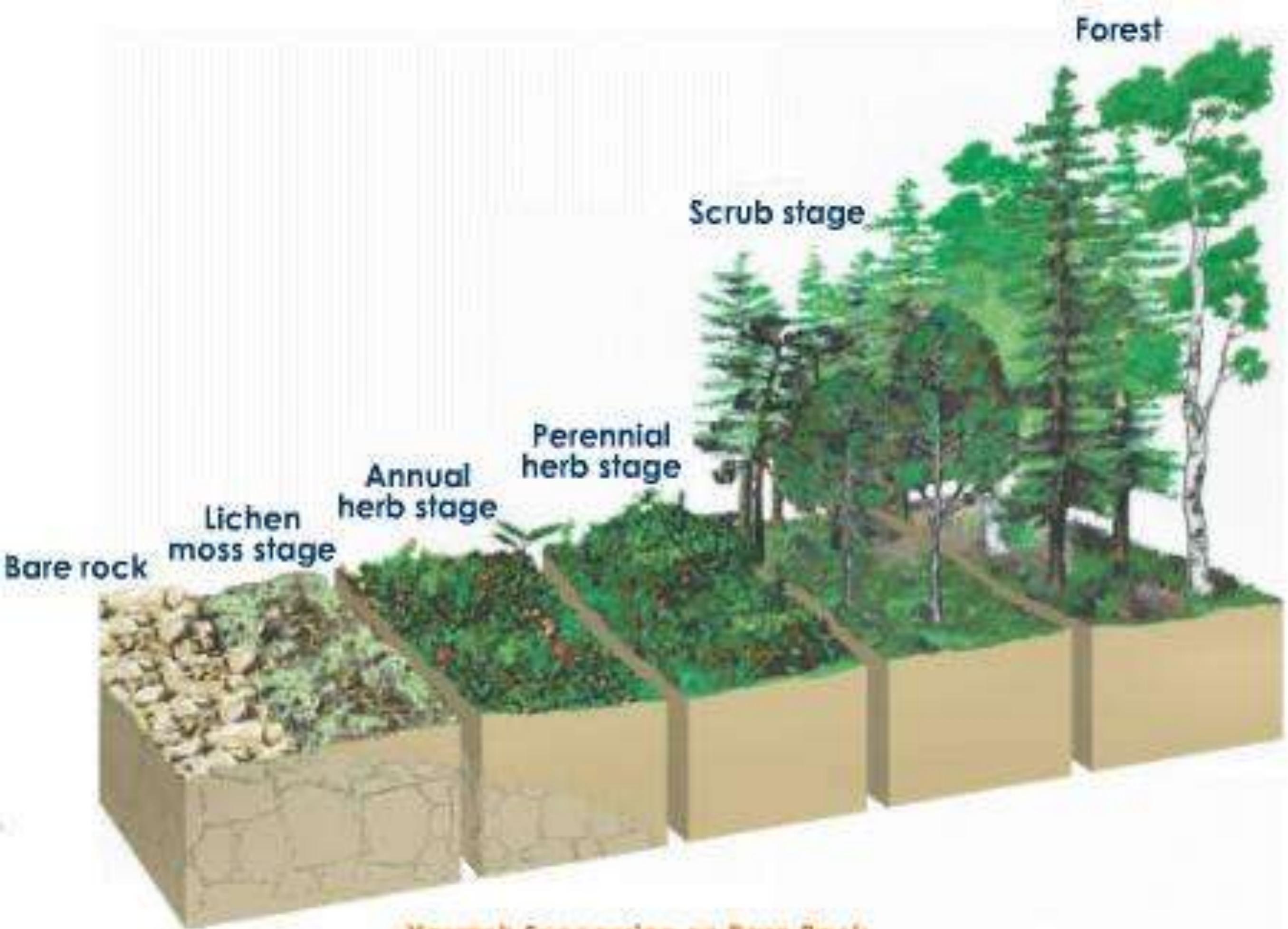
Start of first headfire 5

Backfire 3

Blackline 2

Natural firebreak 1

Handline 4



Xerarch Succession on Bare Rock

RECYCLABLE



PAPER

Solutions:

