



## Lecture 9

# A Locationally Fixed, Multipurpose Resource: Land



# Introduction

- Land has special characteristics.
  - Both topography and location matter.
- This chapter will investigate the efficiency of land use and transactions.



# Introduction

- Questions addressed by Land & Urban Economics
  - Why do cities form and what determines their location, size and structure?
  - What are the causes of urban growth and decline and is there a role for policy?
  - What determines the price of land? – What effect does the price of land have on other markets (e.g. financial markets!)
  - What drives neighborhood segregation?
  - What is the motivation for zoning and landuse restrictions?
  - What causes traffic congestion and what can be done to alleviate it?
  - Why are crime and poverty concentrated in cities?
  - Why is housing different from other goods?
  - What is the role of local governments in urban and housing policy?



# The Economics of Land Allocation

## Land use

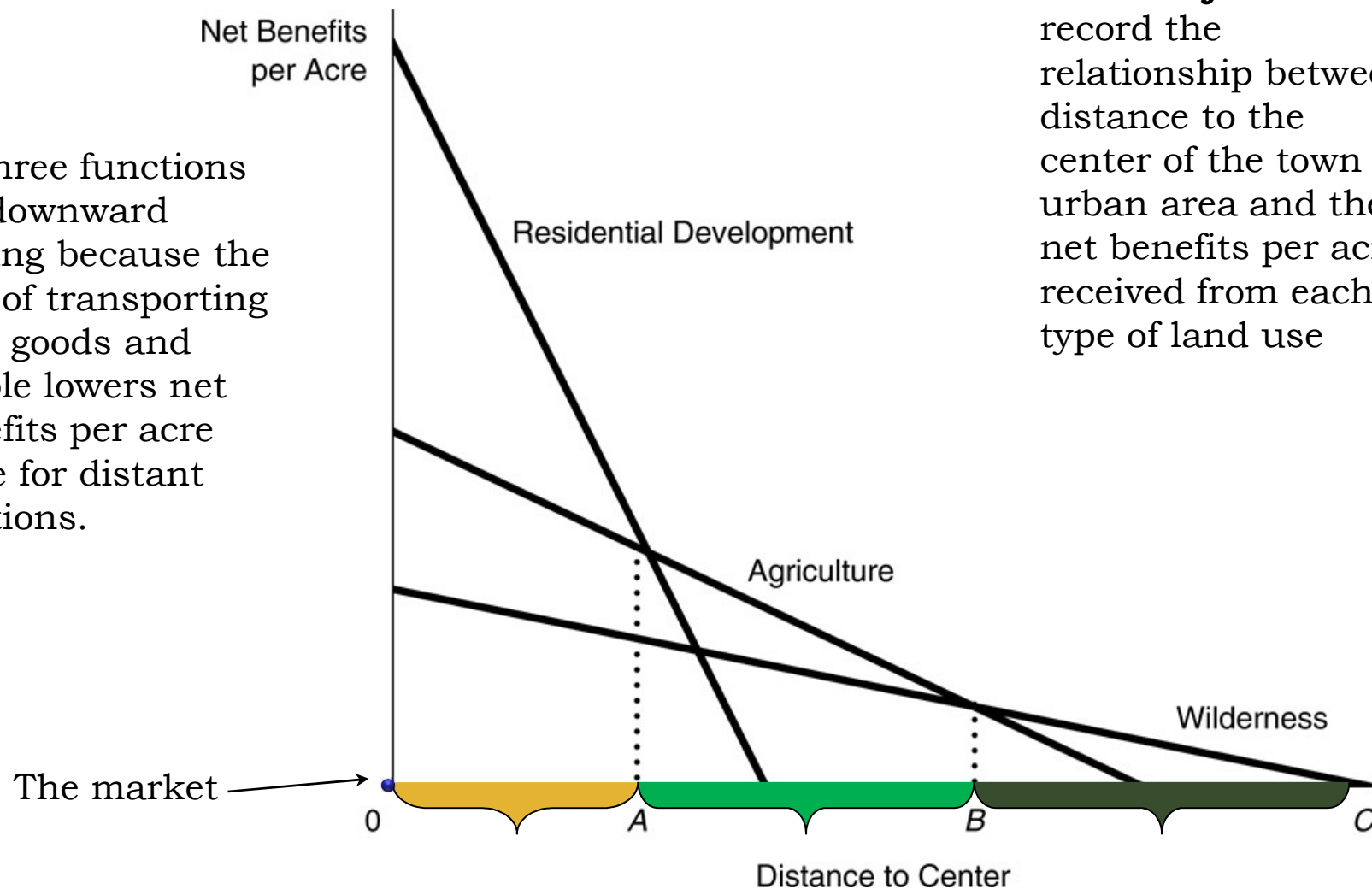
- In general, markets tend to allocate land to its highest valued use.
- The Figure in the next page presents three hypothetical land uses—residential development, agriculture, and wilderness and exhibits the relationship between net benefits and location to market places for three types of land uses.
- Monocentric city dominated in the past
  - In most cities, both manufacturers and office firms wanted to locate at center
  - Office firms to minimize distance to clients
  - Mfg firms to minimize distance to central railroad terminal
  - 65-75% of jobs were located near city center
  - Land use was roughly organized into concentric rings, with office firms in the center, then a ring of manufacturers, then a ring of residential users.



