Chapter 25 Sustainable Cities: Urban Land Use and Management

-The Ecocity Concept in Davis, CA

1. Developed in the 1970s as a model for urban sustainability, solar heating, bicycles superior to traditional energy sources and transportation

25-1 Urbanization and Urban Growth

-What are Urban and Rural Areas?

1. ______- 2,500 or greater, _________- less than 2500; village- rural households linked by culture, opposite of a city

-What causes urban growth?

1. natural growth- births>deaths; immigration- mostly from rural areas due to poverty, decrease in jobs, war, famine, etc, lower price of food and better social services

-What patterns of urbanization and urban growth are occurring throughout the world?

1. __________ countries- rapid urbanization; developed countries- slower urban growth, poverty more urbanized (most cities >10 million in developing countries)
2. 50% of world population lives in large cities, continue to increase

-Case Study: Mexico City

1. 1 out of 5 Mexicans live in Mexico city, suffer from severe air pollution, 50% unemployed, high crime rate, 8 of 18 million do not have access to sewer facilities= __________ (wind + dry excrement= hepatitis infections among children)
2. Frequent thermal inversions due to mountains, breathing is equivalent to smoking 3 packs of cigarettes a day

-The urban poor

1. > 1 billion represent squatters and other insecure living areas, still superior than rural poor-better access to family planning programs

-How urbanized is the U.S.?

1. 75% of population lives in urban areas, 51% in __________, migration mainly to coastal cities

-What are the major urban problems in the U.S.?

1. Good news- concentrating population preserves biodiversity, better sanitation and working conditions
2. Bad news- aging infrastructure, migration out of cities (suburban sprawl)
   - ____ after WWII- all vets, guaranteed single homes, cheap oil encouraged moving further out

-What are the major spatial patterns of urban development?

1. __________ circle city- central business district (NYC)
2. __________ City- grow outward from CBD in sectors (San Francisco)
3. __________ Nuclei- Satellite cities- (Los Angelos)
4. Megalopolises- linked cities, ie BoWash has 60 million people

25-2 Urban Resource and Environmental Problems

-What are the health and environmental pros and cons of urbanization?

1. Pros- live longer better access to medical care, birth rate lower, recycling easier, 50% of world population occupy 4% of planet’s areas, spurs economic development
2. Cons- consume 75% of Earth’s resources, degrading biodiversity, produce more pollution, spread of __________ faster, crime higher, large output of waste

Why are trees and food production important in cities?

1. Absorb air pollution and noise, give off O2, cool the air, reduce erosion, provide habitats, aesthetic pleasure
2. Most cities cut down trees and name _________ after them

What are the impacts of urbanization on the microclimate of cities?

1. Cities are warmer, rainier, foggier, due to urban heat islands; solutions- plant more trees, lighter covered paving and rooftops, more gardens= less energy needed for AC and reduction of smog

How can reducing crime help the environment?

1. No need to live in __________, lessons commute when people live in city= less strain on environment, reuse of abandoned buildings instead of destroying farmland/forests
What are the water resource problems of cities?
1. Leaks, depletion of groundwater= water rates increase; most cities built on __________ or near coast

What are the pollution problems of cities?
1. Air pollution: especially in developing world, 1.1 billion people breath air that is beyond health standards, water pollution: poor sanitation, discharge into rivers and lake

What are the noise problems of cities?
1. Noise causes stress, hampers work efficiency, causes accidents; 75 decibals- damaging, ________ painful damage; using anti-noise technology that cancels out noise

How does urban growth affect nearby rural land and small towns?
1. Loss of croplands, fertile soil, wetlands and wildlife habitats; 3.2 million acres lost each year

25-3 Transportation and Urban Development
-How do transportation systems affect urban development?
1. NYC- ___________, compact, vertical; typical city (Philly) uses 10x more energy per person; European cities- much more walking and bicycling; building more roads= positive feedback loop of inefficiency

-What are the pros and cons motor vehicles?
1. Only 10% of world population can afford a car, US: 32% of all cars, 76% commute ________ to work
2. China and India car ownership has increased dramatically with much larger populations

-Are motor scooters the answer?
1. Produce air pollution, much better ________, electric scooters are best option