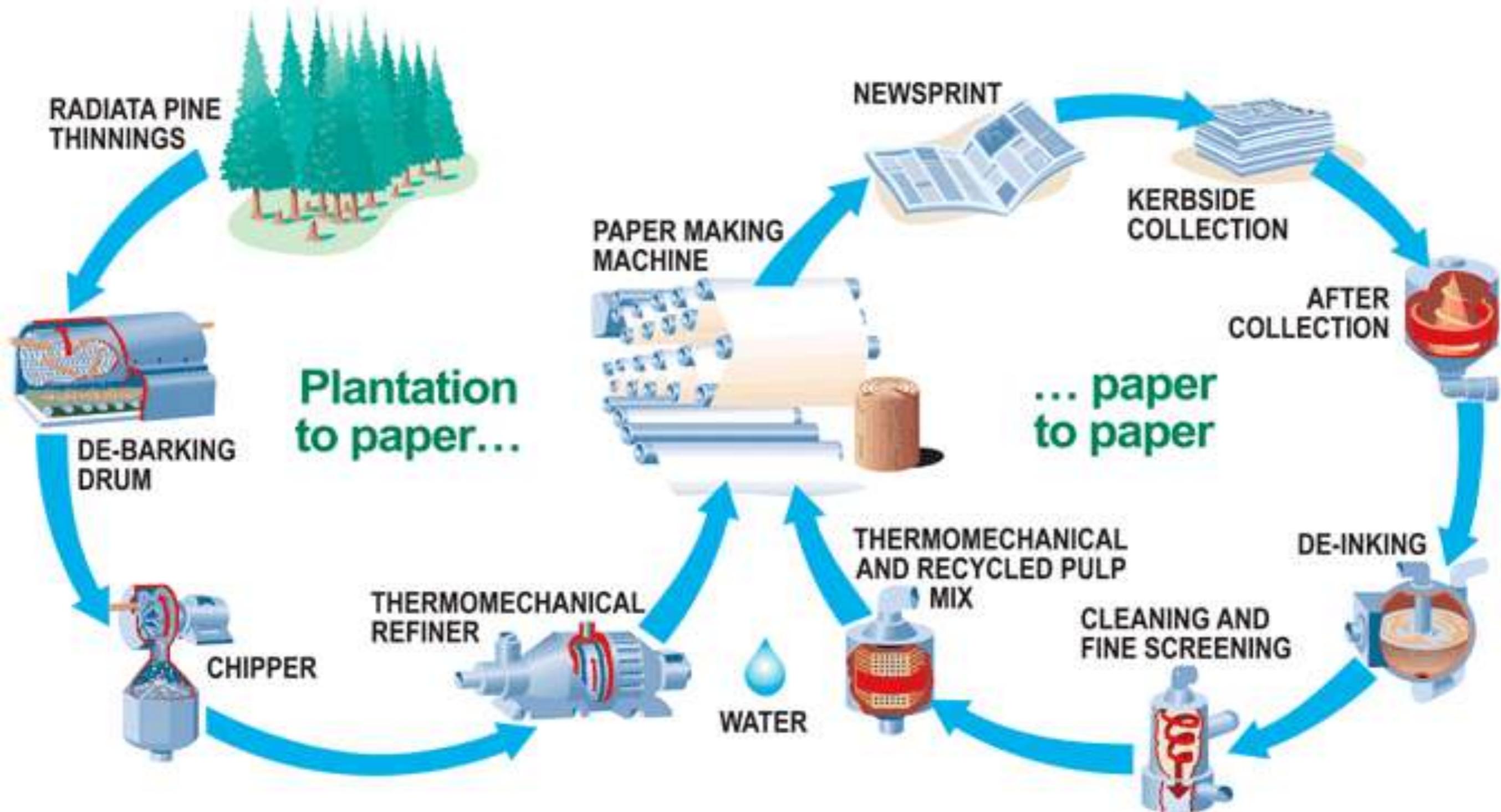
1. Recycling more paper to reduce the harvest of pulpwood trees, using fibers from fast-growing plants to make tree-free paper

Kenaf-produces more pulp yield per acre and uses less pesticides & herbicides, less energy, & less bleaching needed

2. Growing more timber on long rotations, generally about 100-200 years, depending on species and soil quality.



Forests → Paper



Solutions:



3. Leave fallen or standing dead trees for wildlife and nutrient cycling.
4. Minimizing fragmentation of remaining larger blocks of forest.
5. Using road building and logging methods that minimize soil erosion and compaction.
6. Practicing select or strip cutting instead of conventional clear-cutting (or not on steep slopes-Erosion).
7. Stop wasteful, inefficient use of construction materials, excess packaging, junk mail, or find alternatives to wooden shipping containers.

