

# ENVIRONMENT

*THE SCIENCE BEHIND THE STORIES*

Jay Withgott • Scott Brennan

## Ch 13

### Urbanization and Creating Livable Cities

#### Part 2: Environmental Issues and the Search for Solutions

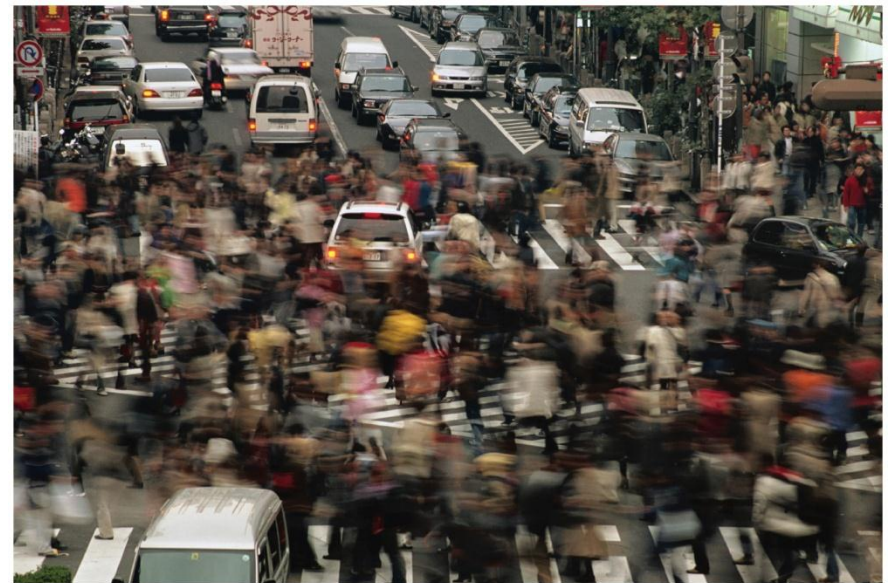
PowerPoint® Slides prepared by  
Jay Withgott and Heidi Marcum



**Third Edition**

# This lecture will help you understand:

- The scale of urbanization
- Urban and suburban sprawl
- Planning and land use strategies
- Transportation options
- The role of urban parks
- Impacts and advantages of urban centers
- Sustainable cities



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# Central Case: Managing growth in Portland, Oregon

- Oregon residents feared sprawling development would ruin their communities
- Urban Growth Boundaries (UGBs) allow development in urban areas and protect open spaces
- Upcoming ballot initiatives may allow landowners to ignore the regulations



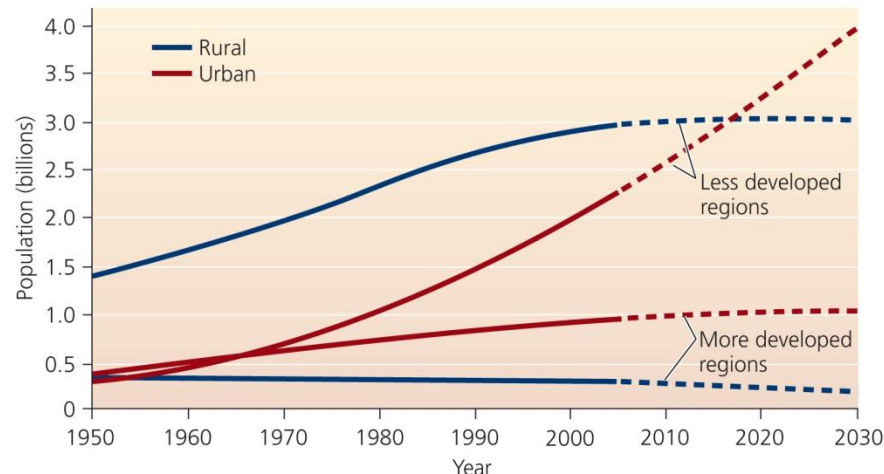
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# Our urbanizing world

- **Urbanization** = the movement of people from rural to urban areas
  - The greatest change of human society since its transition to a sedentary agricultural lifestyle
- Urban areas are growing rapidly
  - The growing human population
  - More people are moving to urban areas
- Urbanization began when agricultural surpluses allowed people to leave their farms

# Global urbanizing trends

- In 1950, 30% of the population was urban, today it's 49%
- In developed nations, urbanization has slowed
  - **Suburbs** = the smaller communities that ring cities
- Developing nations are urbanizing rapidly
  - People are searching for jobs and urban lifestyles