-Is it feasible to reduce automobile use?
1. Large hidden costs of auto use (health, pollution, ______________, decreased property values, etc.);
2. Some suggested user-pays approach includes harmful costs, phasing out subsidies, gas tax ($5-7/gallon)-drop wage taxes, increase tolls, raise parking fees, telecommute
3. Other countries have been successful with above strategies (Hong Kong, Singapore, European countries)

-Good and bad news about motor vehicles
1. More Americans have died due to auto accidents than ____________ in US history (also kill scores of wild animals and pets), produce 50% of pollution, more land devoted to autos than housing
2. Poor efficiency: 1907 NYC _______________ vehicles avg. speed- 11.5 mph; 2007 NYC auto avg. speed- 3.0 mph
3. Building more roads is equivalent to buying larger pants to deal with a weight problem

-What are alternatives to the car?
1. Bikes- ______________ cares by more than two to one; widely used in the rest of the world, some places allow public free bikes, bike lanes allow for faster commutes of less than 5 miles

What are the pros and cons of mass transit?
1. Pros- more energy efficient, less pollution, less fatalities, less ______________, cost 1/10 to build vs. highways, can carry 400 people per driver on train, 40-50 per driver for bus
2. Cons- time constraints

What are the pros and cons of high-speed regional lines?
1. Bullet trains can travel >200 mph (faster than planes for regional travel), consume ½ energy of airplane; cons- expensive to maintain, need a lot of commuters to be profitable

What are the pros and cons of buses?
1. Pros- cheaper than heavy rail system, more flexible; cons- air pollution, time schedule

-Case Study: Mass transit in the U.S.
1. 1917 US cities had better mass transit than today, ____________system gradually began bus routes beginning in 1950s
   -National City Line- found guilty of destroying country’s light rail system- paid $5,000 fine
   -Companies received tax write-offs for providing parking

-Curitiba, Brazil
1. Sustainable city; car traffic has declined 30% though population has ____________; one of Brazil’s lowest air pollution rates; survey 99% of citizens would not want to live anywhere else

25-4 Urban Land-use Planning and Control

-What is conventional land-use planning?
  1. Encourage economic growth, more _______________ = more revenue; does not consider environmental consequences

- Ecological land-use planning?
  1. Surveys- floodplain, soil, watertable, etc.; prioritize goals, develop maps (geologic, ecologic, socioeconomic, plan, implement

-What are the pros and cons of using zoning to control land use?
  1. Can encourage high density growth along mass transit corridors, mixed used zoning- reduces urban growth

- How is smart growth being used to control growth and sprawl?
  1. Prevents sprawl, direct growth to certain areas, protects ecosystems, provides more jobs and economic growth, build markets, offices and stores within ________________
     1999 France- spent $7.7 billion on mass transit and $5 billion on roads, US spent $5 billion on mass transit and $27.7 billion on roads

-How can urban areas open space be preserved?
  1. Some cities have large open areas (______________ has largest city park in US- Fairmount park);
     Greenbelt- surround city, greenways- abandoned railroads become trails
  2. Cluster housing development- 50% of land is left undeveloped

-Land-use planning in Oregon
  1. All rural land permanently preserved zone, set urban growth lines; control over all processes placed at state lands for public good over private interests; Portland OR- example of smart growth

25-5 Solutions: Making Urban Areas More Livable and Sustainable

-What are the pros and cons of building new cities and towns?
  1. _______________ towns- close to major cities; free standing new towns- far from any major city, in-town new towns
  2. Con: Don’t provide affordable housing for poor and middle class

-How can we make cities more sustainable and more desirable places to live?
  1. Developers and politicians plan cities to be desirable places to live, tree lined, narrow streets; ecocity-sustainable, people oriented with ________________ instead of car oriented

-Tapiola, Finland
  1. Designed in 1951 as a satellite city of Helsinki, 80,000 people fully sustainable, developed with greenbelts, shopping and cultural center reached on foot

- The Ecological design arts
  1. Due to cheap land- sprawling cities, wasteful economies, pollution from inefficient automobiles and buildings
  2. See larger picture when designing ecological towns

