

Environmental Science, 15e

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The Human Population and Urbanization

Case Study: Portland, Oregon – On a Quest for Urban Sustainability

- How is Portland, Oregon leading the way to urban sustainability?
 - Their land use policies have slowed population growth, reduced dependence on cars, and preserved green space
 - Increasing beneficial environmental impact and reducing ecological footprint
- How do mixed-use neighborhoods decrease a city's dependence on cars?

6.1 How Many People Can the Earth Support?

- The impact on natural capital of rising human populations raises the question
 - How long can the human population keep growing?

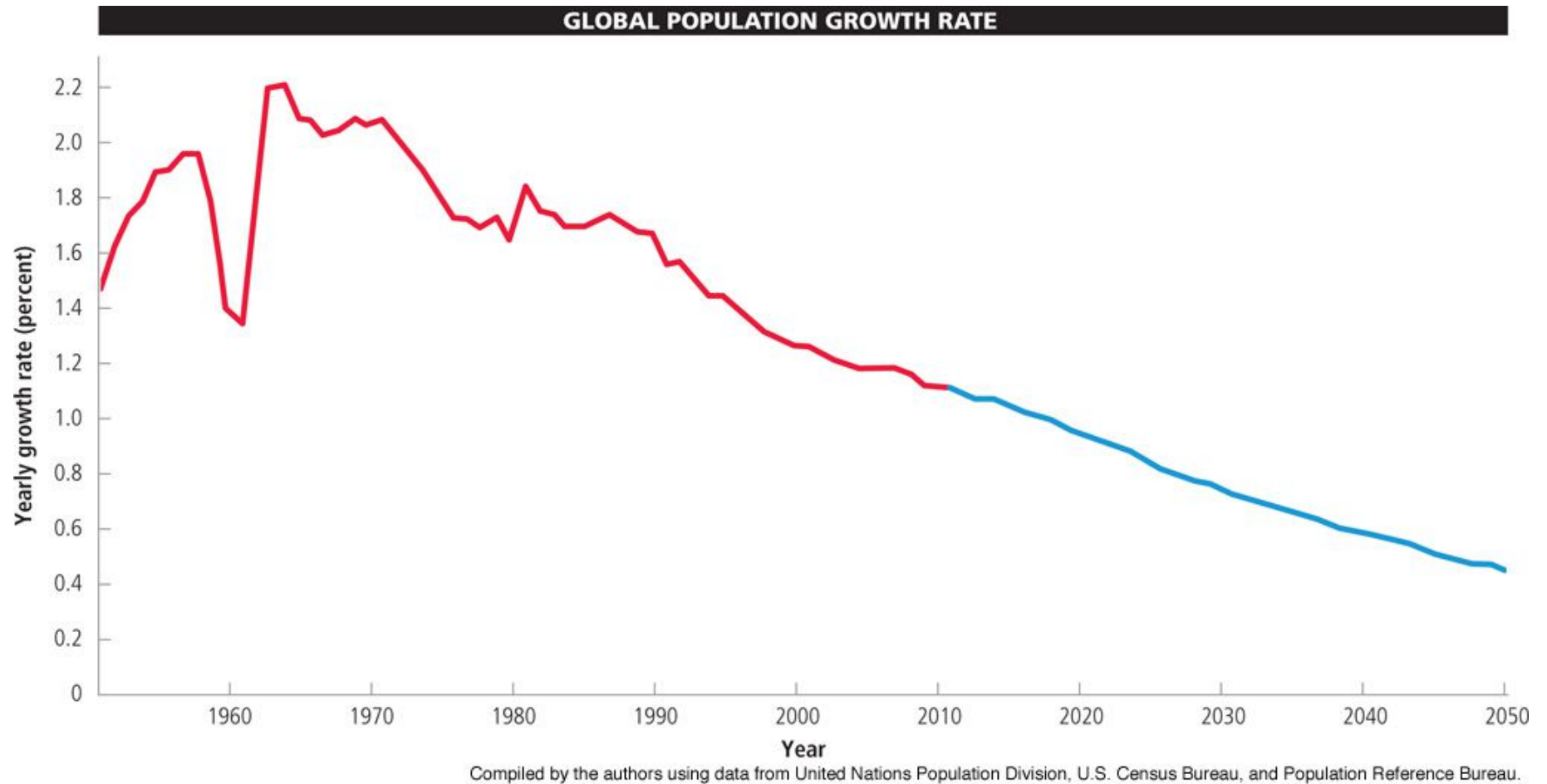
Human Population Growth Shows Certain Trends