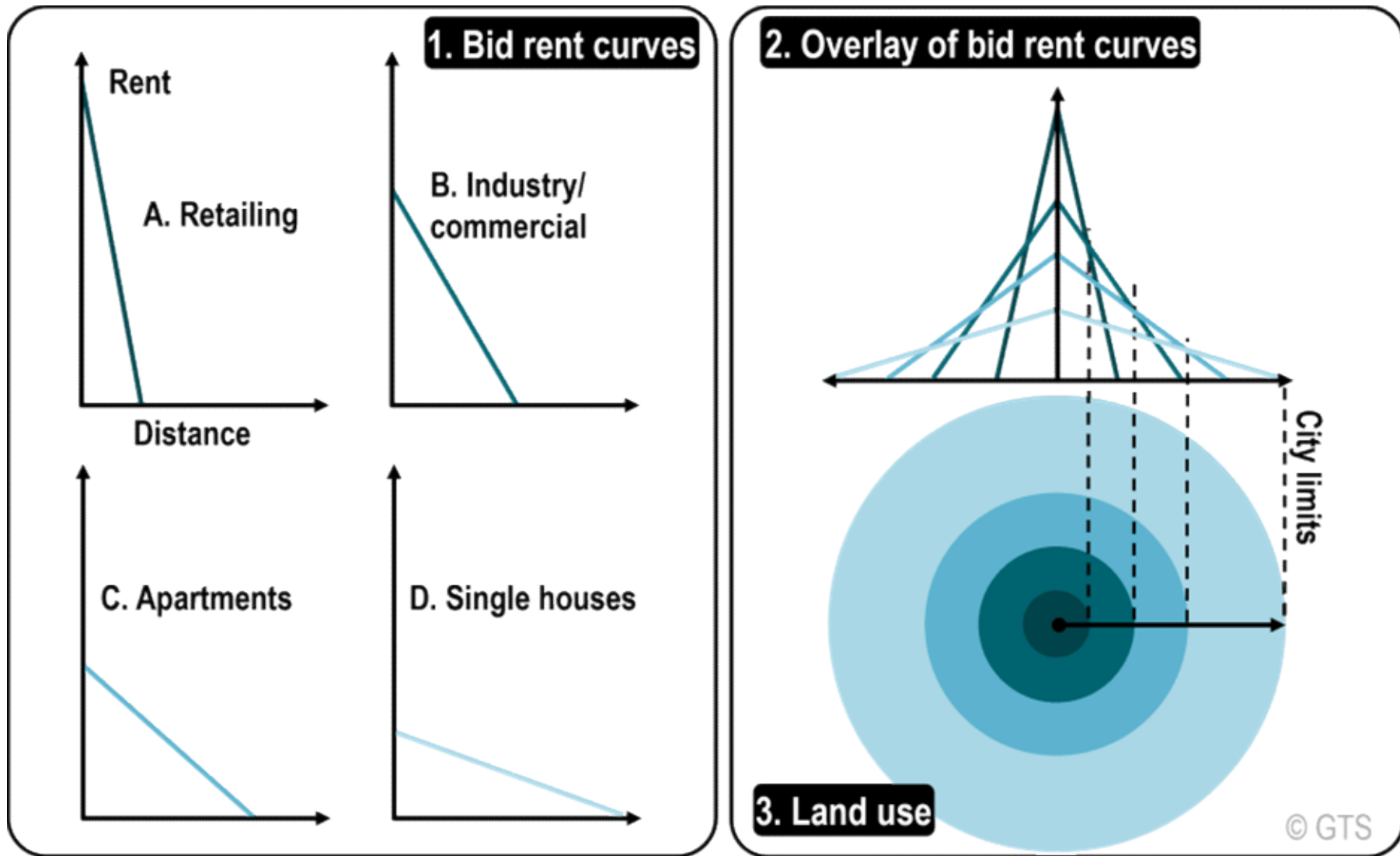
# The Economics of Land Allocation

All three functions are downward sloping because the cost of transporting both goods and people lowers net benefits per acre more for distant locations.

**bid rent functions:** record the relationship between distance to the center of the town or urban area and the net benefits per acre received from each type of land use



# The Economics of Land Allocation



# The Economics of Land Allocation

## Land-Use Conversion

- Conversion occurs whenever the underlying bid rent functions shift.
  - The US has experienced rapid increase in urban land area from 1945 to 2002.
  - Many developing countries are witnessing the conversion of wilderness areas into agriculture.
- Main sources of land conversion include
  - Population growth
  - Increasing urbanization and industrialization;
  - Rising productivity of remaining land
  - Lower agricultural transport costs
  - Increasing demand for wilderness-based recreation

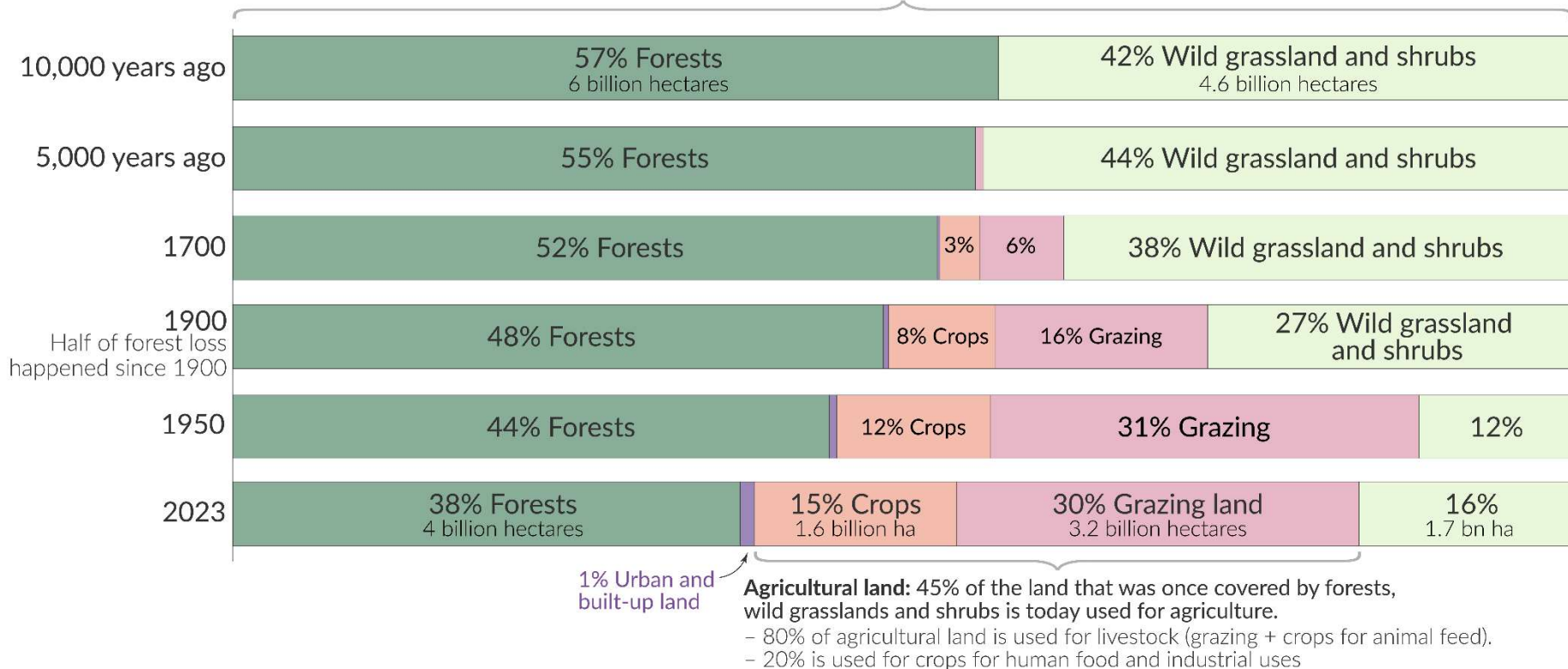


# The Economics of Land Allocation

Humanity destroyed one third of the world's forests by expanding agricultural land  
 Agriculture is by far the largest driver of deforestation. To bring deforestation to an end humanity has to find ways to produce more food on less land.



10,000 years ago, 10.6 billion hectares – 71% of Earth's land surface – were covered by forests, shrubs, and wild grasslands.  
 The remaining 29% are covered by deserts, glaciers, rocky terrain and other barren land.



Data: Historical data on forests from Williams (2003) – Deforesting the Earth. Historical data on agriculture from The History Database of Global Environment (HYDE). Modern data from the FAO.  
 OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser (2025).