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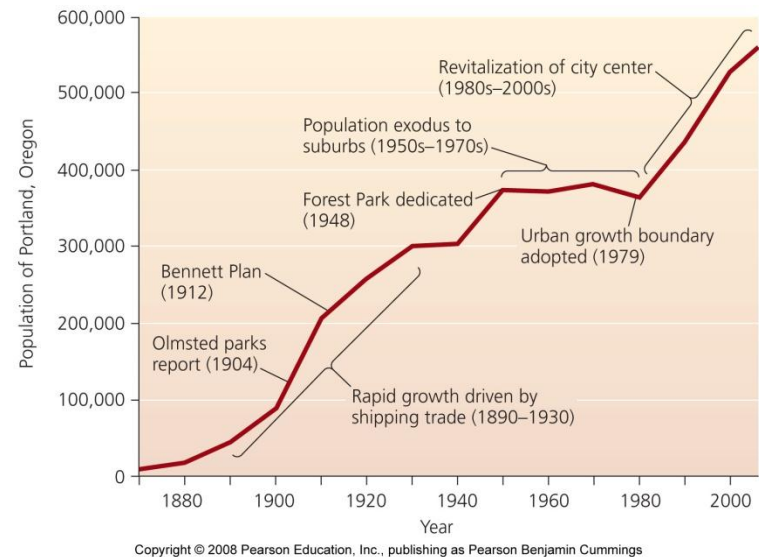


# Today's urban centers are unprecedented

- Urban centers have been part of human culture for thousands of years
  - The sheer scale of today's urban areas is unprecedented
- Today, 20 cities are home to more than 10 million residents
  - Tokyo, Japan, is home to 35 million people
  - Mexico City and New York City, each hold 19 million
- The majority of urban dwellers live in smaller cities

# Urban growth has often been rapid

- American cities grew rapidly
  - Due to increased trade
  - Crowding and deteriorating economic conditions occurred
  - Residents moved to the suburbs
- Cities in southern and western states have grown
  - People in northern and eastern states moved in search of warmer weather or more space



# Urbanization in developing countries

- Most fast-growing cities are in developing countries
  - Less need for farm labor due to industrialization
  - Wars, conflict, and ecological degradation
- Many of these cities face overcrowding, pollution, and poverty
  - Their economic growth does not match their population growth



# Factors influence the geography of urban areas

- Climate, topography, and the configuration of waterways help determine if a small settlement becomes a large city
- Many well-located cities are linchpins in trading networks
  - They funnel in resources from agricultural regions
  - Portland, Oregon; and Chicago, Illinois



(a) St. Louis, Missouri

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(b) Fort Worth, Texas

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# Spatial patterns of urbanization change

- Today, population centers are decentralizing
  - Global commerce, jet travel, television, cell phones, the Internet
  - Businesses don't need to be in urban areas
  - Highway networks make it easier to commute

# People have moved to suburbs

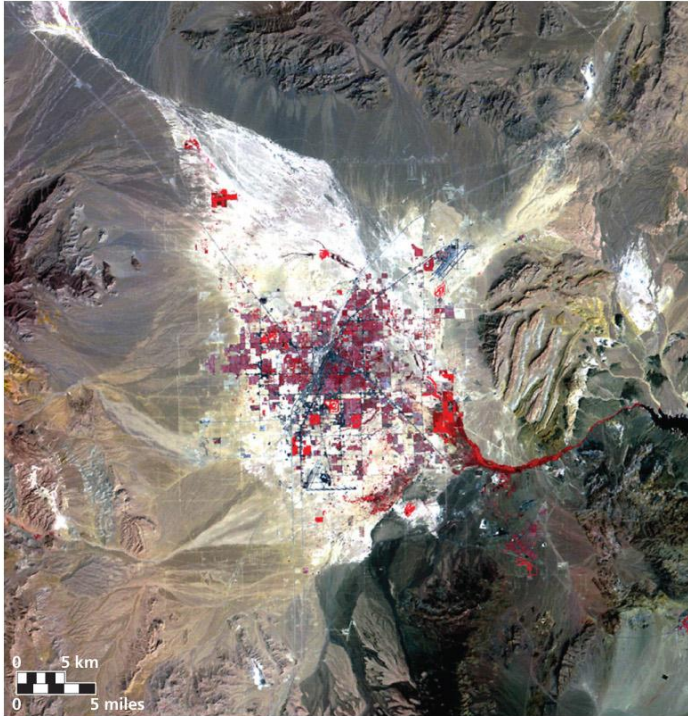
- By the mid-1900s, the U.S. and other countries had accumulated more people than jobs
  - Unemployment caused poverty and crime
  - Affluent city dwellers moved to cleaner, less-crowded suburbs
- Suburbs had advantages of space and privacy
  - More space, better economic conditions, cheaper real estate, less crime, and better schools
- But natural space decreased with increasing suburbs
  - People had to drive everywhere, increasing traffic congestion

