

Lecture 6

Urban Environments



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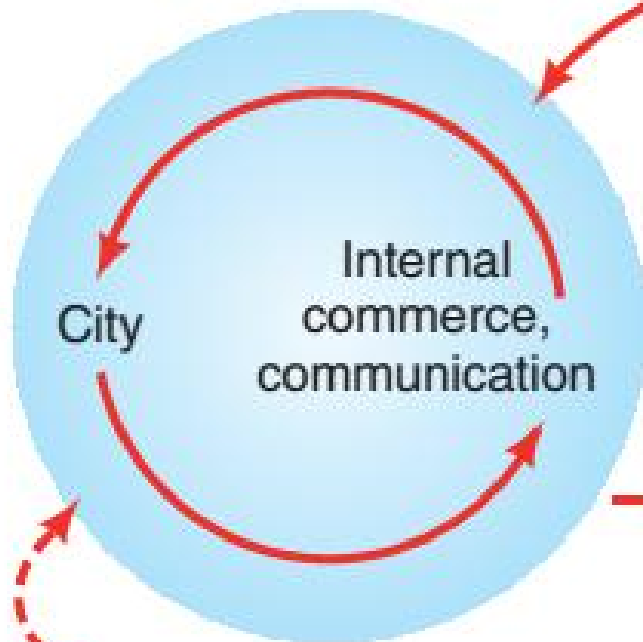
Bringing Nature to the City

1. The City as a System

- Is city an ecological system?
- Is city a self-contained system?
- The city as a system with flows of energy and materials. A city must function as part of a city–countryside ecosystem, with an input of energy and materials, internal cycling, and an output of waste heat energy and material wastes. As in any natural ecosystem, recycling of materials can reduce the need for input and the net output of wastes.

Inputs

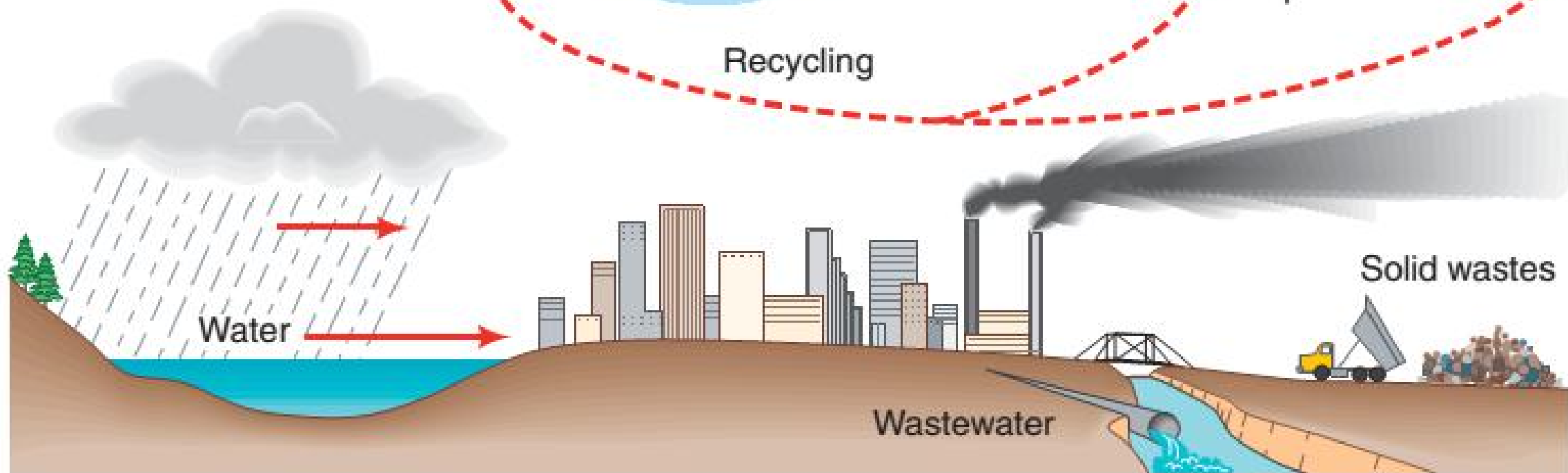
Air
Water
Food
Fuels
Raw materials
People



Outputs

Ideas
Waste heat energy
Finished goods
Wastewater
Solid wastes
Air pollutants

Recycling





2. The Location of Cities: Site and Situation

The location of a city is influenced primarily by the **site**, which is the summation of all the environmental features of that location; and the **situation**, which is the placement of the city with respect to other areas.