- The human population grew slowly for most of human history, but in the last 200 years, rapid growth has taken place
- Factors contributing to exponential growth
 - More people are fed with modern agriculture
 - Technology has helped humans migrate to and live in almost all of the planet's climate zones and habitats

There Are Three Current Trends in the Size and Impact of Human Population

- Since 1960, the human population growth rate has slowed, but the population is still growing
- Human population is unevenly distributed
 - Growing 14 times faster in undeveloped countries than in developed countries
- Increasingly people are moving to urban areas – by 2050, 2/3 will live in cities

Global Human Population Growth Rate



6.2 What Factors Influence the Size of the Human Population?

- Births and immigration increase population size, while deaths and emigration decrease population size
- Fertility rate
 - The average number of children born to women is the key factor in determining population size

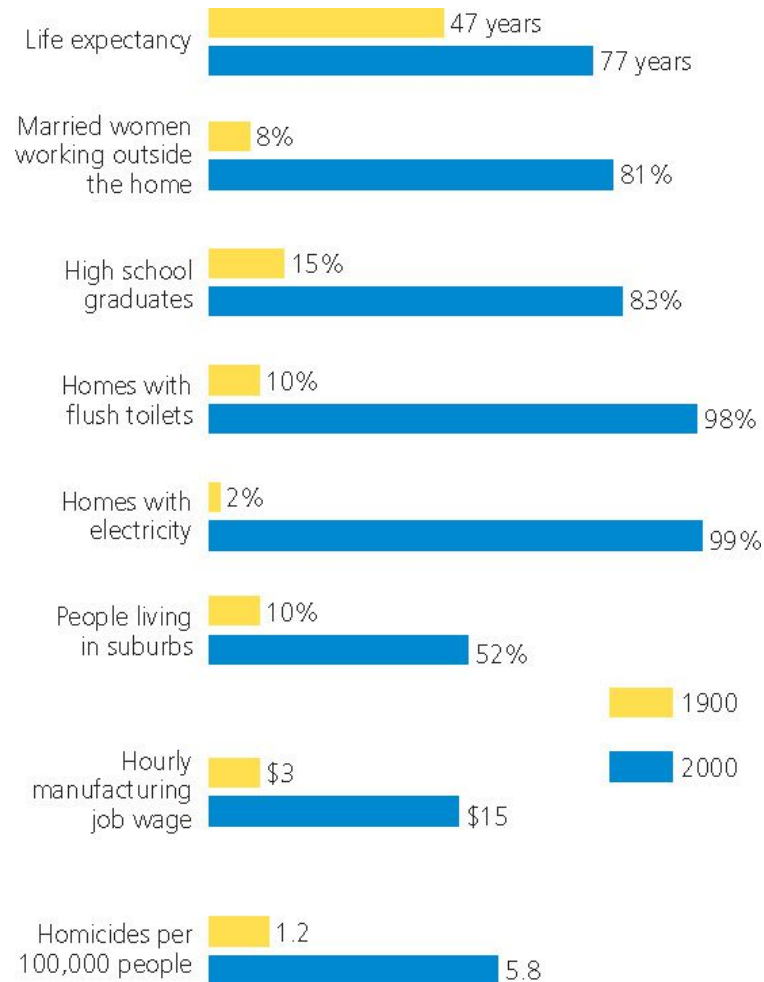
The Population Can Grow, Decline, or Remain Fairly Stable

- Women are having fewer babies but the world's population is still growing
 - Total fertility rate (TFR): the average number of children born to women in a population during their reproductive years

Several Factors Affect Birth/Fertility Rates

- Children as part of the labor force
- Cost of raising and educating children
- Fewer children needed to support seniors
- More family planning in urban areas
- Access to education/employment outside the home
- Age: women over 25 have fewer children
- Abortion and reliable birth control

Recent Changes in the United States



Compiled by the authors using data from U.S. Census Bureau and Department of Commerce.