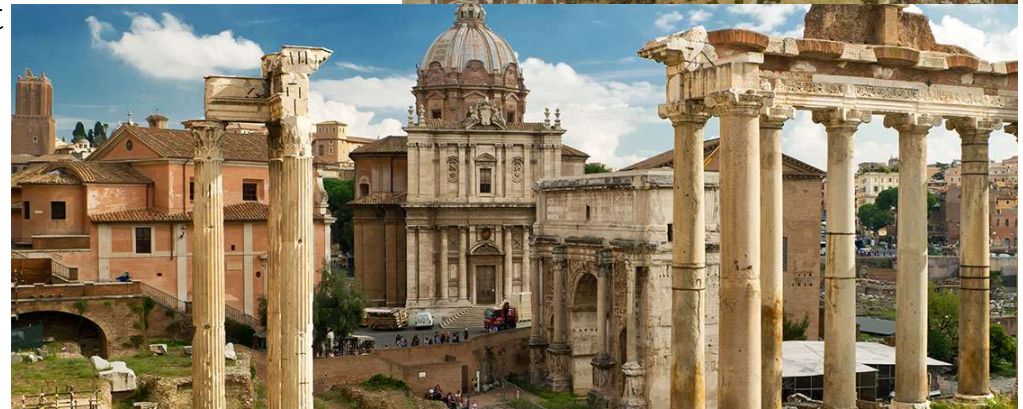
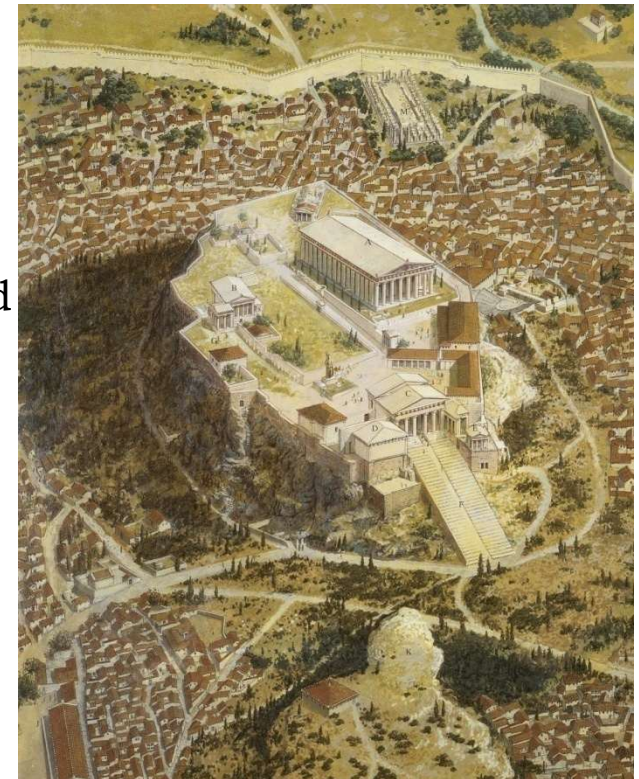
# The historic development of cities

- Early cities thought to have served defensive and religious purposes
  - Food surplus required storage; centralized locations (scale economies) easier/cheaper to defend
  - Rise of large-scale religion coincides with rise of cities
    - Perhaps cities resulted from economies of scale in worship (large centralized temples, etc.)
    - Possible, however, that large-scale religion arose due to increased population density (reverse causality)
- Economies of scope?
  - Defended temples made for convenient grain storage site, or vice versa
- Rise of cities led to rise in military conflict
  - Increasing religious wars
  - Wealth accumulation made for tempting targets
  - On the other hand, defense of cities easier than defense of dispersed sites.



# The historic development of cities

- Athens, 500 BC,
  - Was a trading city with population of 150,000
  - Traded crafts and processed foods with established farm and extracting colonies
  - Developed money
  - Assessed taxes on colonies to support city
  - Declined after war with Sparta
- Rome, 300 A.D.,
  - Had population of 1 million
  - Established colonies throughout Europe
  - Fed itself from combination of trade and taxation
  - Heavy reliance on tributes made it susceptible to uprisings by colonies (barbarians)



# The historic development of cities

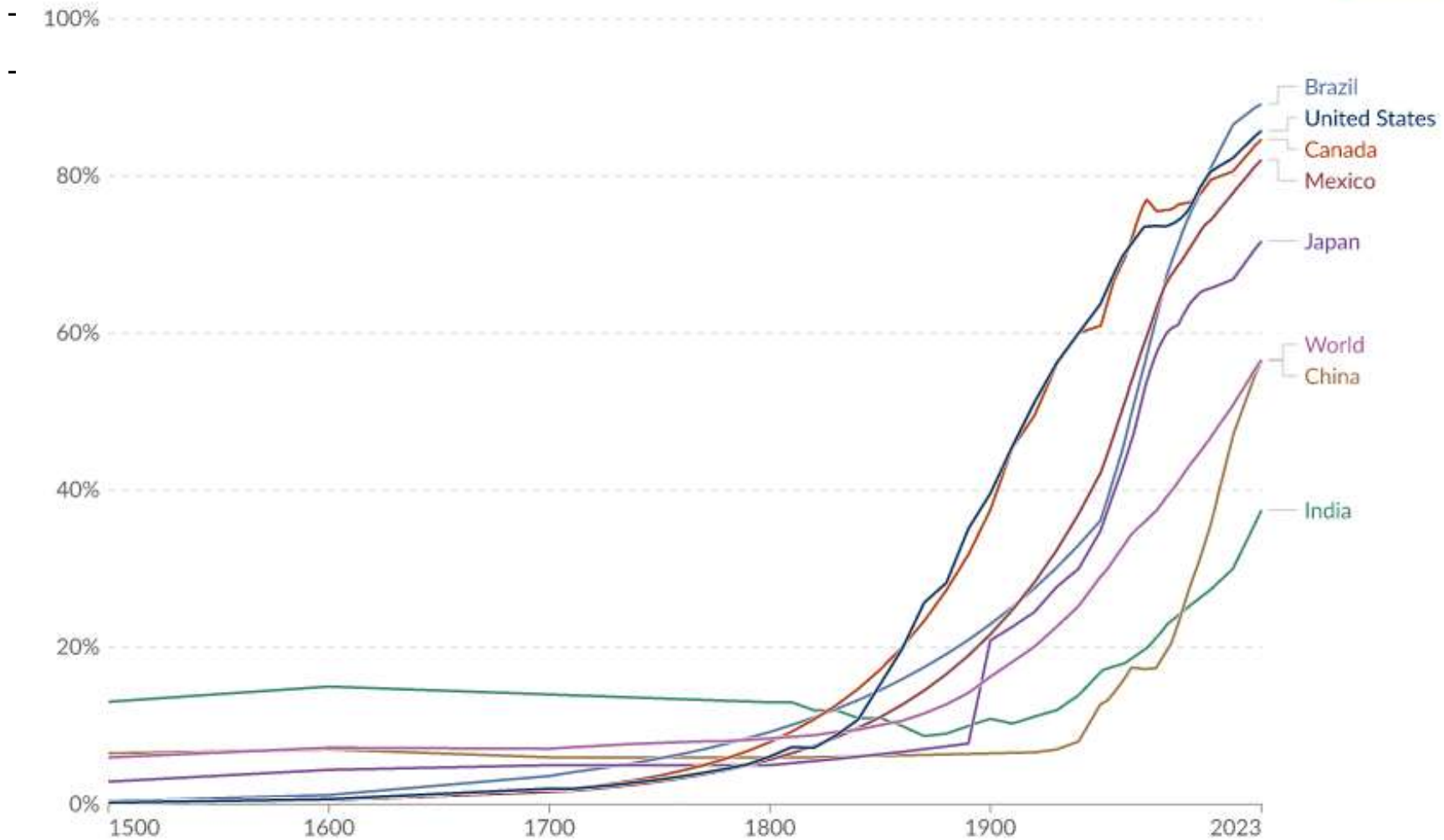
- Feudal Cities,
  - Society was structured around manors with land worked by serfs
  - Small towns housed craftsmakers, exchanged crafts for local farm surplus
  - London in 1000 (a trading city) had population of only 16,000
  - Decentralized power of dispersed manors meant trade, not tribute, was source of income for cities ==>competition, innovation
- Mercantile Cities,
  - Military advances led to consolidation of power in Europe starting in 15th cent.
  - Rise of professional armies
  - Advances in siege technology
  - Economies of scale in defense made large cities more sensible
  - Consolidation led to larger trading areas
  - Rise of long-distance trade (with New World and within Old World) contributed to rise of large trading centers