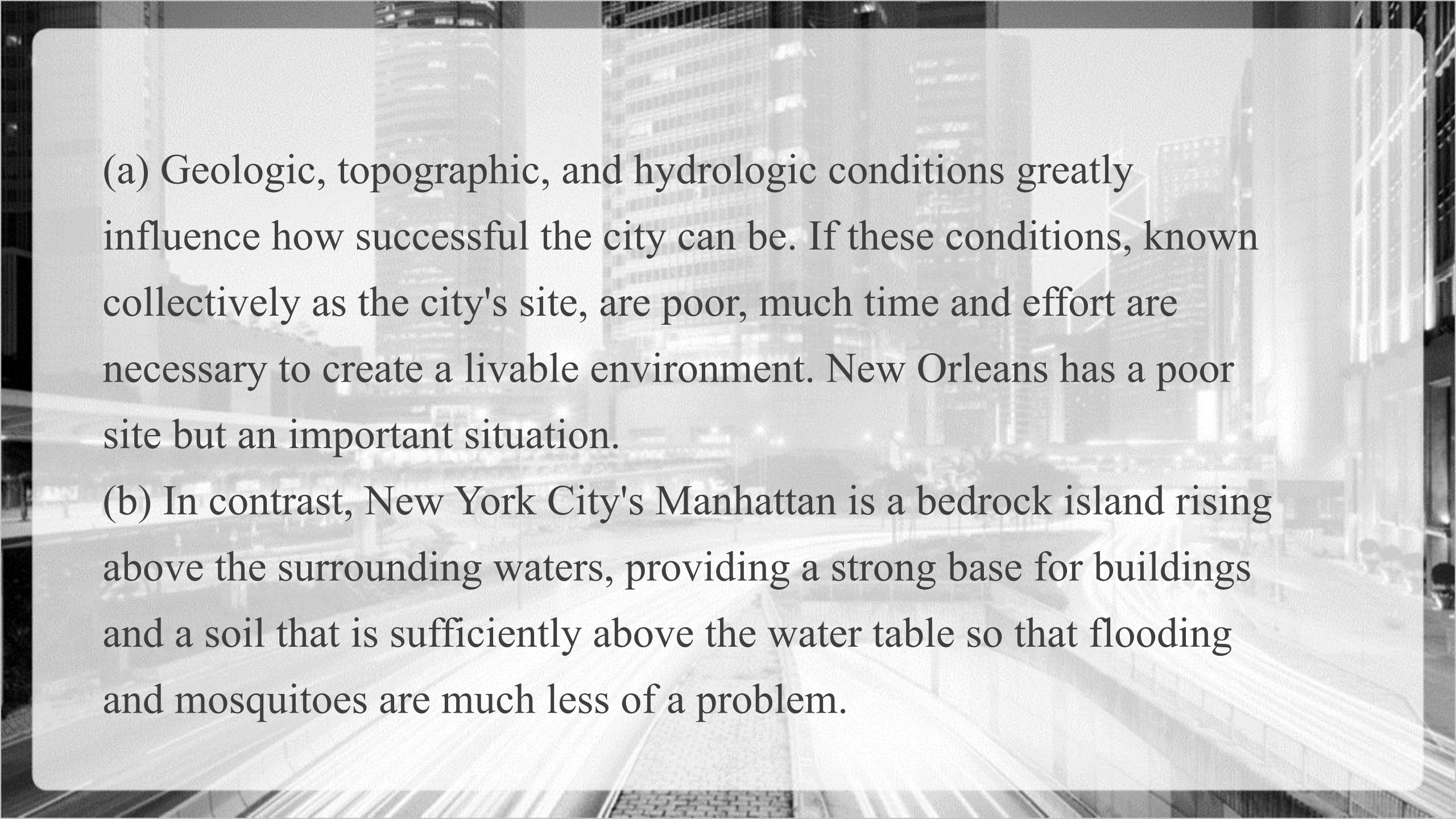
A good site

- a geologic substrate suitable for buildings
- nearby supplies of drinkable water
- nearby lands suitable for agriculture; forests

The **environmental situation** is especially important with respect to transportation and defense. Waterways are important for transportation.



- ①② 豐京&鎬京【西周】 長安區張家坡&長安區斗門鎮一帶
- ③⑦ 秦咸陽&阿房宮【秦】 現咸陽窑店一帶&西安西郊阿房村一帶
- ④⑧ 漢長安&禮製建築【西汉/新莽/东汉/西晋/前赵/前秦/后秦/西魏/北周】
大部分居于现西安市西北汉长安城保护区内
- ⑤ 隋唐大興&長安【隋/唐】
現新城/碑林/雁塔/蓮湖的大部分和/未央區等部分地區。
- ⑥ 明清西安 明城牆內



(a) Geologic, topographic, and hydrologic conditions greatly influence how successful the city can be. If these conditions, known collectively as the city's site, are poor, much time and effort are necessary to create a livable environment. New Orleans has a poor site but an important situation.