# Sprawl

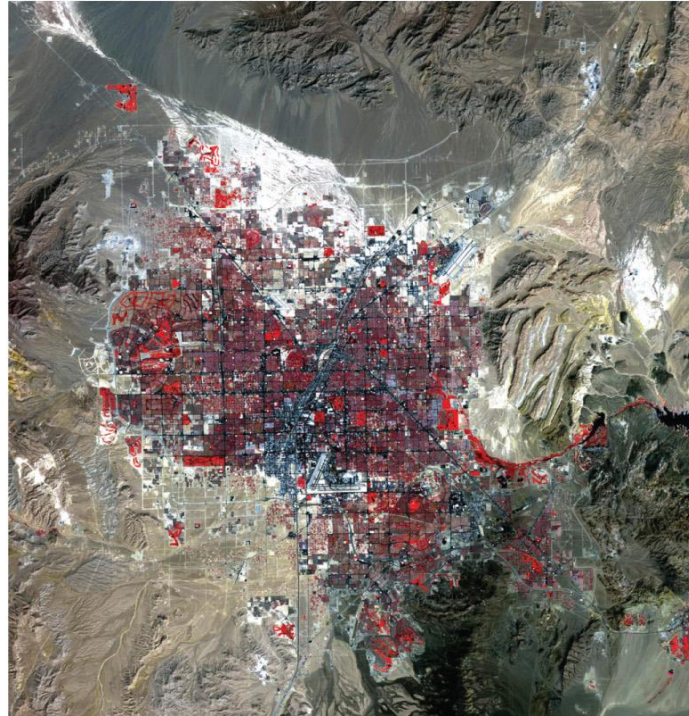
- Houses and roads supplant more than 2 million ha (2.5 million acres) of U.S. land per year
- **Sprawl** = the spread of low-density urban or suburban development outward from an urban center
  - Physical spread of development is greater than the rate of population growth
  - Phoenix, Arizona's land area grew 27 times larger, while its population grew 12 times larger between 1950 and 2002



# People in suburbs take up more space



(a) Las Vegas, Nevada, 1972



(b) Las Vegas, Nevada, 2002

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*Each person in a suburban region takes up an average of 11 times as much space as does a resident of the city proper*



# Several types of development lead to sprawl



**(a) Uncentered commercial strip development**

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**(b) Low-density single-use development**

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**(c) Scattered, or leapfrog, development**

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**(d) Sparse street network**

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# Sprawl has several causes

- Human population growth
- Per Capita Land Consumption: more land per person
  - **The amount of sprawl** = the number of people added to an area times the amount of land the average person occupies
  - Interstate highways
  - Technologies (telecommunications and the Internet) free businesses from dependence on the centralized infrastructure and workers can live wherever they desire
- People like their space and privacy
- Economists, politicians, and city boosters have encouraged it
  - “Growth is good”

# What is wrong with sprawl?

- Transportation: people are forced to drive cars
  - Pressure to own cars and drive greater distances
  - Increases dependence on nonrenewable petroleum
  - Lack of mass transit options
  - More traffic accidents
- Pollution from sprawl's effects on transportation
  - Carbon dioxide, nitrogen- and sulfur-containing air pollutants
  - Motor oil and road salt from roads and parking lots

# What else is wrong with sprawl?

- Health: promotes physical inactivity because driving cars replaces walking
  - Increases obesity and high blood pressure
- Land use: less land is left as forests, fields, farmland, or ranchland
  - Loss of ecosystem services, recreation, aesthetic beauty, wildlife habitat
- Economics: drains tax dollars from communities
  - For roads, water and sewer systems, electricity, police and fire services, schools in new developments