# The historic development of cities

Share of the population living in urbanized areas, 1500 to 2023

Our World  
in Data



Data source: HYDE (2023)

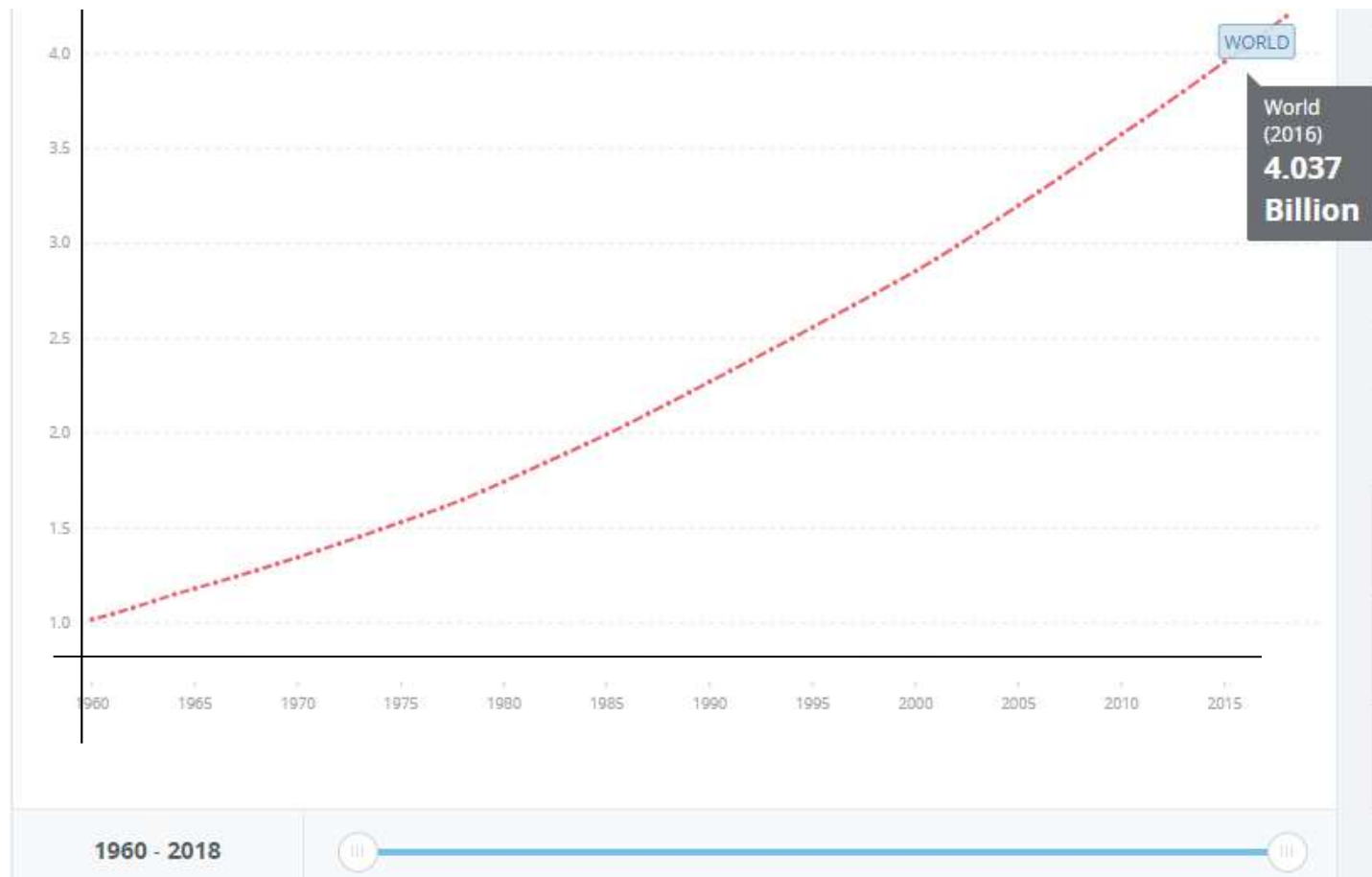
OurWorldinData.org/urbanization | CC BY

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# The historic development of cities