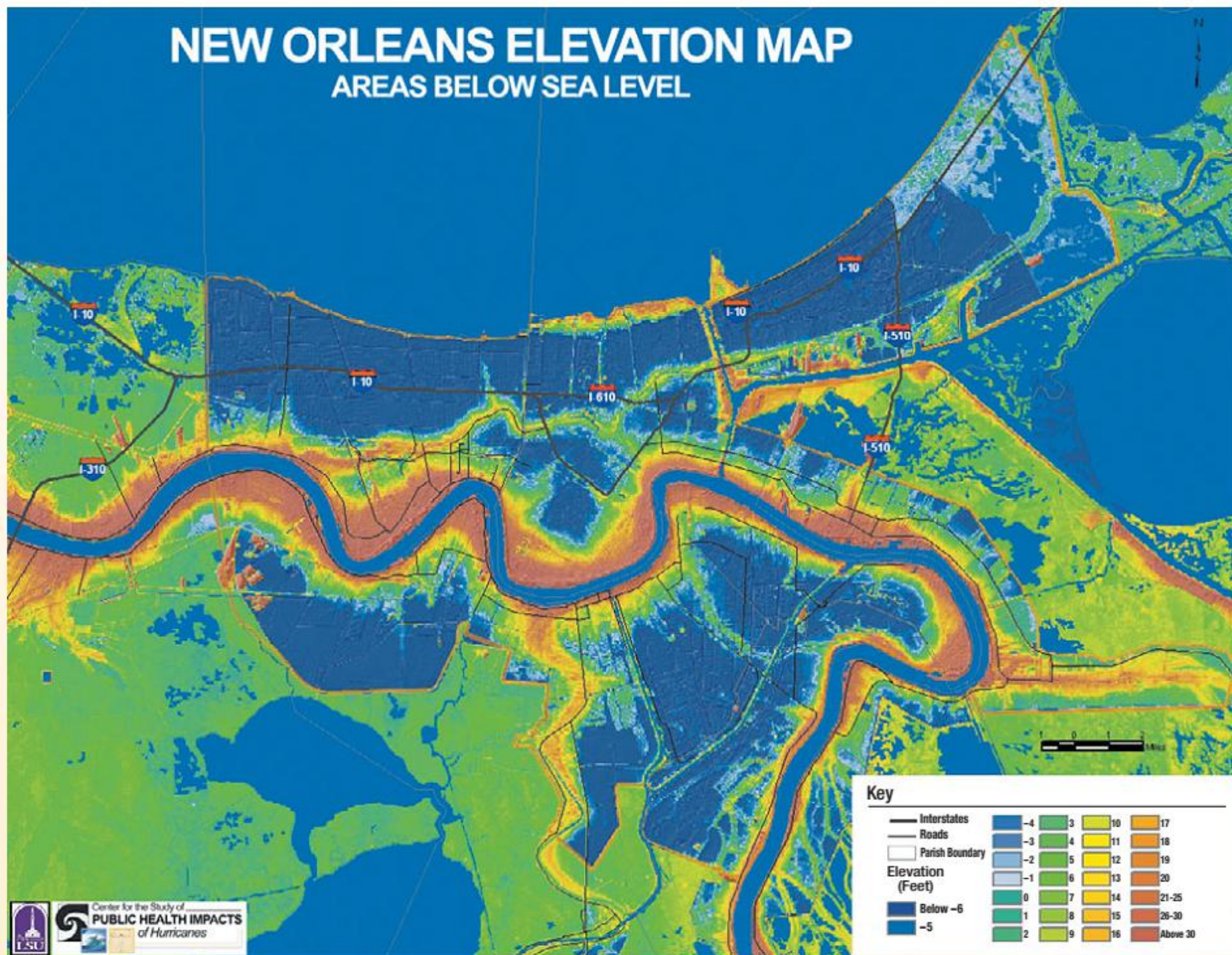
(b) In contrast, New York City's Manhattan is a bedrock island rising above the surrounding waters, providing a strong base for buildings and a soil that is sufficiently above the water table so that flooding and mosquitoes are much less of a problem.