-Case Study: Chattanooga, Tennessee
  - One of the most _______________ towns to most environmentally sustainable in 15 years; 1980s leaders plan for a sustainable city by 2000, 223 projects and 34 specific goals (parks, aquariums, electric buses)

Chapter 26 Economics, Environment and Sustainability

-How important are natural resources?
  1. Used as goods and services, conventional economists treat resources as unlimited or technology will find another way; ecological economists must unite ecology and economy- lead to greater profits, more jobs

26-1 Economics resources and systems and environmental problems

-What supports and drives economies?
  1. Economic resources= natural resources (no substitute), human resources (talent, ____________), financial resources ($), manufactured resources- natural resources + human and financial resources
-What are the major types of economic systems?
  1. ___________ economic systems - govt. makes all economic decisions
  2. ___________ system - no govt. interference, only a theory
  3. ___________ economy - monopolies 50% controlled by five firms all about maximizing profit

-What kinds of economic systems exist in the real world?
  1. Most fall in between command and capitalist market systems, types of economies - capitalist (most developed countries, measured in GNP, 2.7 billion people), survival (rural, developing countries 3.3 billion)

-Why have governments intervened in market economic systems?
  1. Level economic playing field, _______ companies control 75% of global trade, meet economic stability needs, provide safety net, protect health and safety of people, natural disasters

-What are the pros and cons of a global market economy?
  1. __________________________ - stimulate economic growth, raise environmental standards
  2. WTO critics- weaken govt. interference, move to capitalist market, GNP increases but not everyone benefits

-How do conventional and ecological economists differ in their view of market-based economic systems?
  1. Ecological economists see difference between unsustainable economic development and sustainable

26-2 Monitoring Economic and Environmental Progress

-Are GNI and GDP useful measures of economic and environmental health and human well-being?
  1. No- measures outputs not beneficial, hide harmful environmental and social effects ($ of cigarettes) at producing goods, should be subtracted from these indicators

-Solutions: Can environmental indicators help?
  1. Give a more realistic picture of environmental, human and economic health; GPI- Genuine Progress Indicator
  2. Index of Sustainable Economic Welfare (ISEW)- measures per capita GNP adjusted for income inequalities, ______________, pollution and climate change

-Appropriate Technology
  1. Small scale, efficient, labor intensive- sewage gardens, ____________, solar stoves

26-3 Harmful External Costs and Full-Cost Pricing

-What are internal and external costs?
  1. Internal costs- all components involved in manufacturing and marketing a product
  2. External costs- not included in market price, pollution and climate change costs- paid for in healthcare
     -Gallon of gasoline @ $2.00 (internal costs), external costs taken into consideration- ______
     (pollution, healthcare, etc.)

-Should we shift to full-cost pricings?
  1. No incentive in capitalist market economy- companies will go bankrupt
  2. Govt. passes laws, levy taxes and develop regulation, bad news- higher prices, good news- much more

-What is holding back the shift to full-cost pricing
  -_______________ to unprofitable businesses: road transportation, unsustainable agriculture, fossil fuels, nuclear energy, water projects, forestry, fishing
  -lack of knowledge that consumers are already paying full-cost prices but ______________

26-4 The Economics of Pollution Control and Resource Management

-How much are we prepared to pay to control pollution?
  1. Need to find optimum level of pollution problems (who lives near an incinerator, power plant, etc),
  costs (direct and indirect) and presented to public

-How can we assign monetary values to resources and pollution costs?
  1. _______________ costs (cost of offsetting damages), willingness to pay (how much would people pay for avoiding species extinction), maintenance costs (protect natural resources), indirect and direct costs, repercussion costs (company produces and unfavorable image)
What economic factors affect how a natural resource in used or managed?
1. future; time preference-present income vs. greater future income; (ie. A redwood is worth $1 million today but discounted to $10,000 50 years from now at a 10% discount rate), promotes rapid resource depletion
2. Economic return not always the factor determining resource mgmt.
3. -cost from not putting money in something that could give a higher yield (ie. Make more money investing in stock market over sustainable farming methods)
4. Resources use in strongly influenced by subsidies and tax breaks

What is benefit-cost analysis, and how can it be improved?
1. Comparing estimated short and long term benefits and costs for various courses of actions
2. Need to consider data, costs, alternatives, guidelines, uniform standards, lot of drawbacks to BCA