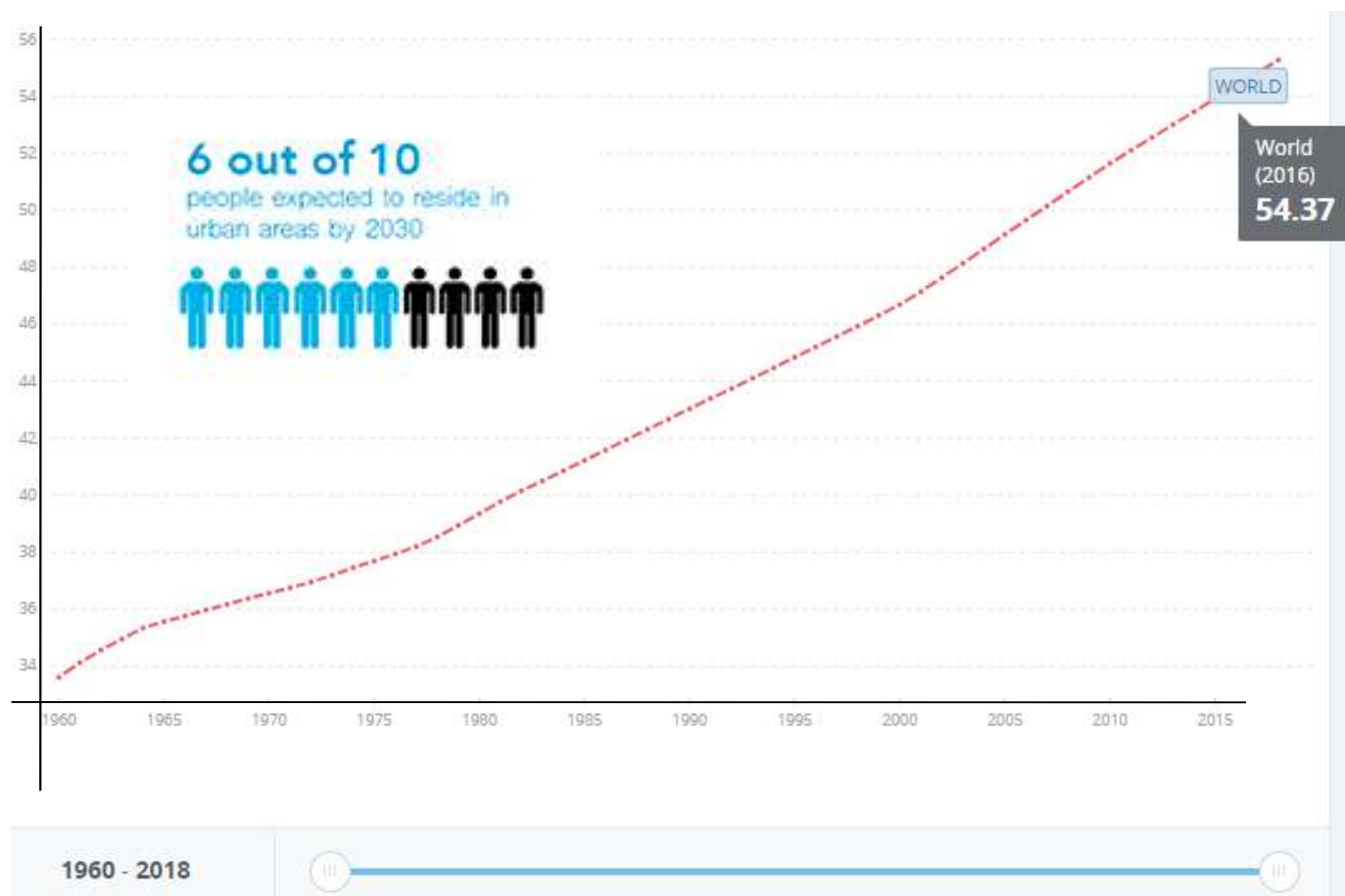


## Urban population in billion (all countries)

World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision.



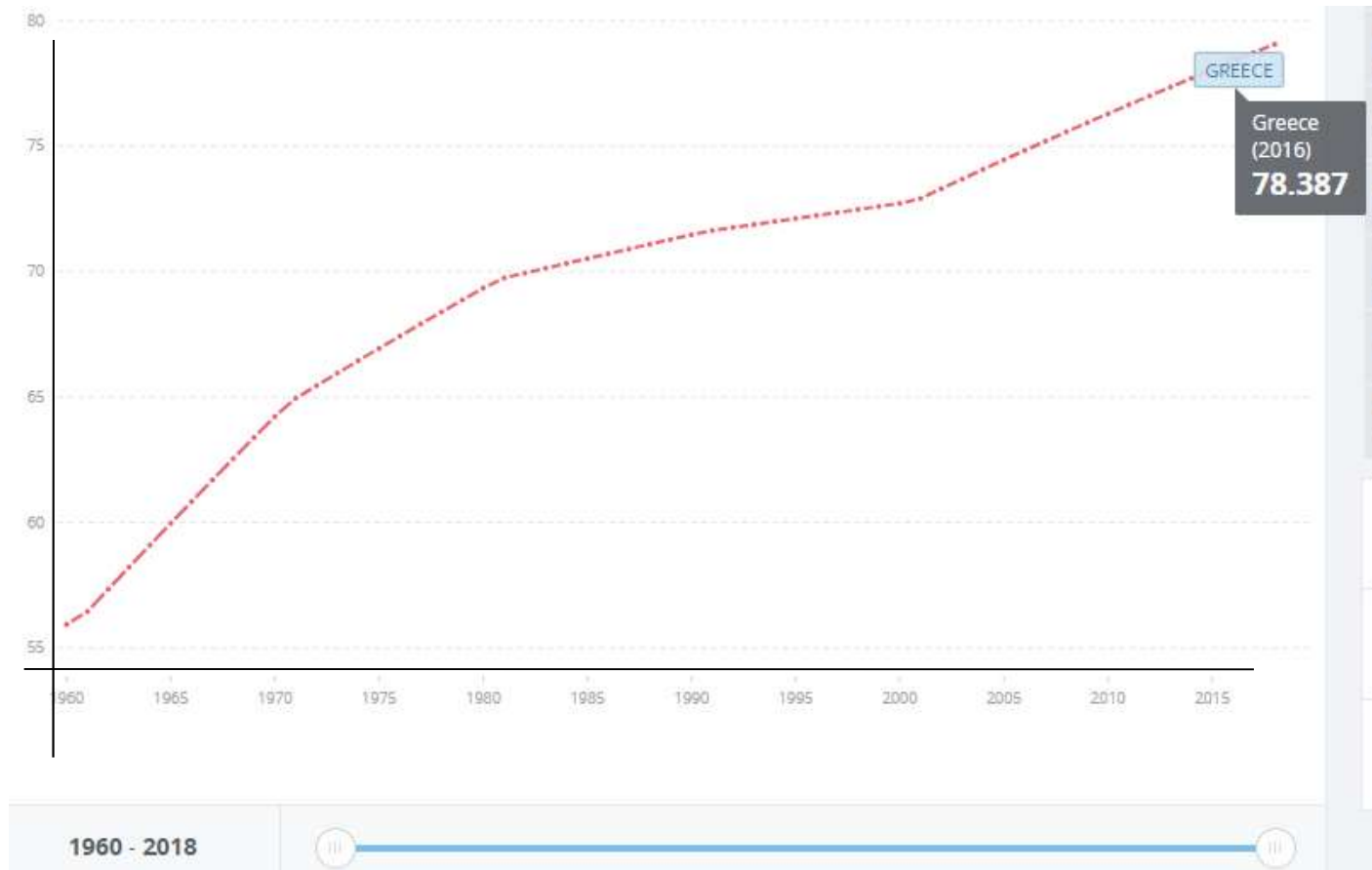
# The historic development of cities



**Urban population as % of total population (all countries)**  
World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision.