New Orleans

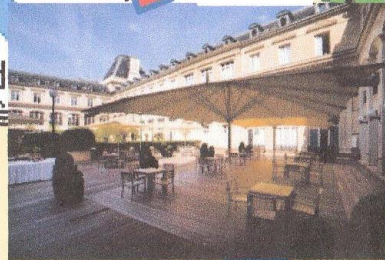
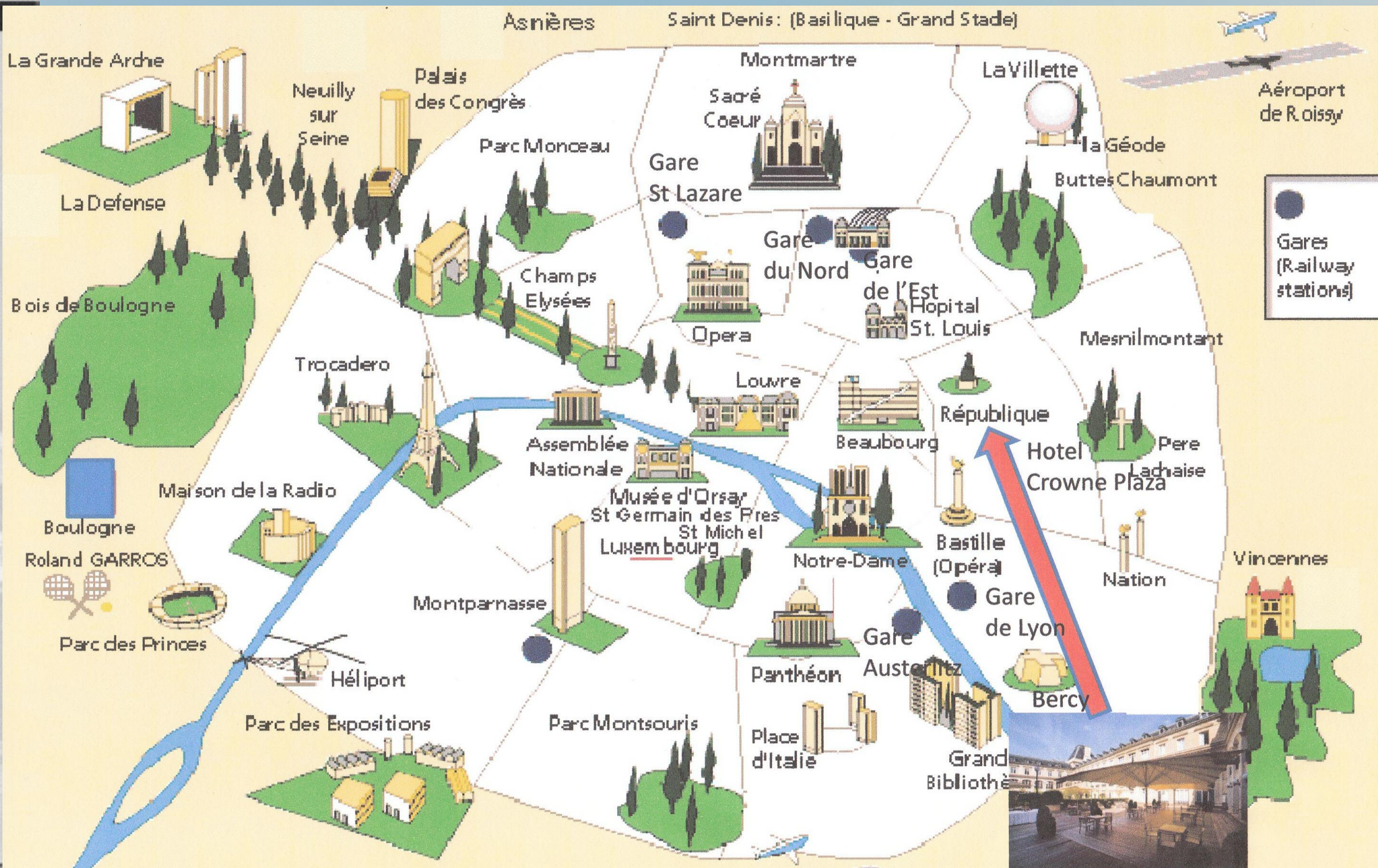


NEW ORLEANS ELEVATION MAP

AREAS BELOW SEA LEVEL



Map of New Orleans showing how much of the city is below sea level.



»» 2. The Location of Cities: Site and Situation

Site Modification

Site is provided by the environment, but technology and environmental change can alter a site for better or worse.

Changes in a site over time can have adverse effects on a city. For example, Bruges, Belgium, developed as an important center for commerce in the 13th century because its harbor on the English Channel permitted trade with England and other European nations.