Grasslands

- Provide important ecological services such as soil formation, erosion control, chemical cycling, storage of atmospheric carbon dioxide, and maintenance of biodiversity
- Unfenced grasslands=rangelands
- Fenced, managed grasslands=pastures
- Overgrazing=too long or too many animals
- Damages grass/roots, exposes soil to erosion, compacts soil leading to not being able to hold water, encourages growth of plants cattle won't eat.

Grasslands

- 50% of land in SW of grassland reduced to 20%
- 1/5 of grasslands have lost productivity in world
- Solutions:
 - Rotational grazing-portable fencing, animals graze for couple days and move to new location
 - Removing invader plants-herbicides, mechanical removal, burning, or trample
 - Finally replant

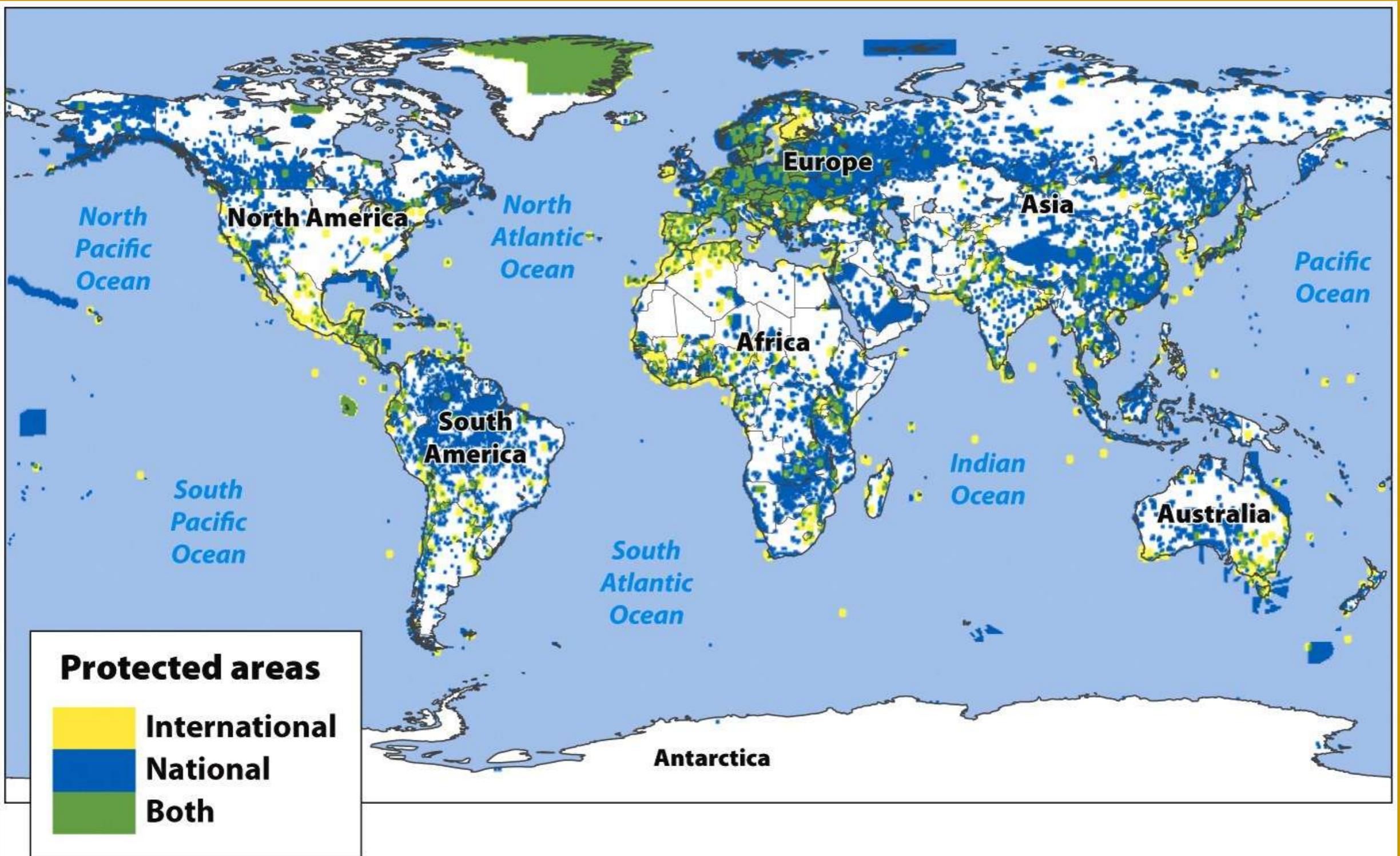


Figure 10.4

Environmental Science

© 2012 W. H. Freeman and Company

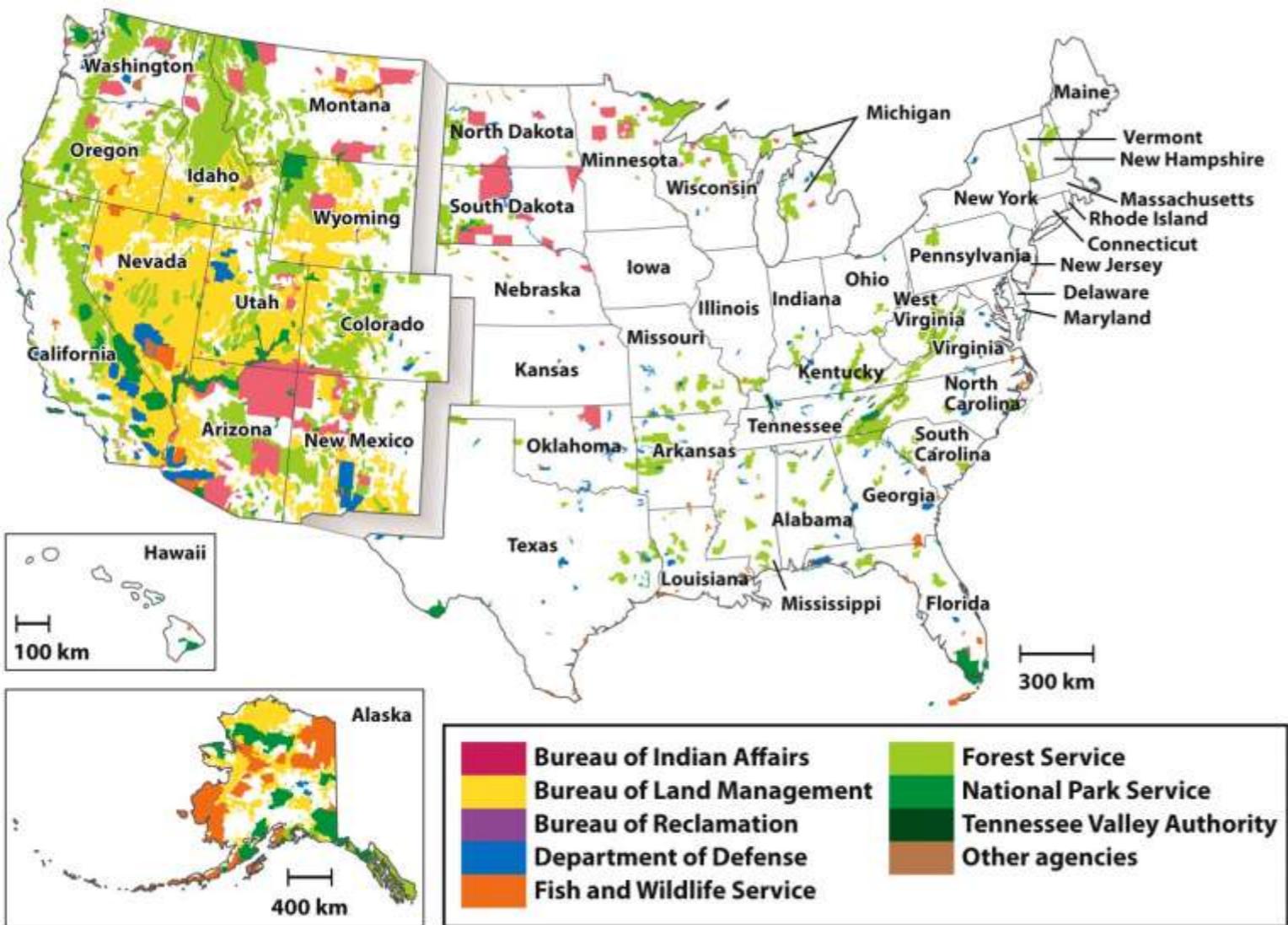


Figure 10.5
Environmental Science
 © 2012 W. H. Freeman and Company

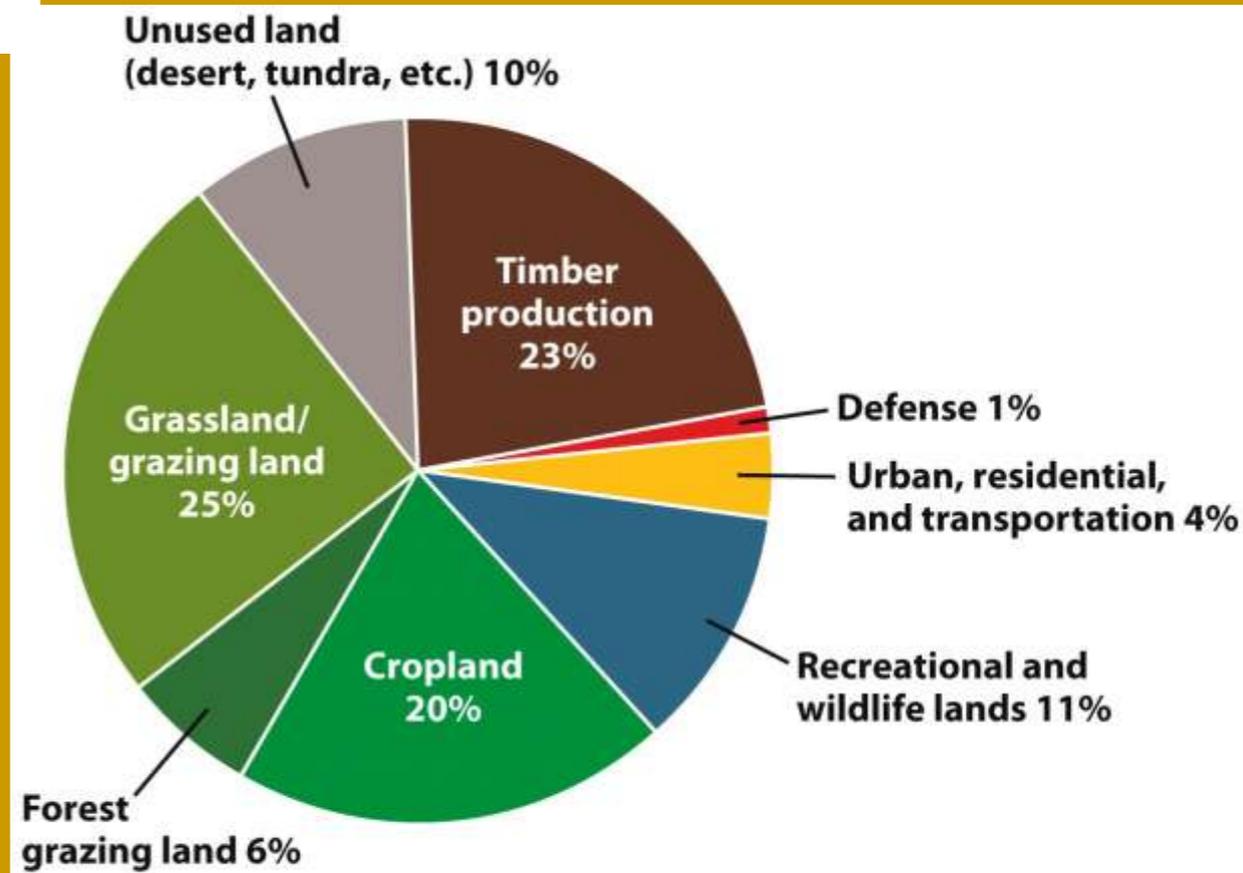


Figure 10.6

Parks and Preserves

- National Parks- established to preserve scenic views and unusual landforms.
- National wildlife refuges- managed for the purpose of protecting wildlife
- National wilderness areas- set aside to preserve large tracts of intact ecosystems or landscapes.

Parks and Preserves

- 1,100 national parks in 120 countries
- Less developed countries have lots of diversity but less protection
- Illegal poaching, logging and mining
- No money or personnel to manage
- US National Park System-est. 1912
 - 58 National Parks
 - 333 monuments and historic sites
- Popular parks have seen visitor # triple 1960-2008

Parks and Preserves

- Visitors may experience long backups, noise, eroded trails, off road vehicles that damage fragile ecosystems.
- Visitors expect grocery stores, laundries, cell phone service and other conveniences
- Non native species such as boar (Smokies) and mt goats (Olympic NP) have destroyed habitat
- Native, threatened or endangered species have been removed (Gray wolves-Yellowstone) but successfully introduced

Residential Land

- Suburban- areas surrounding metropolitan centers with low population densities.
- Exurban- similar to suburban areas, but are not connected to any central city or densely populated area.