# City and regional planning

- **City planning** = the professional pursuit that attempts to design cities so as to maximize their efficiency, functionality, and beauty
  - Planners advise policymakers on development options, transportation needs, public parks, etc.
- Daniel Burnham's 1909 *Plan of Chicago* = the first thorough plan for an American city

# The *Plan of Chicago*

- Expanded city parks, playgrounds
- Streamlined traffic systems
- Removed industry and railroads from Lake Michigan



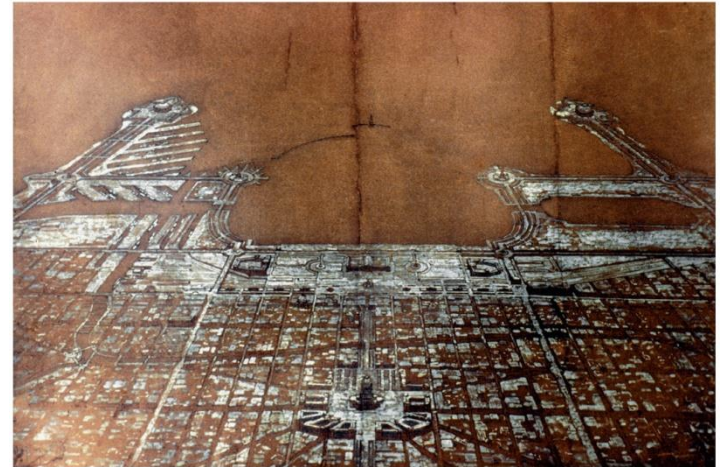
(c) Modern-day Chicago

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(a) Chicago lakefront in 1890

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(b) Architectural drawing from the *Plan of Chicago*

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# City and regional planning

- City planning grew throughout 20th century
  - Expanding urban populations
  - Decay of inner cities
  - Wealthier residents fled to suburbs
- **Regional planning** = deals with same issues as city planning, but with broader geographic scales that must coordinate with multiple municipal governments



# Zoning



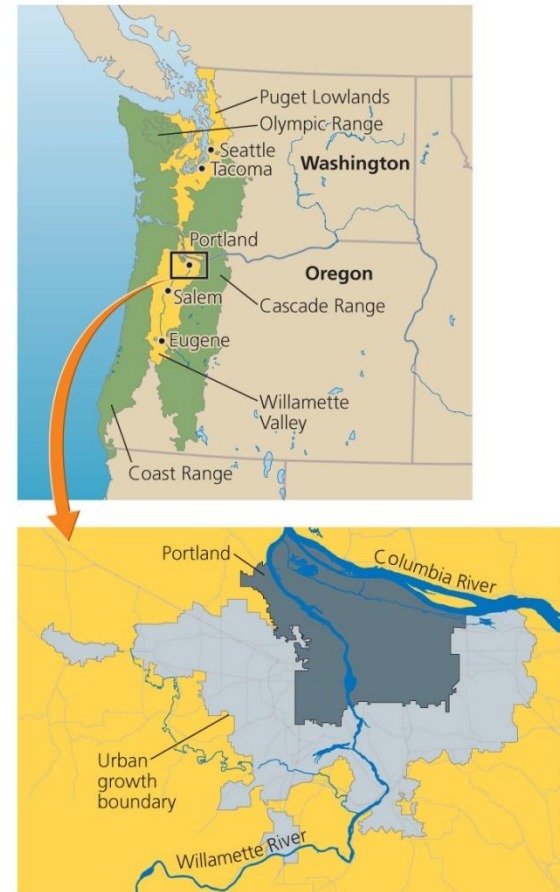
- **Zoning** = the of development different types
  - Can restrict areas to a single use or can allow a combination of residential and commercial use
- Opponents say that zoning's government restriction violates individual freedoms
- Proponents say government can set limits for the good of the community

# Urban growth boundaries (UGBs)

- Limits sprawl: keeps growth in existing urbanized areas
  - Revitalize downtowns
  - Protect farms, forests, and their industries
  - Ensure urban dwellers some access to open space
- May reduce infrastructure costs
- Disadvantages:
  - Increases housing prices within their boundaries
  - Restricts development outside UGB
  - Increases the density of new housing inside the UGB
  - Increasing pressure to expand boundaries

# Oregon's urban growth boundary

*The long-term goal was to prevent growth of a megalopolis stretching from Eugene to Seattle*