# The historic development of cities

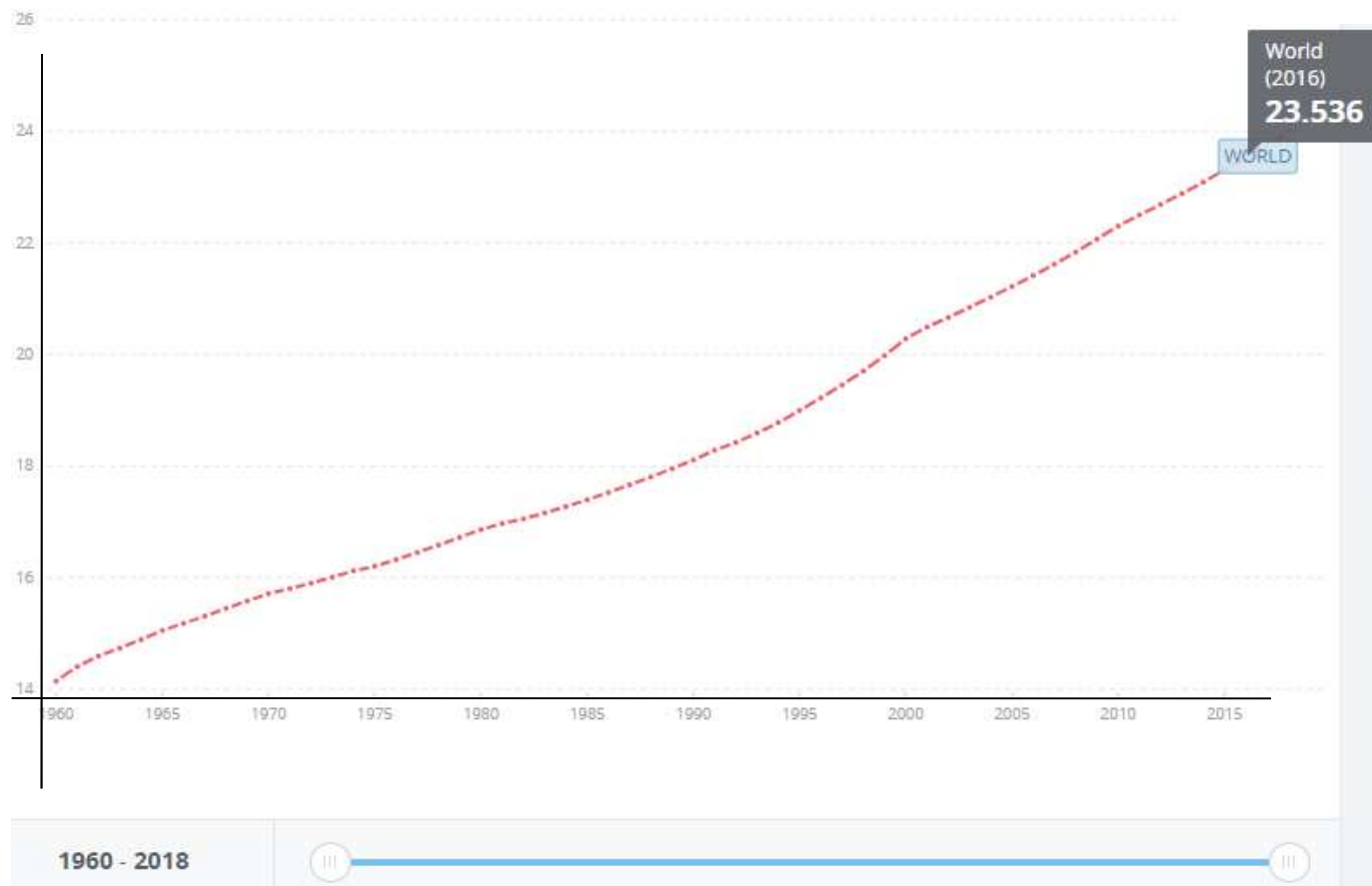


## Urban population as % of total population (Greece)

World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision.



# The historic development of cities



**Population in urban agglomerations of more than 1 million  
(% of total population)**

United Nations, World Urbanization Prospects.



# The historic development of cities

**90 percent**

of urban growth by 2030 will take place in Africa, Asia, Latin America and the Caribbean



**880 million**

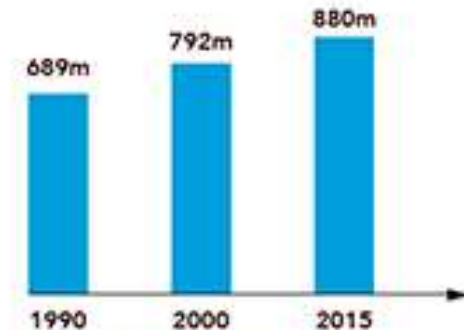
people are currently living in slums in developing countries



## 11 SUSTAINABLE CITIES AND COMMUNITIES



Between 1990 and 2016, the proportion of the global urban population living in slums fell from 46 to 23%. This progress was largely offset by internal population growth and rural-urban migration. In 2016, just over 1 billion people lived in slums or informal settlements, with over half (589 million) living in East, South-East, Central and South Asia.



**880 million**

people are currently living in slums in developing countries



# The historic development of cities

- Driven by innovations in agriculture, manufacturing, transportation, construction:
  1. Agricultural innovations ==> increased demand for manufactured goods
  2. Manufacturing innovations ==> Increased scale economies in production
    - Production moved from home to factory as relative cost of production in factories fell, relative wage rose
  3. Transport innovations ==> Larger markets, greater specialization, greater productivity
    - Resulting increase in income caused greater demand for output overall
  4. Construction innovations ==> higher density living
    - Increased population potential of cities by reducing commuting costs – Steel construction and elevators were key to achieving height in buildings



# Why cities?

- Why would people choose to cluster and suffer congestion, pollution, high rents?
- Ignore economics for a moment. Think intuitively.
  - Because we are social creatures?
  - Because we work better together?
  - Because cities are fun?
  - Because cities are located near useful things?
  - Other reasons?
- Note: These can all be thought of in economic terms
  - Finding friends and a mate is easier in a large group; this is about production and consumption of enjoyable social experiences
  - Humans work well in teams, whether hunting or producing high-tech equipment; this is about gains from specialization and trade
  - Cities are centers of consumption—and hence fun
  - Locating near something useful, like a crossroads or a resource, is about lowering transport costs.



# Why cities?

- Clustering together facilitates trade (in goods and ideas)
  - Even in rural areas, the weekly market brings buyers and sellers together in a central location
  - Allows for comparison shopping; one-stop shopping
  - Allows people to chat, exchange ideas, socialize
  - Cities are like the weekly rural market writ large
- Clustering together facilitates production
  - If there are economies of scale in production, it pays to make things in big factories rather than in home workshops
  - If a factory needs lots of workers, it makes sense for those workers to locate near their jobs
  - Firms benefit from being near other firms, because its cheaper to collaborate with partners nearby than ones far off
- Clustering together facilitates consumption
  - Small towns can't sustain big museums, niche restaurants, etc.; big cities can because of their huge population