»» Bruges

Top 5 Things to Do in Bruges





灶面
Stove surface

第二次建造
Second construction

第一次建造
First construction

第三次建造
Third construction

3. An Environmental History of Cities

3.2 The Urban Center

In the second stage, the internal size of a city was limited by pedestrian travel. The density of people per square kilometer was limited by architectural techniques and primitive waste disposal. These cities never exceeded a population of 1 million, and only a few approached this size, most notably Rome and some cities in China.



»» 3. An Environmental History of Cities

3.3 The Industrial Metropolis

Three technological advances that had significant effects on the city environment were improved medicine and sanitation, which led to the control of many diseases, and improved transportation.

Subways and commuter trains have also led to the development of suburbs.

»» 3. An Environmental History of Cities

3.4 The Center of Civilization

We are at the beginning of a new stage in the development of cities. With modern telecommunications, people can work at home or at distant locations. Perhaps, as telecommunication frees us from the necessity for certain kinds of commercial travel and related activities, the city can become a cleaner, more pleasing center of civilization.

3. An Environmental History of Cities

3.5 City Planning and the Environment

The City Park — design with nature

- Frederick Law Olmsted: Central Park in New York City
- Yu Kongjian (俞孔坚) : Turenscape (土人设计)
- Royal Botanic Garden, Sydney







3. An Environmental History of Cities

◆ Garden city

An extension of the park idea was the “garden city,” a term coined in 1902 by Ebenezer Howard. Howard believed that city and countryside should be planned together. A garden city was one that was surrounded by a greenbelt, a belt of parkways, parks, or farmland.

◆ Forest city



4. The City as an Environment

4.1 The Energy Budget of a City

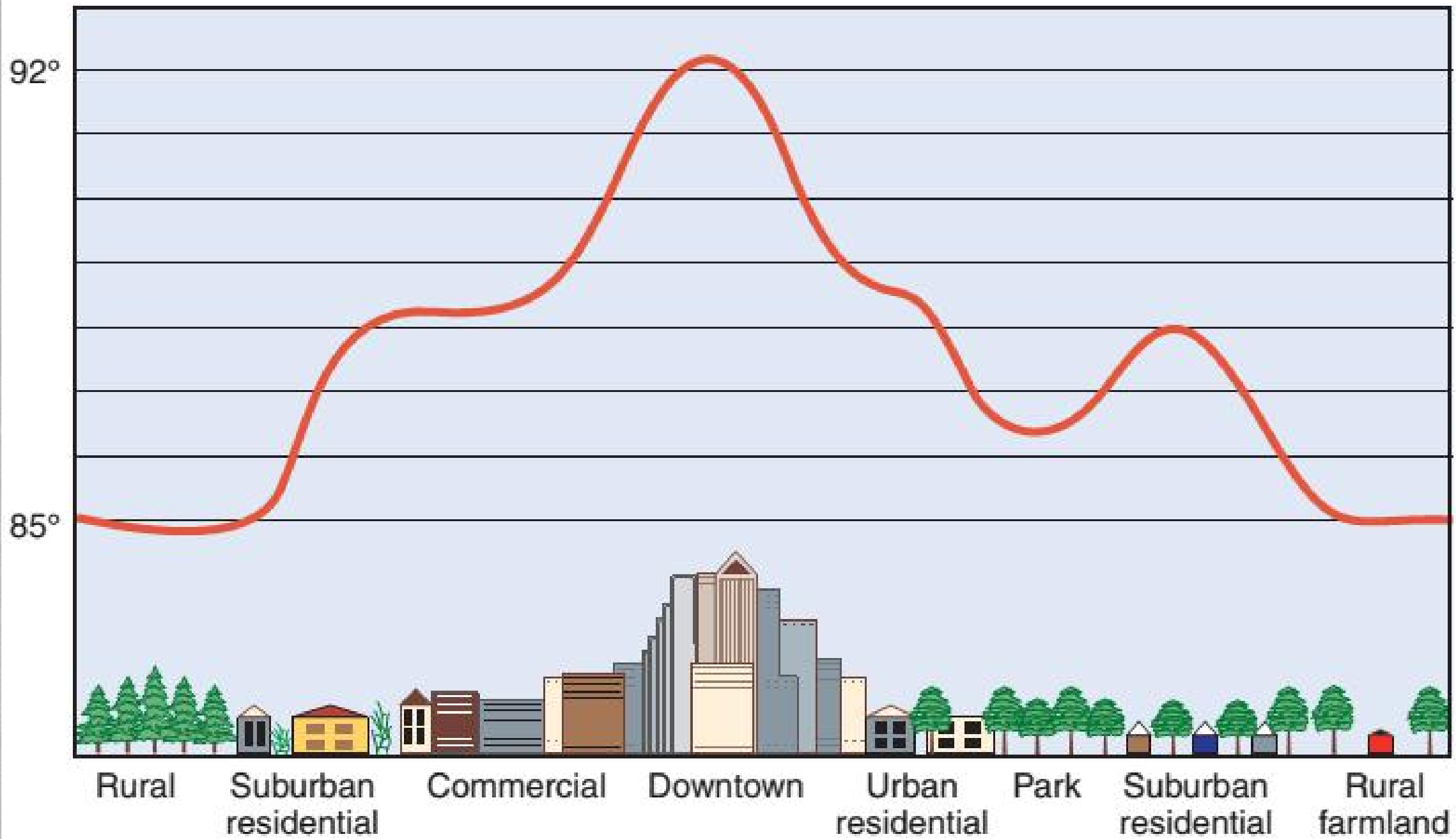
Like any ecological and environmental system, a city has an “energy budget .” The city exchanges energy with its environment in the following ways: (1) absorption and reflection of solar energy, (2) evaporation of water, (3) conduction of air, (4) winds (air convection), (5) transport of fuels into the city and burning of fuels by people in the city, and (6) convection of water (subsurface and surface stream flow). These in turn affect the climate in the city, and the city may affect the climate in the nearby surroundings, a possible landscape effect.