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# Smart growth

- **Smart growth** = urban growth boundaries and other land use policies to control growth
- Proponents promote:
  - Healthy neighborhoods and communities
  - Jobs and economic development
  - Transportation options
  - Environmental quality
- Building “up, not out”
  - Focusing development in existing areas

# Principles of smart growth

- Mixed land uses
- Compact building design
- Range of housing opportunities and choices
- Walkable neighborhoods
- Distinctive, attractive neighborhoods
- Preserve open space
- Develop existing communities
- A variety of transportation choices
- Predictable development decisions
- Community collaboration in development decisions

# New urbanism

- **New urbanism** = neighborhoods are designed on a walkable scale
  - Homes, businesses, and schools are close together
- Functional neighborhoods can be designed to meet a family's needs



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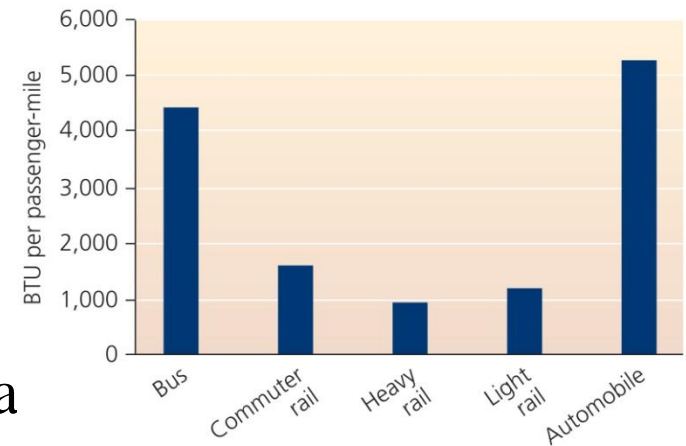


# Transit-oriented development

- **Transit-oriented development** = communities arrayed around stops on a major rail transit line
  - People can travel by train and foot alone
- Zoning rules must cooperate with new urbanism
  - Denser development must be allowed

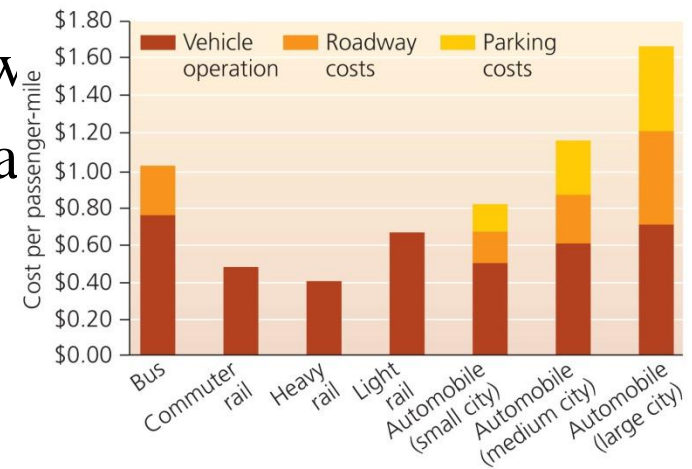
# Mass transportation

- A key in improvement of quality of urban life
- Options include:
  - Public buses
  - Trains and subways
  - **Light rail** = smaller rail systems powered by electricity
- Cheaper, more energy efficient, and cleaner
- Traffic congestion is eased



(a) Energy consumption for different modes of transit

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(b) Operating costs for different modes of transit

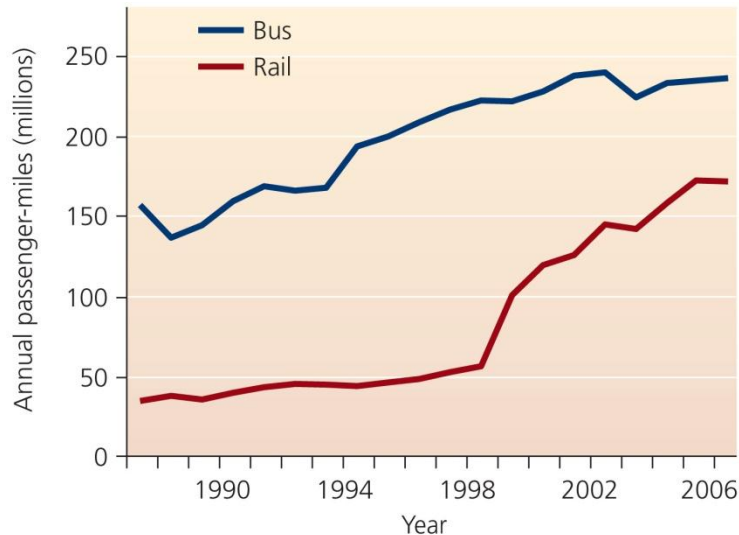
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# Train and bus systems