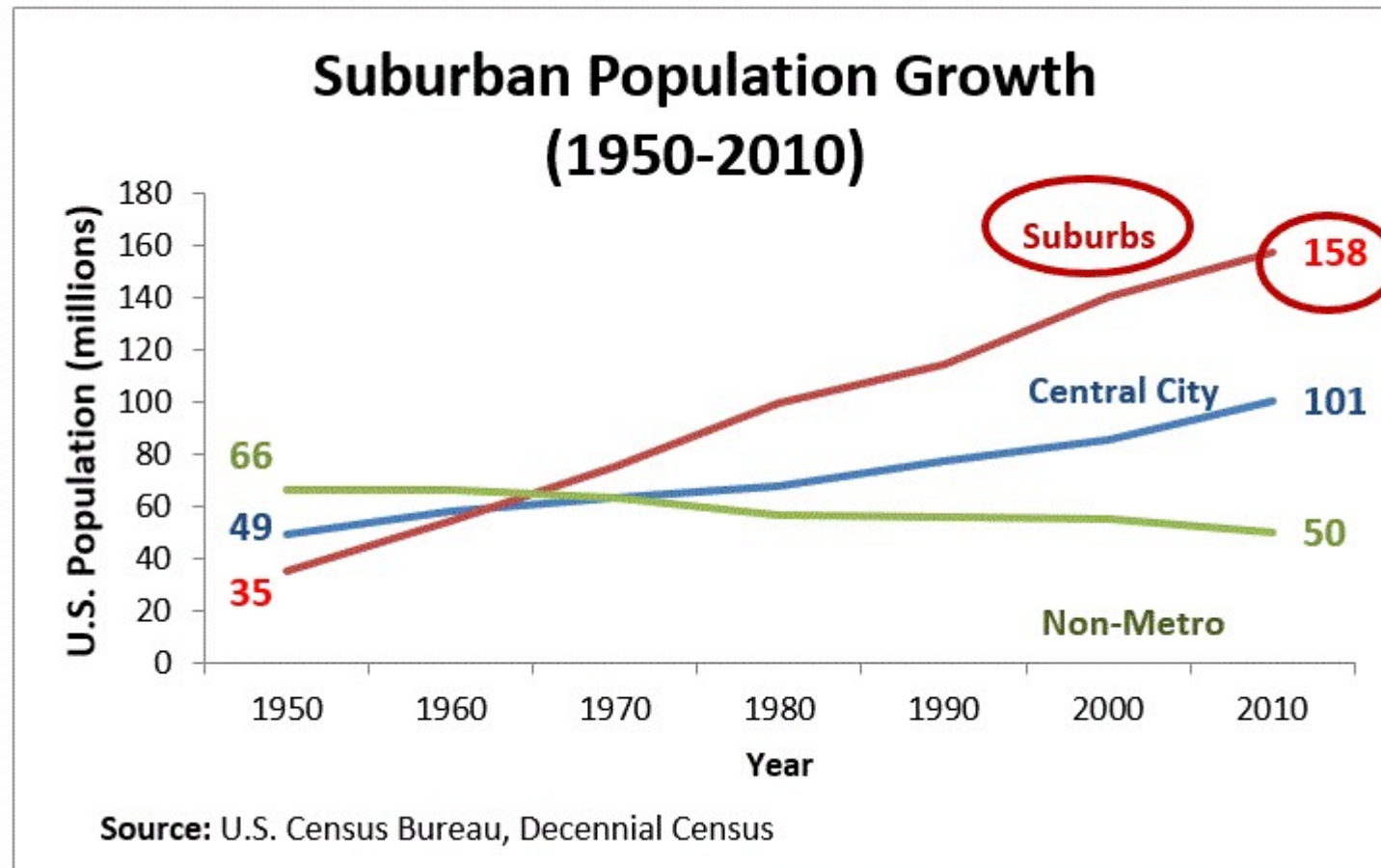


# From monocentric to ... suburbia

- The Monocentric City Does Not Describe Modern Cities Well
- In monocentric city, employment concentrated at center
- In modern cities, employment dispersed throughout metro area
- Modern metro areas tend to be “multi-centric,” not monocentric
  - Manufacturers, office firms have increasingly dispersed away from primary center to urban subcenters
  - Suburbs are not just residential; firms increasingly locate in suburbs
- Suburbanization is the decentralization of employment and population that occurred over the past 100 years or so
  - In 1948, 64% of US urban population lived in central city; 39% by 1990
  - In 1948, 67% of manufacturing employment was in CC; 45% by 1990
  - Suburbanization can be attributed to several factors



# From monocentric to ... suburbia



In 2010, with 158 million people residing in the suburbs of metropolitan areas, versus 101 million people residing in the central city of metropolitan areas, 61 percent of metropolitan residents lived in suburbs.



## ... to sprawl

- A big current policy issue in North America (European cities tend to be much denser and Asian even more) is that of urban sprawl.
  - Cities today occupy larger “footprint” than they used to (relative to population)
  - Decreasing urban density leads to concerns about loss of open space, wilderness, increased pollution/congestion from long commutes
- Is sprawl a problem?
  - One side says: No, because what we have is just people exercising their desire to live in big houses with big yards. Just as we don't tell people what to eat for dinner, we shouldn't tell them how to live.
  - The other side says: Yes, because an individual's decision to live in a big house with a big yard and long commute has effects on other people, and those effects aren't being taken into account by that individual.



# Sources of Inefficient Use & Conversion

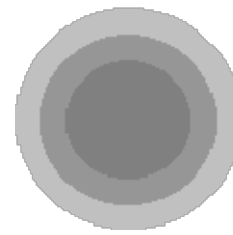
## Sprawl and Leapfrogging

- Sprawl occurs when land use in a particular area are inefficiently dispersed.
- Leapfrogging refers to a situation in which new development continues not on the very edge of the current development, but further out.
  - Problems: Trips to town to work, shop, or play become longer. Longer trips not only mean more energy consumed, but also frequently they imply a change from the least polluting modes of travel
- The Public Infrastructure Problem: Inefficiently low transportation costs that have not been internalized can create inefficient favors over more distant locations, such as low marginal cost of driving and free parking.

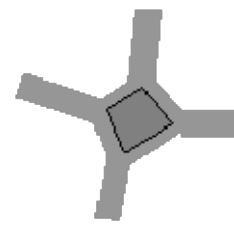


Sprawl development consists of three basic spatial forms:

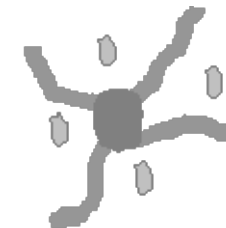
- low-density (radial)
- sprawl,
  - ribbon and
  - leapfrog development



Radial Sprawl



Ribbon Sprawl



Leapfrog Sprawl

- High Density Sprawl
- Medium Density Sprawl
- Low Density Sprawl

**Urban or suburban sprawl** describes the expansion of human populations away from central urban areas into previously remote and rural areas, particularly resulting in low-density communities reliant upon heavy automobile usage.



# Costs of sprawl

- In terms of economics sprawling presents an externality
  - Total social costs of someone living in a big house in Trilofos include construction costs and the commuting costs of the individual (private costs) plus the loss of nice views and longer commutes for others in the area (external costs).
  - Private market transactions ignore external costs. Since only private costs are taken into account, the private market tends to provide too much of the good (e.g. houses in Trilofos)
- Costs of Sprawl
  - Home energy costs
    - New suburban homes are more efficient than old urban homes, but would use even less energy if smaller
  - Commuting pollution costs
    - Suburban HHs drive 30% more than central city HHs
  - Loss of agricultural land
    - Is this a problem?: If food shortages occur, farmer's profits would rise so WTP for land would rise, so farmers would buy back land from suburban homeowners and cultivate it.
    - “Food security”?
    - Aesthetic appeal of farms (possible externality)



# The Economics of Land Allocation

## Incompatible Land Uses

- Negative externalities are rather common in land transactions.
  - Example: houses near the airport are affected by the noise and neighborhoods near a toxic waste facility may face higher health risks.
- One traditional remedy is zoning.
  - Zoning involves land use restrictions enacted via an ordinance by local government to create districts (zones) that establish permitted and special land uses.
  - One limitation of zoning is that that it promotes urban sprawl.



# The Economics of Land Allocation

## Undervaluing Environmental Amenities

- Many of the beneficial ecosystem goods and services associated with a particular land use may also not accrue exclusively to the landowner.
- Thus, net benefits from positive externalities may be undervalued by land owners.
- One remedy involves direct protection of the assets by regulation or statute.
  - Example: Wetlands that help protect water quality in lakes, rivers, streams, and wells by filtering pollutants, nutrients, and sediments, and they reduce flood damage by storing runoff from heavy rains and snow melts.



# The Economics of Land Allocation

- The Influence of Taxes on Land Use and Conversion
  - The Property Tax Problem
    - A property tax has two components: the tax rate and the tax base. The tax base (the value of the land) is determined by either the market value or an assessor.
    - When this tax does not reflect the current activity's use funded by the revenue from that tax, a bias can be created against land-intensive activities.



# The Economics of Land Allocation

- Inheritance Tax Problem
  - Since the inherited land may not produce a sufficient cash flow to pay the taxes, part or all of the land might have to be sold to raise the necessary funds. In this case, the conversion of the land would be dictated by tax-driven liquidity considerations, not efficiency considerations.



# The Economics of Land Allocation

## Market Power

- Because market power allows the seller to charge inefficiently high prices, market power can frustrate the ability of the market to achieve efficiency by preventing transfers that would increase social value.
- The “Frustration of Public Purpose” problem
- Government has to provide certain services (parks, potable drinking water, sanitation services, public safety, and education). To do that, it may be necessary to convert land that is being used for a private purpose to a public use.
- The private owner might exercise monopoly power
- Eminent domain is the doctrine under which government can legally acquire property for a “public purpose” by condemnation as long as the landowner is paid “just compensation.”
  - The transfer is mandatory.
  - The compensation is determined by a legal determination.