Several Factors Affect Death Rates

- Over the last 100 years, the human population grew because of reduced death rates
 - Nutrition, medicine, and sanitation improved
 - Life expectancy increased (the average number of years a person may expect to live)
 - Infant mortality rates dropped (the number of babies out of every 1,000 that die before their first birthday)

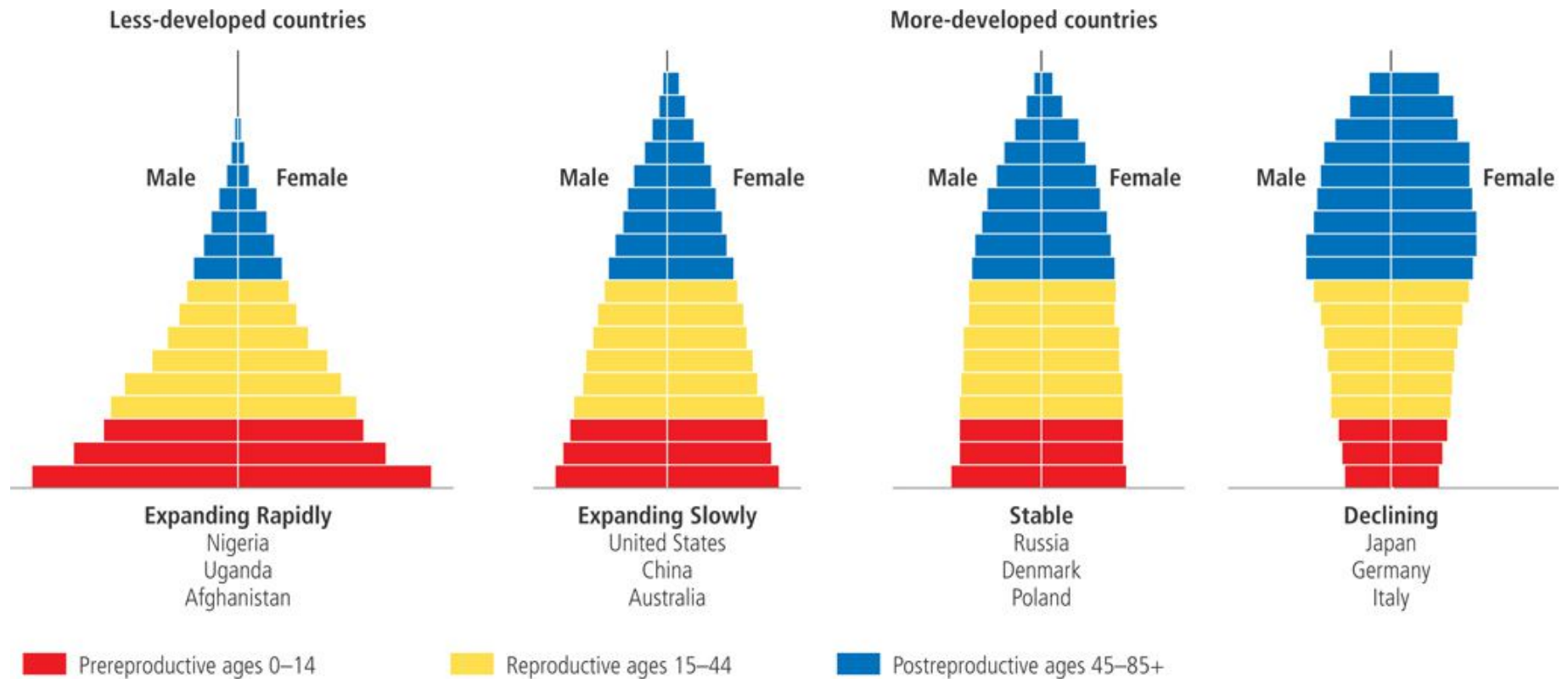
The Population Size Can Be Affected by Immigration and Emigration