Using Regulations and Market Forces to Improve Environmental Quality
-What are the pros and cons of using regulation to improve environmental quality?
1. Innovation friendly regulations- improves productivity (reduced costs) = more profits

How can economic incentives be used to improve environmental quality and reduce resource waste?
1. Subsidies and tax breaks- tough in political arena due to powerful economic interests
- need to remove market barriers

How can economic disincentives be used to improve environmental quality and reduce resource waste?
1. Tax shifting instead of tax burden approach, charging , post a pollution prevention bond (similar to performance bonds for new construction),

What are the pros and cons of using tradable pollution and resource-use rights
1. Pros- not regulatory
2. Cons- allows companies to continue polluting, concentrates pollutants at dirtiest plants, creates incentives for fraud, not globally used

Should we rely mostly on regulations or market approaches?
1. Combination of both is best solution

Evolving eras of environmental management
1. 1970-1985- resistance to change, mgt. era, used lawyers and loopholes to resist
2. 1985- accepted pollution control, no innovative solutions
3. 1990s- innovation mgmt. era, preventing pollution and improved resource productivity
4. Final phase- total life quality mgmt., similar to a , all is connected

Reducing Poverty to Improve Environmental Quality and Human Well-Being?
-What is the relationship between poverty and environmental problems?
1. 50% of world trying to live off of ; unsustainable use of resources- burning forests to plant crops
-Has economic growth reduced poverty?
1. Not really; economic growth has primarily only benefitted the rich= growing

Shifting the tax burden from wages and profits to pollution and waste
1. Would raise $1 trillion per year; cut wages and profits by 15%, phased in over 20 years, very successful in some countries

How can poverty be reduced?
1. Developing countries- set aside land and $ for urban and rural poor, use for education
2. Developed countries- forgive $2.5 trillion in from developing countries and use funds for basic human needs

How much will it cost?
1. $40 billion a year for basic service= of world income

Microloans to the poor
1. allows borrowers to move above poverty line by starting their own business (sewers, weavers, etc.)
1. Reward (subsidize) Earth sustaining behavior, discourage- tax the latter; increase resource productivity; tax energy throughput instead of wages; reduce poverty

- Case Study: how are Germany and Netherlands working to achieve an environmentally sustainable economy?
  1. Results are mixed but 1st attempt by any country- Netherlands
  2. Denmark- banned construction of ________________, 32% use bike

- How is Germany investing in the future and the Earth?
  1. Very efficient nonpolluting products, great __________ of all materials, coal industry still a problem

- Can we make the transition to an environmentally sustainable economy?
  1. Leaders need to be ________________ compensated and respected for doing socially ecologically responsible work while making profits for owners and stockholders
  2. Main problem is not economics but politics

- Jobs and Environment
  1. Employs as many people as car industry in US, 2x as many workers in ________________ of aluminum compared to production; more jobs in environmental than fossil fuels
The Eye of Nye: Transportation

1. What are the two largest sources of air pollution? ________________________________________

2. Why have electric vehicles not caught on, what is the major drawback?
   ___________________________________, ________________________________________________

3. How does a fuel cell engine work?
   __________________________________________________________
   _______________________________________________________
   ______________________________

4. Gasoline powered engines are ______ efficient.

5. Hydrogen fuel cells are ________ efficient.

6. What event impaired the chance for hydrogen to become a practical application? ____________

7. What is C₈H₁₈? ____________________________________________

8. What is CH₄? ____________________________________________

9. Where do we find pure hydrogen? ________________________________

10. What are ways we can produce pure hydrogen? ________________________________

11. What is the maximum width of a ‘productive’ highway, why no larger? ______, _____________

12. How can we prevent traffic from getting worse, give 3 ways?

   __________________________________________________
   __________________________________________________
   __________________________________________________
The New Suburb?

Go to http://www.nationalgeographic.com/features/00/earthpulse/sprawl/index_flash-feature.html

What should are better ideas that allow for smart and sustainable growth, complete the items below to get a better understanding of what makes for a smarter suburb/city.