# DEBATE: What Is a “Public Purpose”?

The U.S. Constitution only allows the eminent domain power to be used to accomplish a “public purpose.” What exactly is a public purpose?

Although acquiring land for typical facilities, such as parks and jails, is settled legal terrain, recent decisions that justify the use of eminent domain to condemn private neighborhoods to facilitate urban renewal by private developers are much more controversial.

For example, in *Kelo v. City of New London, Conn.* 125 S.Ct. 2655 (2005), the court upheld the city’s development authority to use eminent domain to acquire parcels of land that it planned to lease to private developers in exchange for their agreement to develop the land according to the terms of a development plan. Can private development such as this fulfill the “public purpose” test?

Those who support this decision point out that large-scale private developments face many of the same market power obstacles (such as “holdouts”) as faced by the public sector. Furthermore, since large-scale private developments of this type provide such societal benefits as jobs and increased taxes to the community, eminent domain is seen as justified to prevent inefficient barriers that inhibit development.

Opponents suggest that this is merely using governmental power to favor one set of private landowners (the developers) over others (the current owners of the land).

Should the scope of “public use” include large-scale private developments such as this? When it is allowed, should the developers be under any special requirements to assure that the public benefits are forthcoming?



# The Economics of Land Allocation

## Special Problems in Developing Countries

- Insecure Property Rights
  - Lack of clear property rights can introduce both efficiency and equity problems.
- The Poverty Problem
  - Poverty may constrain choices of sustainable use of land.
- Government Failure
  - It occurs when the public policies have the effect of distorting land use allocations.



# Innovative Market-Based Policy

- Establishing Property Rights
  - It can mitigate or avoid the problems of over exploitation that can occur when land is merely allocated on a first-come, first-served basis.
- Transferable Development Rights
  - It is a method for shifting residential development from one portion of a community to another.



# Innovative Market-Based Policy

- Wetlands Banking
  - Wetlands Mitigation Banking policy provides incentives for creating offsite “equivalent” wetlands services when adverse impacts are unavoidable or when on-site compensation is favorable.



# Innovative Market-Based Policy

- Conservation Banking
  - A conservation bank is a parcel of land containing natural-resource values that are conserved and managed, in perpetuity, through a conservation easement (described below) held by an entity responsible for enforcing the terms of the easement.
  - Banks are established for specified listed species (under the Endangered Species Act) and used to offset impacts to the species occurring on nonbank lands. The values of the natural resources are translated into quantified “credits.”



# EXAMPLE

## Conservation Banking: The Gopher Tortoise Conservation Bank

In rapidly growing Mobile County, Alabama, the gopher tortoise faced survival problems due to the disappearance of its habitat. Since the tortoise is federally listed as a threatened species under the Endangered Species Act (ESA), small landowners were forced to observe some rather severe restrictions on their use of the land. Because these restrictions were quite burdensome for the landowners and the resulting fragmented, patchy habitat proved ineffective in protecting the tortoise, these restrictions created quite a conflict in the community.

A conservation bank established by the Mobile Area Water and Sewer System (MAWSS) in 2001 reduced the conflict, allowing development to continue on other areas while restoring and permanently protecting a much more suitable large tract of the long-leaf pine habitat that the tortoise prefers.

MAWSS owns a 7,000-acre forest that buffers and protects the county's water supply. Under the terms of its conservation bank, MAWSS has agreed to set aside 222 acres, forgo any development on that land, and manage it in perpetuity for the benefit of gopher tortoises. Landowners who want to build on tortoise habitat elsewhere in Mobile County can purchase "credits" from the bank, and thereby be relieved of their ESA responsibilities to set aside a small patch of their land. The tortoises benefit because the large tract of contiguous, suitable habitat is vastly superior to a network of small, unconnected patches of land, while the landowners can now develop their land by helping to fund (through the purchase of credits) this tortoise habitat.

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*Source:* Environmental Defense's Center for Conservation Incentives, "Gopher Tortoise Conservation Bank: Mobile Area Landowners and Wildlife Get Help," February 24, 2003, accessed at <http://www.environmentaldefense.org>.



# Innovative Market-Based Policy

- Safe Harbor Agreements
  - This is a means of conserving endangered and threatened species on privately owned land.
- Grazing rights
  - The Taylor Grazing Act of 1934 attempted to prevent overgrazing by setting up a system that involving the issuance of grazing permits to farmers.



# Innovative Market-Based Policy

- Conservation Easements
  - It is a legal agreement between a landowner and private or public agency that limits uses of the land in order to protect its conservation values.
- Land Trusts
  - A conservation land trust is a nonprofit organization that actively works to conserve land using a variety of means.
  - A community land trust, focuses on using land for housing and community service, rather than land conservation.



# Innovative Market-Based Policy

- Development Impact Fees
  - They are charges imposed on a developer to offset the additional public-service costs of new development.
- Property Tax Adjustments
  - States sometimes offer programs to discount property taxes to protect a socially desired use, particularly when undiscounted taxes are seen as an inefficient bias against that use.



# DEBATE: Does Ecotourism Provide a Pathway to Sustainability?

One of the ways ecotourism can promote conservation is by providing the necessary funds to implement an effective conservation program. Take the example of Bolivia's Eduardo Avaroa Reserve. This diverse landscape includes hot springs and geysers surrounded by volcanoes and majestic mountains. Its freshwater and saltwater lakes provide habitat for year-round flocks of pink flamingos and other birds, while nearby 23 types of mammals and almost 200 species of plants flourish in the desert-like environment. With over 40,000 visitors per year, the park is Bolivia's most visited.

When a conservation planning initiative determined that tourism was a major threat to the reserve, The Nature Conservancy worked with the Bolivian National Park System to develop a visitor fee system. The program, which reportedly generated over half a million dollars in new funds, allows the reserve to fund efforts to mitigate these tourism-related threats. The visitor fee approach is now being extended across the Bolivian Park System. It is estimated that the national protected areas system could generate more than \$3 million per year in new income for conservation.

Quite a different take on ecotourism is provided by a British academic, Rosaleen Duffy. Speaking about the former British colony of Belize—a popular ecotourist destination in Central America—Duffy relates stories of how scuba diving and snorkeling visitors have spoiled fragile corals and otherwise-harassed marine wildlife.

"In their pursuit of reefs, rainforests, and ruins," writes Duffy, "they did not reflect on the environmental impact of the construction of hotels, the use of airlines, the manufacture of diving equipment, the consumption of imported goods or even something as visible as taking a motorboat out to the reef, which polluted the water." As a *Time* article on her book notes: "To Duffy, it seems, the only good tourist is the one who stays home."

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*Sources:* Rosaleen Duffy, *A TRIP TOO FAR—ECOTOURISM, POLITICS & EXPLOITATION* (Island Press, 2002); Mary Ann Bird, "Ecotourism or Egotourism." *TIME* online, 2002 (accessed May 24, 2007); and The Nature Conservancy, Ecotourism and Conservation Finance <http://www.nature.org/aboutus/travel/ecotourism/about/art14824.html> (accessed May 24, 2007).