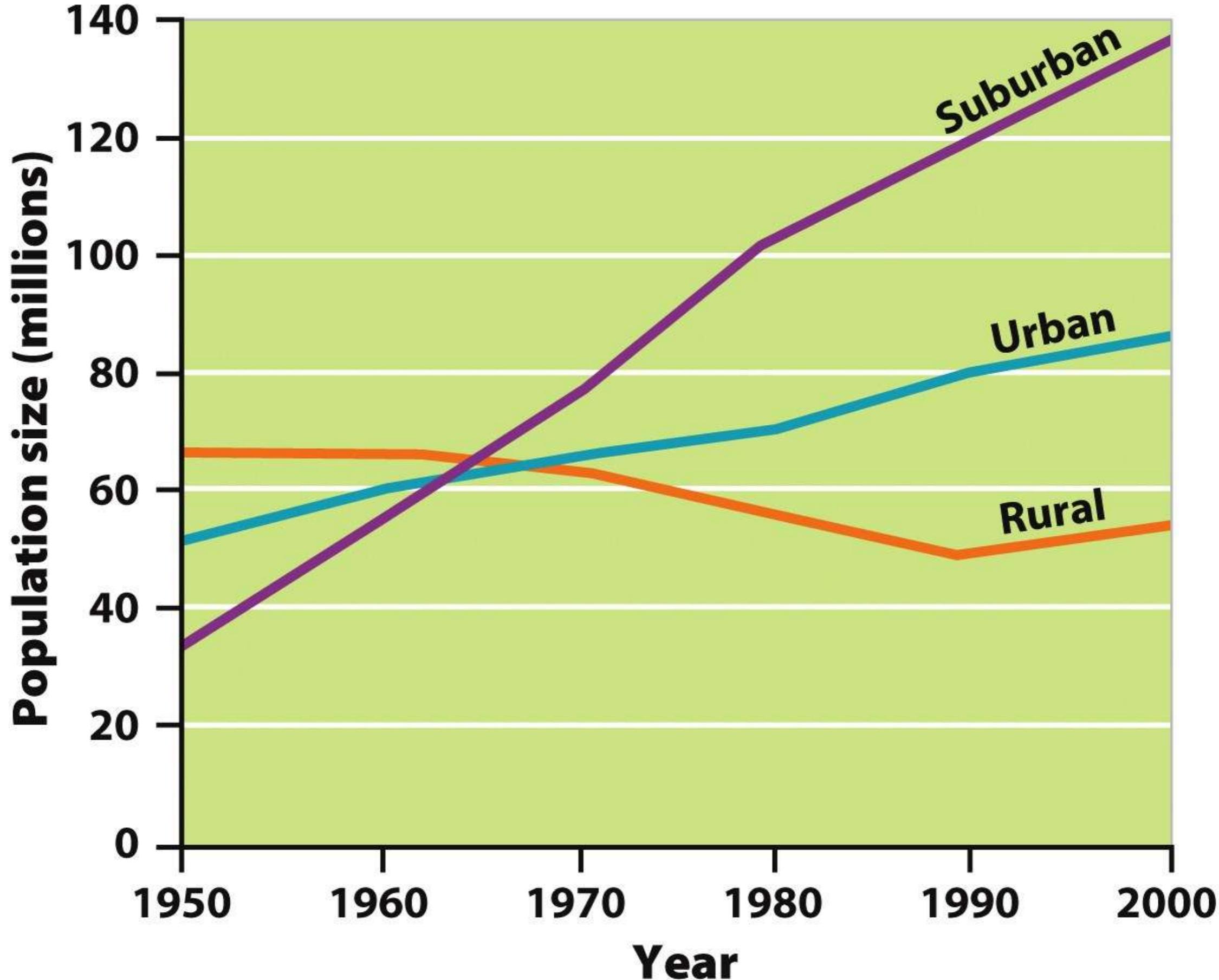


Figure 10.13
Environmental Science
© 2012 W. H. Freeman and Company

Urban Sprawl

- Urban sprawl- the creation of urbanized areas that spread into rural areas.
- The four main concerns of urban sprawl in the U.S. are:
 - automobiles and highway construction
 - living costs (people can get more land and a larger house in the suburbs for the same amount of money)
 - urban blight (city revenue shrinks as people move to the suburbs)
 - government policies