(a) MAX light rail train

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(b) Portland transit ridership trends

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- The most-used train systems in the U.S. are in the largest cities
  - Carry more than 25% of each city's daily commuters
- Most countries have bus systems more accessible than in the U.S.
- Light rail systems are rapidly increasing

# Problems with mass transport

- Expensive to replace existing roads
- Types of mass transit differ in their effectiveness
  - Depends on city size, size of the transit system
- Governments can encourage mass transit
  - Raise fuel taxes
  - Tax inefficient modes of transport
  - Reward carpoolers
  - Encourage bicycle use and bus ridership
  - Charge trucks for road damage
  - Stimulate investment in renewed urban centers

# Parks and open spaces are key elements

- City dwellers want to escape from noise, commotion, and stress of urban life
- Natural lands, public parks, and open space provide greenery, scenic beauty, freedom, and recreation
- Protecting natural lands becomes more important with increased urbanization
  - Because urban dwellers become more isolated and disconnected with nature



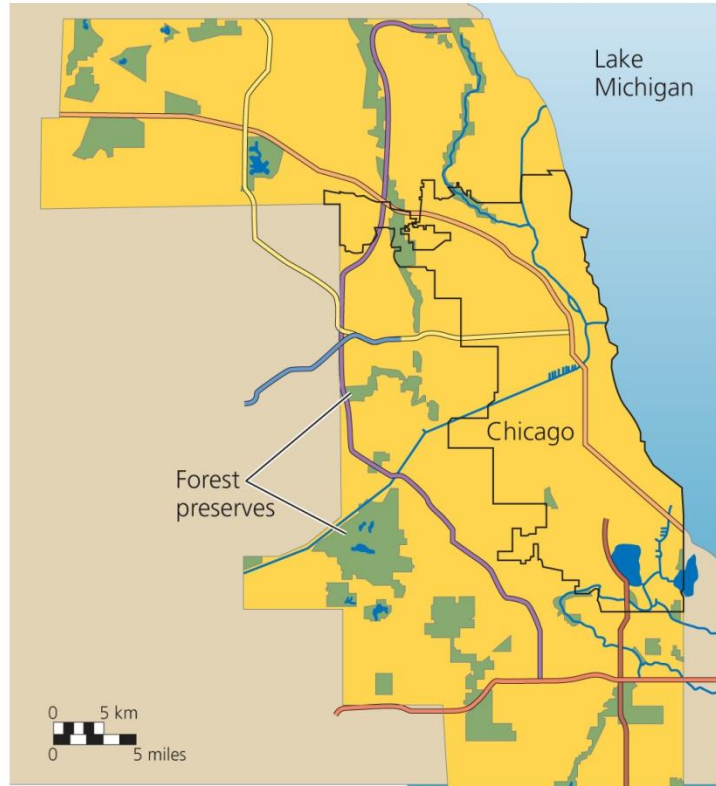
# City parks

- Originated in America in at the end of the 19th century
  - People wanted to make dirty, crowded cities more livable
  - Began in eastern cities
  - Lawns, groves, and curved pathways originated with European ideals



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# Conflicts between the wealthy and labor classes



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- Conflicts over park's intended purposes arose
  - Rich citizens wanted aesthetic “pleasure grounds”
    - Carriage rides
  - Poor citizens were interested in active recreation
    - Ballgames