4. The City as an Environment

4.2 The Urban Atmosphere and Climate

- ✓ Cities are generally less windy than nonurban areas because buildings and other structures obstruct the flow of air.
- ✓ A city also typically receives less sunlight than the countryside because of the particulates in the atmosphere over cities—often over ten times more particulates than in surrounding areas.
- ✓ A city is a heat island, warmer than surrounding areas.

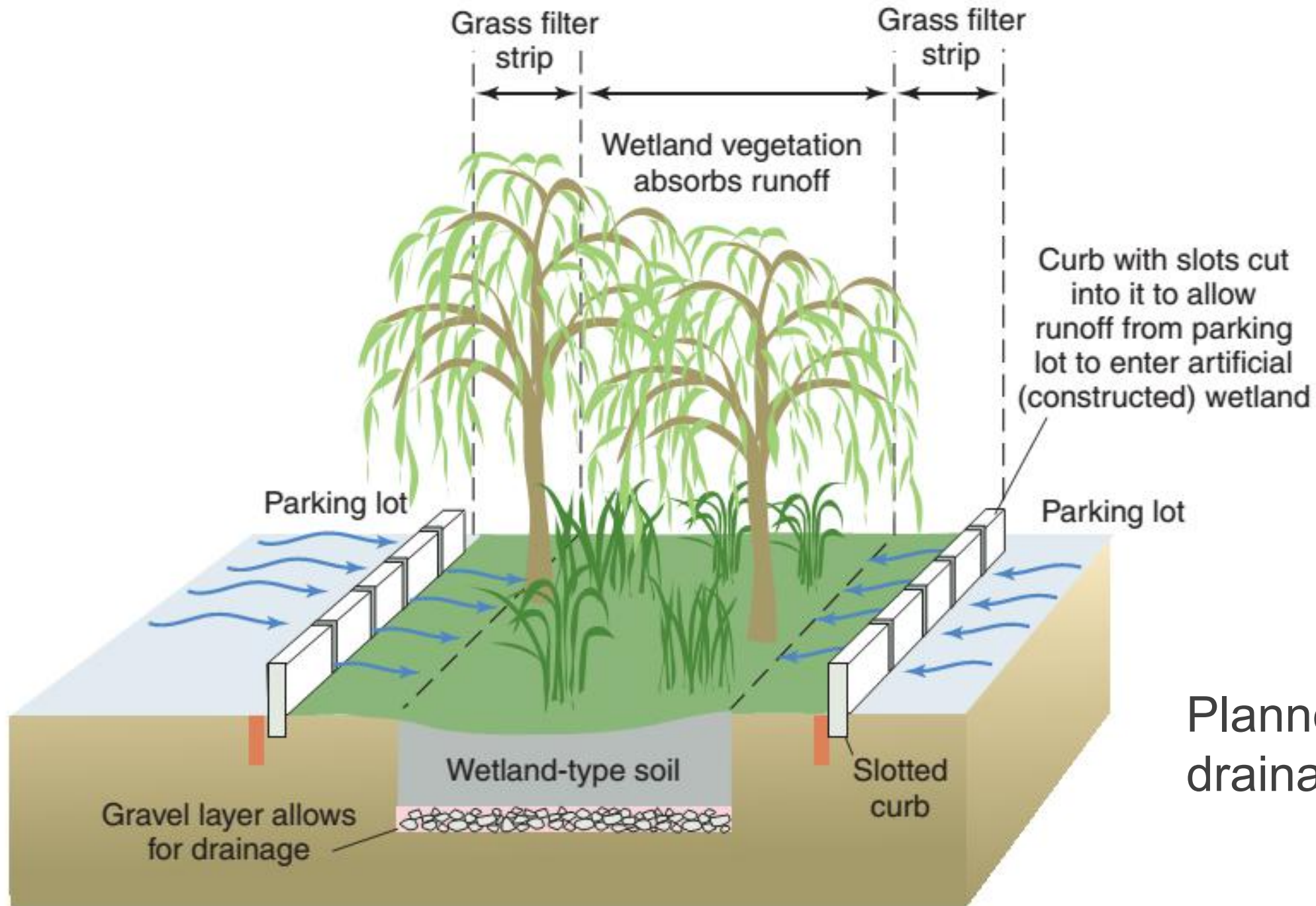
An Urban Heat Island Profile



4. The City as an Environment

4.3 Water in the Urban Environment

- Modern cities affect the water cycle, in turn affecting soils and consequently plants and animals in the city.
- Chances of flooding increase both within the city and downstream outside the city.
- New, ecological methods of managing stormwater can alleviate these problems by controlling the speed and quality of water running off pavements and into streams.



Planned for better drainage.



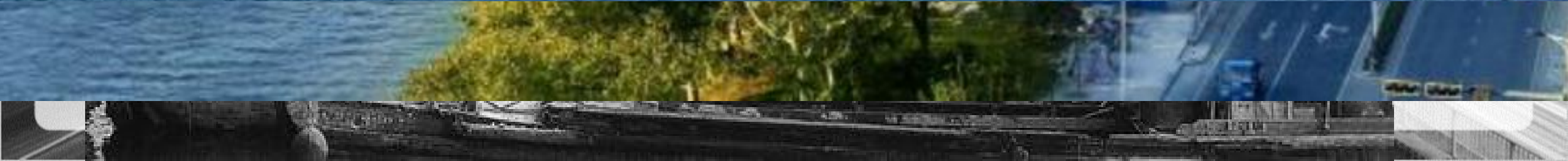
5. Bringing Nature to the City

As we saw in the study about New York City, a practical problem is how to bring nature to the city—how to make plants and animals part of a city landscape. This has evolved into several specialized professions, including **urban forestry** (whose professionals are often called tree wardens), **landscape architecture**, **city planning and management**, and **civil engineering** specializing in urban development.