- Immigration (people in) and emigration (people out)
 - Seeking jobs and economic improvement
 - Fleeing religious persecution, ethnic conflicts, and war
 - Environmental refugees – those who emigrate because of famine, drought, soil erosion or other environmental degradation

6.3 How Does a Population's Age Structure Affect Its Growth or Decline?

- The growth or decline of a population is determined by the number of males and females in specific age categories (youth, middle, older age)

Generalized Population Age-Structure Diagrams



Compiled by the authors using data from U.S. Census Bureau and Population Reference Bureau.

A Population's Age Structure Helps Us to Make Projections about Growth

- Age structure is the number and percentages of people in the young, middle and old age categories
 - Demographers create age-structure diagrams for populations to determine whether the population is increasing or decreasing

Aging Populations Can Decline Rapidly

- As the percentage of people age 65 or older increases in a population, that population will decline
 - Japan: highest percentage of people over 65
 - With declining population, few adults are working and paying taxes
 - Younger people have to support the increasing population of those over 65
 - Japan could experience economic difficulties in the future

Rapid Population Decline Can Cause Several Problems

Some Problems with Rapid Population Decline

Can threaten economic growth

Labor shortages

Less government revenues with fewer workers

Less entrepreneurship and new business formation

Less likelihood for new technology development

Increasing public deficits to fund higher pension and health-care costs

Pensions may be cut and retirement age increased



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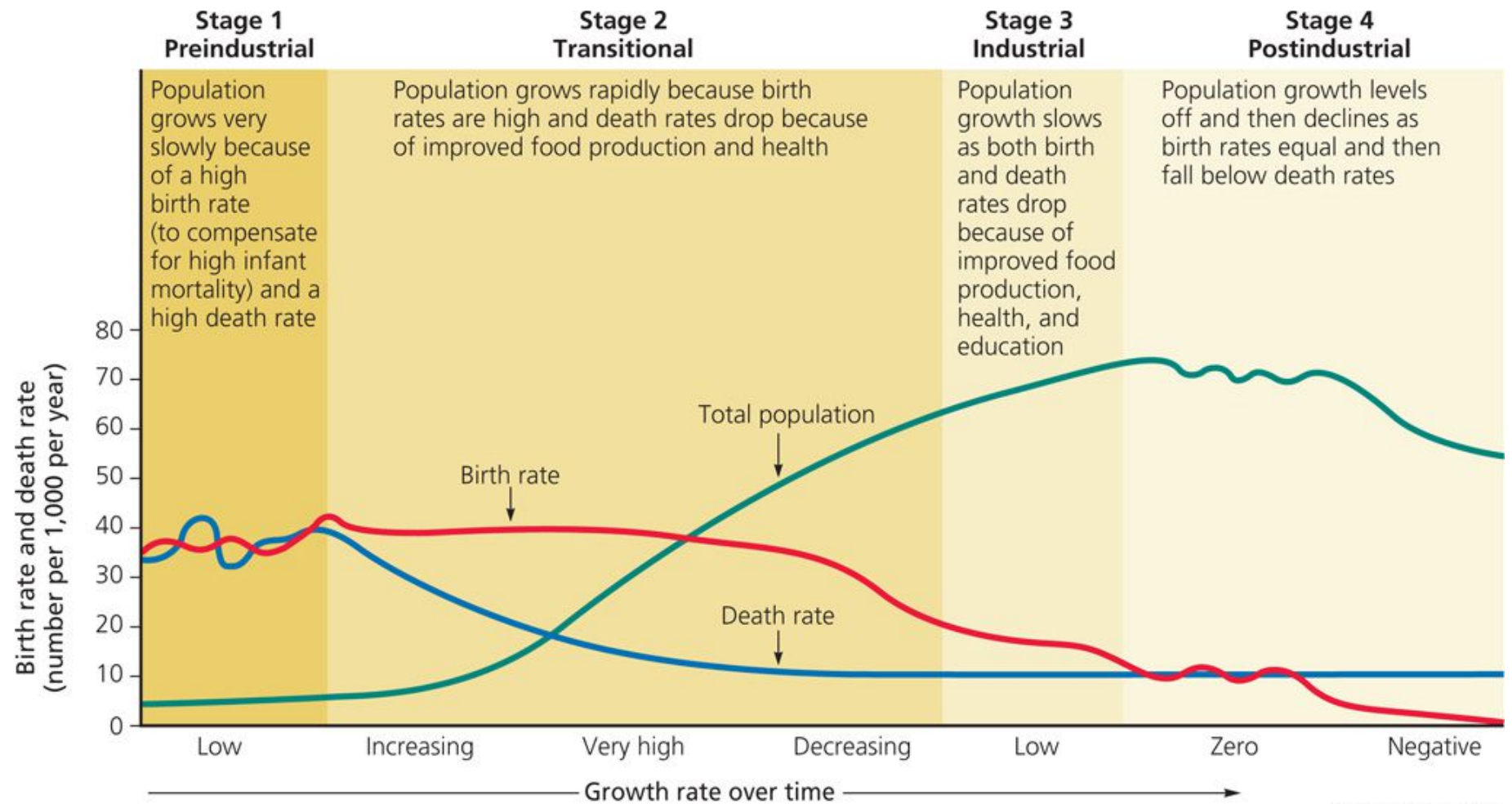
6.4 What Are Some Ways To Slow Human Population Growth?