# Smaller public spaces are also important

- Small spaces can make a big difference
  - Playgrounds, community gardens

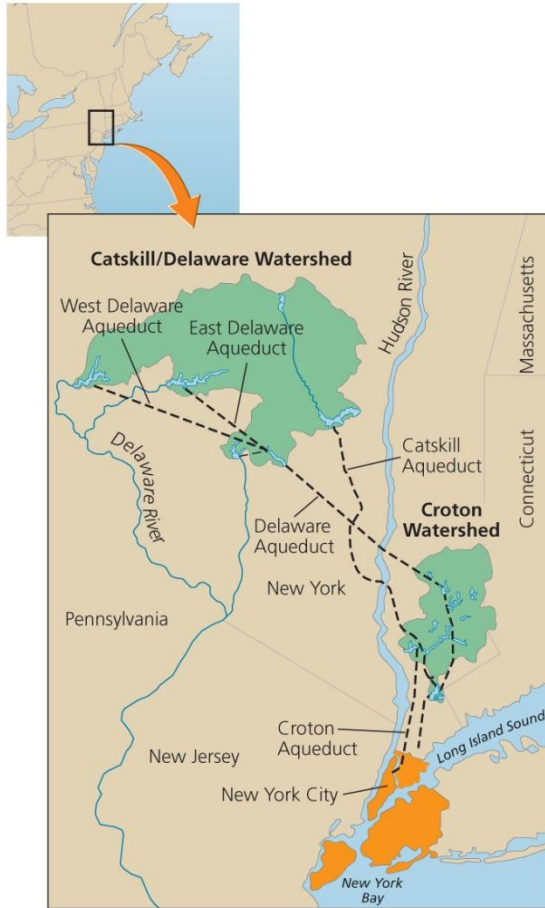


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# Greenways

- **Greenways** = strips of land that connect parks or neighborhoods
  - Protect water quality
  - Boost property values
  - Corridors for wildlife movement
- Ecological restoration in cities
  - Enhances “naturalness” of cities
  - San Francisco’s Presidio area is being restored to native dune communities

# Urbanization impacts the environment



- **Resource sinks** = cities must import resources from long distances
  - We rely on large expanses of land elsewhere for resources
  - We need natural land for ecosystem services (air and water purification, nutrient cycling, water treatment)

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# People don't feel the consequences of choices

- Isolated urban residents don't feel the environmental impact of their choices
- Long distance transportation of resources requires a great deal of fossil fuels
  - But, a world without cities would require more fossil fuels

# Efficiency in urban areas

- **Efficiency** = the concentration of people in cities allows efficient consumption of resources
  - City density facilitates social services that improve the quality of life
  - Medical services, education, water and sewer systems, waste disposal, transportation

# Consumption in urban areas

- **Consumption** = heavy use of outside resources extends ecological footprints of cities to a level far beyond their actual sizes
  - Cities take up only 2% of the land surface, but consume more than 75% of the world's resources
  - Urban dwellers have far larger ecological footprints than rural dwellers
  - But, urban residents tend to be wealthier, and wealth correlates with consumption

# Cities preserve land but export pollution

- Because people are packed densely in cities, more land outside cities is left undeveloped
  - If cities did not exist, we would have much less room for agriculture, wilderness, biodiversity, or privacy
- Cities export wastes and transfer the costs of activities to other regions
  - Citizens are exposed to pollution such as heavy metals and chemicals
  - The poor bear the brunt of pollution because they are too poor to move

# Cities have noise and light pollution

- **Noise pollution** = undesired ambient sound
  - Degrades aesthetic surroundings
  - Can induce stress and harm hearing
- **Light pollution** = lights obscure the night sky, impairing the visibility of stars



# Urban centers foster innovation

- Cities promote a flourishing cultural life
  - They spark innovation and creativity
  - Promote education and scientific research
  - They are engines of technological and artistic inventiveness
  - They serve as markets for organic produce, recycling, and education



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# Some seek sustainability for cities

- Cities must replace the one-way linear metabolism of importing resources and exporting wastes
  - Destabilizes environmental systems and are not sustainable
- **Urban ecology** = cities can be viewed explicitly as ecosystems
  - Fundamentals of ecology and systems apply to cities

# Urban sustainability: cities should...

- Use resources efficiently
- Recycle
- Develop environmentally friendly technologies
- Account fully for external costs
- Offer tax incentives for sustainable practices
- Use locally produced resources
- Use organic waste and wastewater to restore soil fertility
- Encourage urban agriculture

# Cities can become sustainable

- Singapore, Japan, produces all its own meat
- Curitiba, Brazil, has a highly effective bus network, as well as provides recycling, environmental education, job training, and free health care
- Developed countries should invest in resource-efficient technologies to reduce their impacts
- Developing countries should invest in basic infrastructure to improve health and living conditions

# Conclusion

- As half the human population has moved to urban lifestyles, our environmental impact has changed
- Resources must be delivered over long distances
- Urban sustainability makes urban areas better places to live
  - Expanding transportation options to relieve congestion
  - Ensuring access to park lands and greenspaces prevents us from becoming isolated from nature
- American cities are becoming more livable



## ***QUESTION: Review***



\_\_\_\_\_ occurred as a result of deteriorating conditions in the inner cities

- a) Movement to suburbs
- b) Movement to rural areas
- c) Development of inner cities
- d) Decentralization of city management

# QUESTION: Review



“Sprawl” is defined as...?