Click on the Trolley
New Urbanism

What are 3 key advantages of using mass transit over automobiles?
1. _________________________________________________
2. _________________________________________________
3. _________________________________________________

Sprawl
1. In the U.S., a two-car suburban family makes ______ car trips a day on average
2. If you have a commute of 1 hour each week to work how many work weeks do you waste in traveling? ______

3. Why do businesses have to relocate from Main Street? _____________________________________________
   __________________________________________________

Trees
How are trees perceived by developers? _________________________________

How can trees be beneficial to suburban curbs? ___________________________________________

The street plan
New Urbanism

Give 3 ways that streets should be designed? ____________, _________________, _________________

How does subdivision design not pertain to the above characteristics? ________________________________,
   ________________________________, ________________________________

(MOVE RIGHT)
On Street Parking

List 3 ways that Doylestown resembles New Urbanism:

________________________________, _______________________________, _______________________________

List 3 ways that Warrington resembles Sprawl:

________________________________, _______________________________, _______________________________

Mixed-use Building

Based on where you live, which description best fits your neighborhood, describe why:

_____________________________________________________________________________________
Square
How can a square, plaza or park be beneficial to a community?

Mixed Housing
What neighborhoods generally perform better in the real estate market? New urbanist neighborhoods or Subdivisions (circle one)
What data supports your choice? ____________________________________________________________

What are examples of new urbanist neighborhoods? ____________________________________________

Can you think of a new urbanist neighborhood in the Philadelphia area? ________________________

Corner Store
Why are corner store considered illegal in U.S. suburbs? ______________________________________

School
What local school best fit the description based on the description on the website? ______________

Alley
What advantages do alleys play in a town? ____________________________________________________

Front Porch
How can front porches benefit the public? ____________________________________________________

Preserved Natural Features
What’s the point to having them? ___________________________________________________________
APES: Urban Land Use in Bucks County, PA using urban land use models

This lab asks you to examine actual patterns of urban land use in a county with which you are probably familiar: Bucks County, PA. The lab has you view patterns of demographic data, and you will access the Internet site and use an online program called Social Explorer. Through this site, you will be able to map a variety of data from the U.S. Census for any set states, counties or census tracts in the U.S.

In the course of this lab, you will:
- Create a set of maps that illustrate patterns of urban residential land use by census tract.
- Format the maps and capture them
- Print your maps and annotate each map by responding to the questions below

Procedural Details: Using Social Explorer for this lab
2. Under Census: Maps and Reports: Click on United States: 1940-2000
3. Click on Pennsylvania and zoom in till you see Bucks County
4. Select one of the following variables and sub-variables
   - Population
   - Race- one or more ethnic variables given as percentages
   - Income
   - Employment Sector
   - Housing
   - Income
5. Print out your selection for the 2000 Census tract and select another time period
6. Repeat for 1 other variable
7. For each variable that you chose to investigate, please write up a paragraph describing the pattern you see. Where are the highest values with respect to the urban core area (where most of the tracts are the smallest) and where are the lowest values? Does this pattern loosely resemble any of the other two (either directly or inversely)?

Knowing a little bit about the county you live in, describe the character of the residential neighborhoods you’d encounter going out from Doylestown in several directions. Neighborhood by neighborhood, bring together the information you mapped and describe above.
On a typical weekday morning in Los Angeles, 3.3 million commuters jam the roads. Of all these daily travelers, 3% commute by train or bus. Seven out of 10 ears on the road contain only one passenger. Elsewhere in the United States, this scene is repeated as 144 million cars take to the streets each day throughout the years.

Each year, an average American will travel about 9,000 miles by car. To accommodate automobile travel, the United States has paved over 3 million miles of land. One-quarter of all the energy consumed in this country is used for transportation; three-quarters of the energy used for transportation goes to fueling highway vehicles.

This increasing use of the car has caused a decline in public transportation. City public transit use has declined by more than 50% since the early 1970s. However, the impact of cars on the environment has led some people to reconsider public transportation. Tax money funds the building and maintenance of roads, trains, and buses. Because this money is limited, governments and citizens must decide if the money should be spent on public or private transportation projects.