- Ways to slow growth
 - Reduce poverty
 - Elevate the status of women
 - Make family planning available

Promoting Economic Development Can Stabilize a Population

- Demographic transition
 - As countries industrialize and develop economically, per capita income rises, poverty declines, and populations grow more slowly
- This happens in four stages:
 - Preindustrial
 - Transitional
 - Industrial
 - Postindustrial

The Demographic Transition



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Promoting Economic Development Can Stabilize a Population

- Empowerment of women tends to slow population growth
 - Educated women who control their own fertility have fewer children – stabilizing populations, reducing poverty and minimizing environmental impact
- Some promote family planning
 - Access to education and clinical services enables couples to choose how many children they will have

6.5 What Are the Major Urban Resource and Environmental Problems?

- Cities use high levels of resources resulting in waste, pollution and poverty
- Most cities are unsustainable

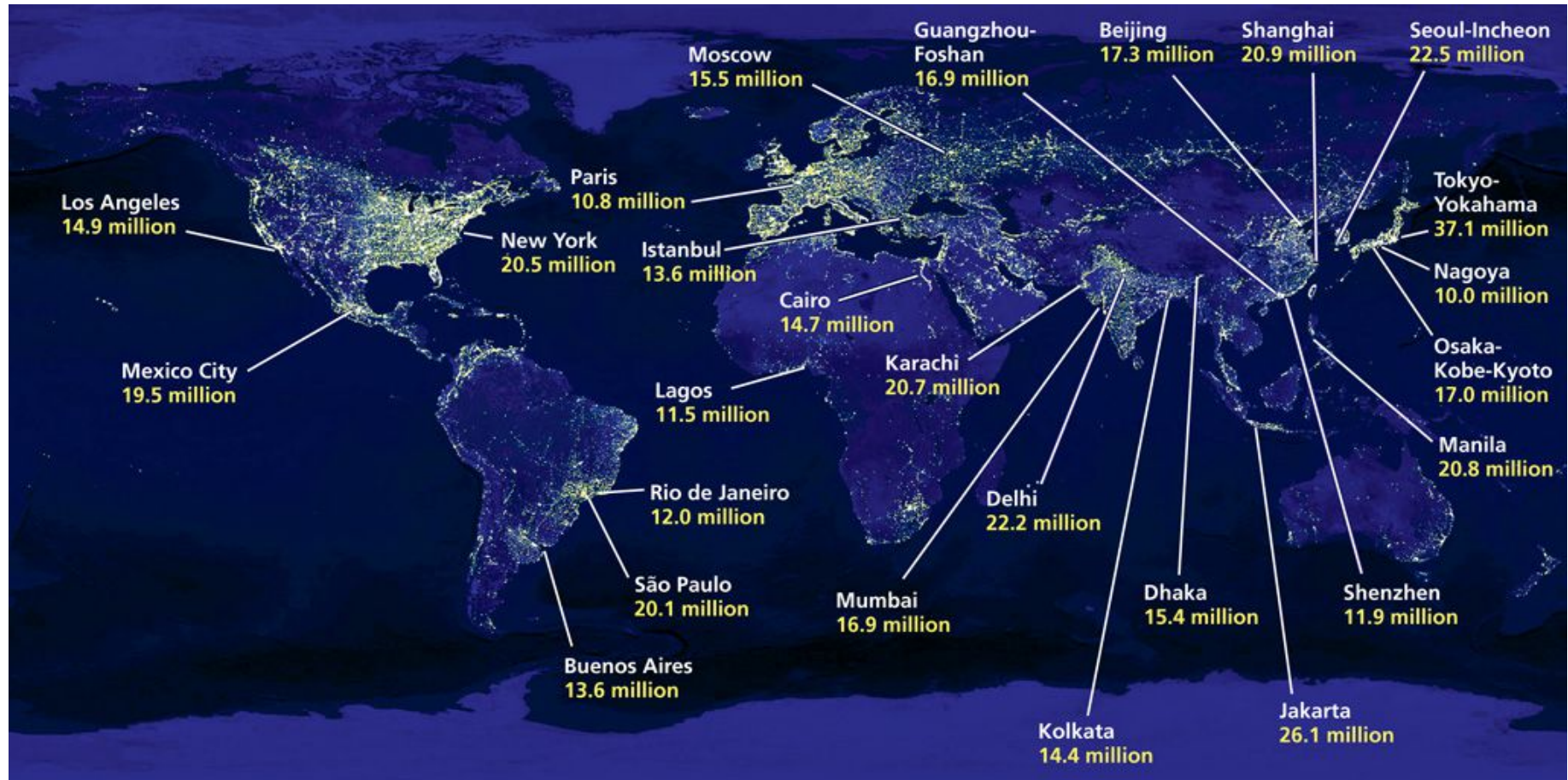
Population Experts See Important Urban Trends

- Urban areas grow by natural increase and by migration, mostly from rural areas
- Trends in urban population dynamics
 - The percentage of people living in urban areas will continue to increase
 - The size and number of urban regions is increasing exponentially
 - Poverty is becoming increasingly urbanized (typically in less-developed countries)

Why Are People Moving to Cities?

- Every day, about 200,000 more people become urban dwellers
 - Rural people come to cities in search of better jobs, living conditions, education, food, and health care
 - Some rural people are driven to urban areas by famine, deteriorating environmental conditions, and war

Global Outlook: Megacities



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Urban Sprawl Gobbles Up the Countryside

- Shopping malls and parking lots replace farmer's fields
- Urban sprawl:
 - Is the product of ample affordable land, automobile use, federal and state funding of highways, and inadequate urban planning
 - Contributes to environmental problems and natural capital degradation

Urbanization Has Advantages

- Cities are centers of economic development, innovation, education, technological advance, social and cultural diversity, and job markets
- People who live in urban areas live longer, have better health care and education

Urbanization Has Disadvantages

- Disadvantages
 - Unsustainable
 - Cities lack vegetation, have water problems, concentrate pollution and health problems, produce noise pollution, and affect local climate

Population Experts See Important Urban Trends

- Life is a desperate struggle for the urban poor in less-developed countries
 - Crowded into slums or live in squatter settlements and shantytowns at the edges of cities
 - Lack clean water, proper food, plumbing, and electricity
 - Live in areas of high pollution and/or in environments prone to floods and earthquakes