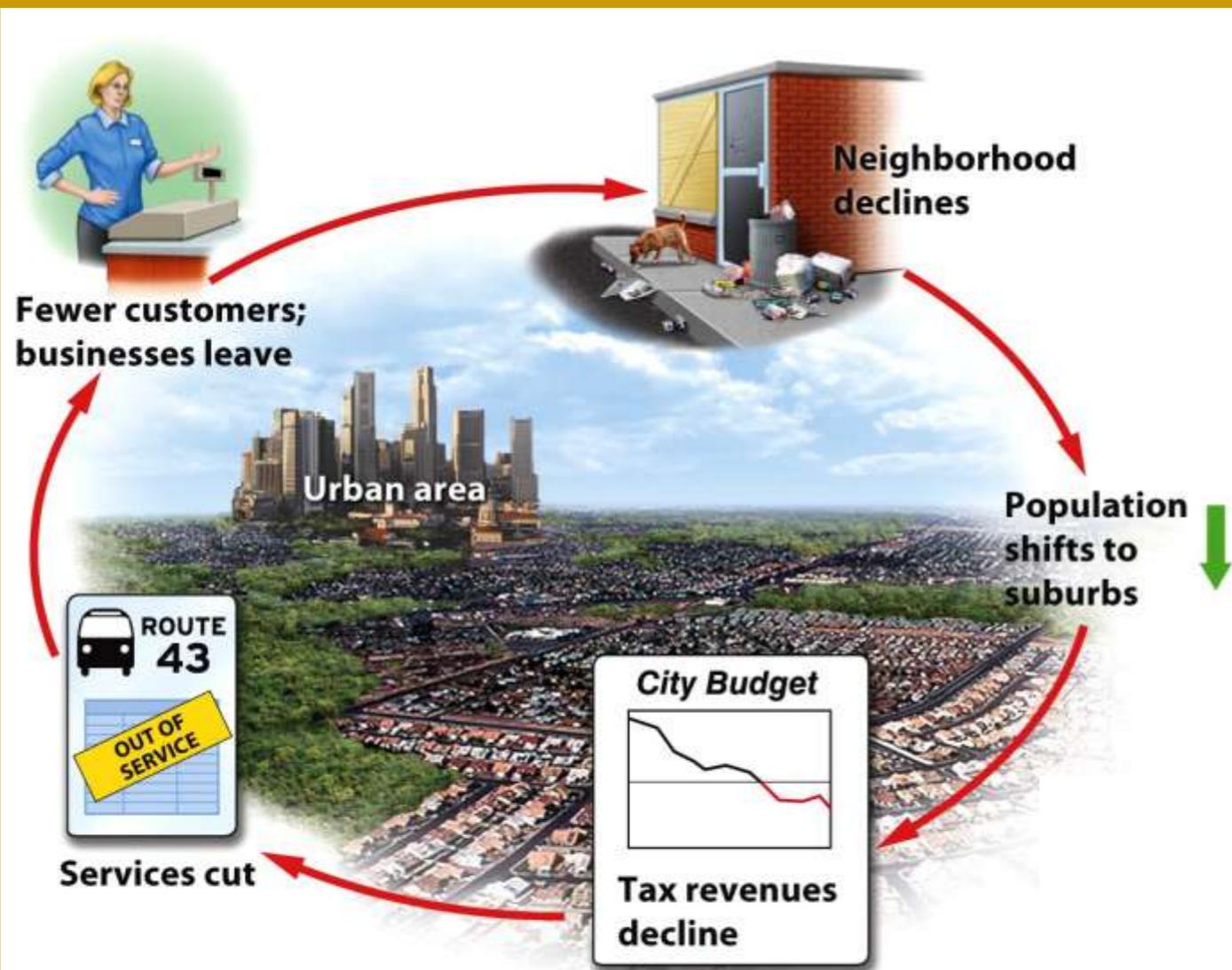


Figure 10.14
 Environmental Science
 © 2012 W. H. Freeman and Company

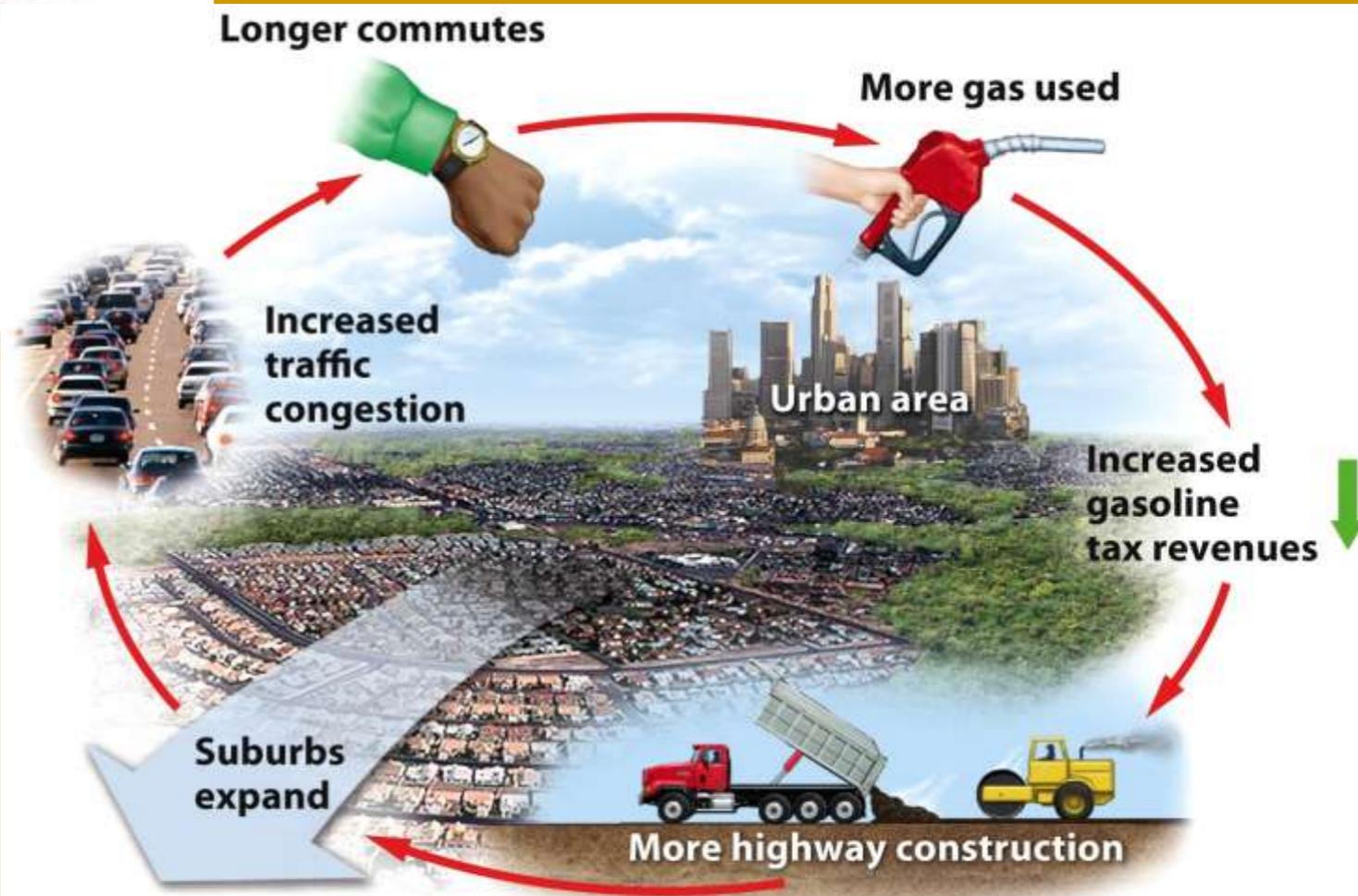


Figure 10.15
 Environmental Science
 © 2012 W. H. Freeman and Company

Government Policies

- Highway Trust Fund- a federal gasoline tax to pay for construction and maintenance of roads and highways.
- Zoning- a planning tool to create quieter and safer communities. For example, prohibiting the development of a factory or strip mall in a residential area.
- Multi-use zoning- allows retail and high-density residential development to coexist in the same area.
- Subsidized mortgages- low interest rates offered to people to purchase a home that would otherwise not be able to do so.

Smart Growth

- Mixed land uses
- create a range of housing opportunities and choices
- create walkable neighborhoods
- encourage community and stakeholder collaboration in development decisions
- take advantage of compact building design
- Foster distinctive, attractive communities with a strong sense of place
- Preserve open space, farmland, natural beauty and critical environmental areas
- Provide a variety of transportation choices
- Strengthen and direct development toward existing communities
- Make development decisions predictable, fair and cost-effective



Figure 10.16

Environmental Science

© 2012 W. H. Freeman and Company



Figure 10.17

Environmental Science

© 2012 W. H. Freeman and Company



Figure 10.18

Environmental Science

© 2012 W. H. Freeman and Company