Points Supporting Private Transportation
- Twenty-two percent of American workers depend on the automobile industry for a living. Funding public transportation projects could cost many of these people their jobs.
- Most roads in the United States are already built. Because the taxpayers have already paid for the roads, they should be able to use them.
- Public transportation is not time-efficient. Buses and trains make many stops, and if a person has a transfer, it may take a long time to reach a destination.
- People have to adjust to the schedule of a public transportation system. In today’s busy, complicated world, a person has to be able to move about as needed.

Points Supporting Public Transportation
- Automobile exhaust is a major source of carbon monoxide, sulfur oxides, and other pollutants that affect human health.
- Cars release a large amount of carbon dioxide, which may lead to global warming. Global warming will affect the climate of the entire planet.
- Fossil fuels are a limited resource. A bus is 1.5 times more fuel-efficient than a car because it can carry more passengers. If people use public transportation, fossil-fuel reserves will last longer. Also, the amount of fossil fuels shipped will be reduced, resulting in fewer oil spills.
- Each year, over 50,000 people are killed and over a million people are injured in the United States in car accidents. Using public transit would reduce the number of vehicles on the road, which would lower the accident rate.
- The United States spends approximately $300-350 billion dollars each year on hidden costs associated with driving including injuries from car accidents, higher insurance costs, air and water pollution, the value of time wasted in traffic jams, and decreased property values near roads due to noise and congestion.

Response:
1. Currently 80% of federal gasoline tax revenue is used to build and maintain highways, and only 20% is used for mass transit. Do you think tax money should be spent to build and maintain roads for automobiles or to improve public transit?

2. How would better public transportation affect the Doylestown area? Would people use the public transportation if it were readily available in the Doylestown area?

3. Economists and environmentalists suggest that drivers pay directly for most of the full costs of automobile use in a “use-pays” approach which would include the estimated harmful cost of driving as a tax on gasoline and phase out government subsidies for motor vehicle owners. The tax revenues and savings from vehicles subsidies would be used to lower taxes on income and wages as well as to help finance mass transit systems, bike paths, and sidewalks. Do you favor altering the system to a “user-pays” approach considering that the price of gasoline would rise to approximately $5 – 7 per gallon? Keep in mind the mass transit system would greatly improve. How would this alter your daily life?
4. Consider some of the methods utilized in other countries to reduce car use.
   - In Hong Kong, motorists are charged by distance for all car travel using electric sensors that record miles traveled and time of travel. Then drivers get a bill each month.
   - Singapore taxes car heavily, charges people $3-6 per day to drive downtown and uses the revenue to fund an excellent mass transit system.
   - Rome and Florence, Italy, ban all vehicles from 7:30 am until 7:30 am with the exceptions of buses, delivery vehicles, taxis and cars of local residents.
   - More than 300 cities in Germany, Austria, Italy, Switzerland, and the Netherlands have established “carsharing networks” to disconnect car use from the hassles of renting or owning a car. Each member pays for a card that opens lockers containing keys to cars parked around a city. Members call the network and are directed to the closest locker and car. In Berlin, Germany, carsharing has cut car ownership by 75% and car commuting by nearly 90% without decreasing mobility options.

Do you think any of these methods of reducing car use would work in the United States? In Doylestown? Why or why not? Are there other suggestions you have that could limit car use in the United States?

5. Mass transit in the forms of rapid-rail, suburban train (or light rail), and trolley systems can transport large numbers of people at high speeds with greater energy-efficiency, less air pollution, and fewer associated injuries than motor vehicles. In the United States, 21 cities – including San Diego, Sacramento, San Jose, Los Angeles, Seattle, Buffalo, and Portland (Oregon) – have built light-rail systems, and seven more cities are planning to build them. These light rail trains are expensive, yet they cost only 1/10 as much as to build per kilometer as a highway or a heavy-rail system and have lower operating costs than a comparable bus system. These light rail lines can carry up to 400 passengers per driver compared with 40-50 passengers per bus driver. Would this type of transit be effective in Bucks County? In Philadelphia?

6. Japan and western Europe utilized bullet supertrains that can travel up to 330 kilometers (or 200 miles) per hour. These trains are ideal for trips of 120-620 miles and consumer 1/3 as much energy per rider as an airplane and only 1/6 as much as a car carrying one driver for every mile of travel. What are some pros and cons to this kind of transport?