6.6 How Does Transportation Affect Urban Environmental Impacts?

- Widely disbursed urban areas in some countries create larger ecological footprints because the population depends on motor vehicles for transportation

Cities Can Grow Outward or Upward

- Many people live in compact cities – like Hong Kong or Tokyo
 - Move around the cities by walking, biking or using mass transit
- Some people live in dispersed cities
 - Depend on cars for transportation
 - Cities with urban sprawl have adverse environmental effects

Motor Vehicle Usage Has Advantages and Disadvantages

- Advantages:
 - Cars are comfortable and convenient
 - Much of the world's economy is tied to the production/maintenance of cars, roads, etc.
- Disadvantages
 - Accidents, killing or severely injuring people
 - Auto exhaust, the largest source of outdoor air pollution
 - Congestion and traffic jams

Reducing Automobile Use Is Not Easy, But It Can Be Done

- Phase in full-cost pricing – charging a tax on gasoline that could:
 - Offset harmful effects of driving
 - Fund programs to educate people
 - Finance mass transit, bike lanes, and sidewalks
- Raise parking fees in cities
- Increase/charge tolls on roads, tunnels, and bridges

6.7 How Can Cities Become More Sustainable and Livable?

- Give people the ability to choose alternate modes of transportation – walking, biking, or taking mass transit
- Provide ways to recycle or reuse waste
- Provide ways to grow much of your own food
- Protect biodiversity by preserving the surrounding land

Smart Growth Can Promote Environmental Sustainability

- Smart growth
 - Policies and tools that encourage more environmentally sustainable urban development
 - Includes zoning laws and other regulations to direct growth and reduce ecological footprints

Eco-Cities: Cities for People, Not Cars

- Retrofit existing cities by:
 - Developing low-polluting mass transit
 - Meeting high energy-efficiency standards for electricity and appliances
 - Planting trees and plants throughout the city
 - Reducing air and noise pollution, as well as soil erosion
 - Efficient use of ecological land-use planning

Smart Growth Tools

Solutions

Smart Growth Tools

Limits and Regulations

Limit building permits

Draw urban growth boundaries

Create greenbelts around cities



Zoning

Promote mixed use of housing and small businesses



Concentrate development along mass transportation routes



Planning

Ecological land-use planning

Environmental impact analysis

Integrated regional planning



Protection

Preserve open space

Buy new open space

Prohibit certain types of development

Taxes

Tax land, not buildings

Tax land on value of actual use instead of on highest value as developed land

Tax Breaks

For owners agreeing not to allow certain types of development

For cleaning up and developing abandoned urban sites

Revitalization and New Growth

Revitalize existing towns and cities

Build well-planned new towns and villages within cities

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The Role of Eco-Cities

- Eco-cities can:
 - Clean up industrial sites and preserve nearby forests
 - Source food locally from nearby farms, solar greenhouses, and rooftop gardens
- This is already a reality in some cities
 - Portland, Oregon; Bogota, Columbia; Helsinki, Finland; and Melbourne, Australia

Additional Case Study: The Use of Smart Growth Tools

- What, where, and how communities build will affect their residents' lives for generations to come
- The EPA's ten smart-growth principles to create new cities/retrofit existing cities
 - Preserve natural lands and critical environmental areas, protect water and air quality, and reuse already-developed land

Additional Case Study: Smart Growth Tools in CA, MD, CO, and FL

- How are cities in California, Maryland, Colorado and Florida using the 10 Smart Growth Principles?
 - Provide a variety of transportation choices, develop mixed land use, and preserve open space, farmland, natural beauty, and critical environmental areas
- Do you think your city can begin to use these?

Smart Growth Tools and the Three Big Ideas

- Smart growth tools
 - Can reduce the strain on the earth's natural capital resources in cities
 - Makes cities economically competitive, which can provide opportunities for women to be educated and self-sufficient – and have fewer children
 - Create sustainable cities and convert unsustainable existing cities to sustainable environmentally friendly communities