- a) Increased resource extraction from rural areas
- b) Creating more livable cities
- c) The spread of low-density development outward from an urban center
- d) The spread of high-density development outward from an urban center

## ***QUESTION: Review***



Which of the following is NOT a cause of urban sprawl?

- a) People like their privacy
- b) Technology allows people to work from home
- c) Technology frees businesses from having to be located in the city
- d) All of the above are causes of sprawl

# ***QUESTION: Review***



City planning tries to design cities so they....

- a) Maximize their efficiency and beauty
- b) Maximize their efficiency, even at the expense of their beauty
- c) Maximize their beauty, even at the expense of their efficiency
- d) Increase the tax base for needed infrastructure

# ***QUESTION: Review***



Urban growth boundaries....

- a) Encourage development in the suburbs
- b) Can be implemented only in wealthier cities
- c) Keeps growth within existing urbanized areas
- d) Are no longer a viable option for U.S. cities

## ***QUESTION: Review***



In “new urbanism,” cities are designed around...?

- a) Mass transit
- b) Cars and highways
- c) Walking
- d) All of the above



## ***QUESTION: Review***



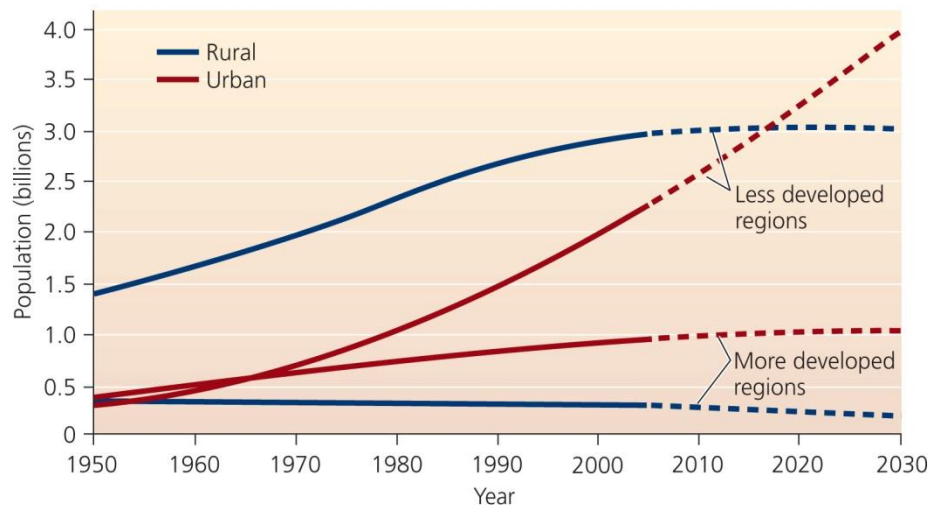
Which statement is false, regarding cities?

- a) They must import resources from far away
- b) They rely on large expanses of land for ecosystem services
- c) People living in cities feel more connected to nature, particularly since TV
- d) Cities tend to concentrate people, allowing for more efficient consumption of resources

# QUESTION: Interpreting Graphs and Data



What major conclusion can be drawn from this graph on urbanization?



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- a) Urbanization will decrease in more developed regions
- b) Urbanization will decrease in less developed regions
- c) Urbanization will increase most rapidly in less developed regions
- d) Urbanization will increase most rapidly in more developed regions

# QUESTION: Interpreting Graphs and Data



What result can be anticipated from the following type of development?



**(b) Low-density single-use development**

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- a) Urban sprawl will increase
- b) Urban sprawl will decrease
- c) People will leave this area and move back to the city
- d) People will suffer stress from overcrowding

# QUESTION: Viewpoints



Imagine you lived next to a 10-acre parcel of land that the owner wanted to develop into a dense housing division. How would you feel?

- a) Fine; it's the person's right to develop the land as he or she wants
- b) I would not like it, but it's the person's right to develop the land
- c) The city should buy the property to put in a park
- d) I would try to buy the property, and post large "Keep Out" signs