5.1 Cities and Their Rivers

- 京杭大运河的今与昔
- Hudson River in New York
- Sydney





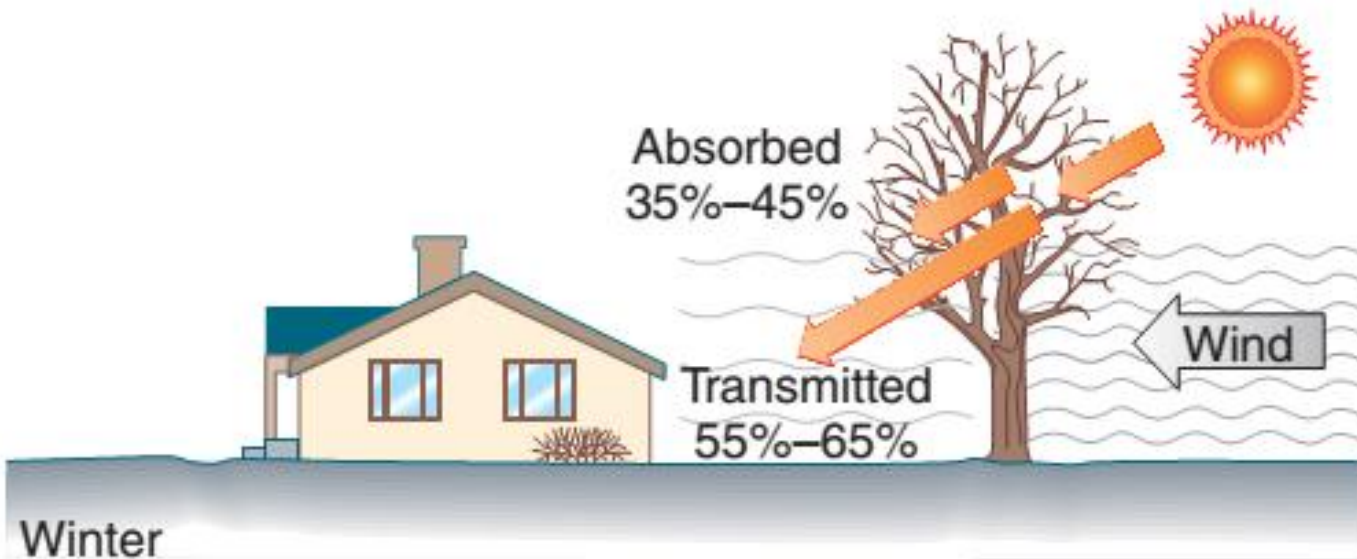
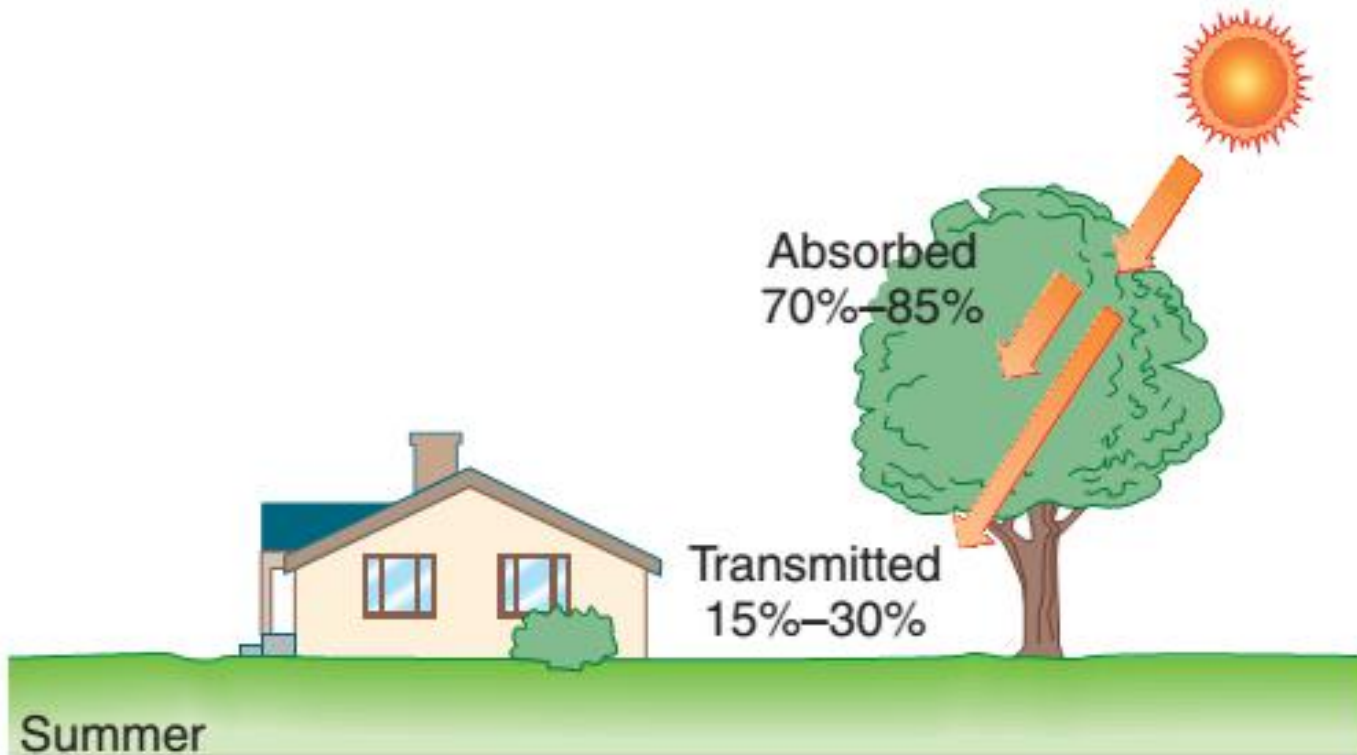


5. Bringing Nature to the City

5.2 Vegetation in Cities

- ✓ Trees, shrubs, and flowers add to the beauty of a city.
- ✓ Trees provide shade, which reduces the need for air-conditioning and makes travel much more pleasant in hot weather.
- ✓ In parks, vegetation provides places for quiet contemplation; trees and shrubs can block some of the city sounds, and their complex shapes and structures create a sense of solitude.
- ✓ Plants also provide habitats for wildlife, such as birds and squirrels, which many urban residents consider pleasant additions to a city.





Trees cool homes. Trees can improve the microclimate near a house, protecting the house from winter winds and providing shade in the summer while allowing sunlight through in the winter.

5. Bringing Nature to the City

5.3 Urban “Wilds” : The City as Habitat for Wildlife and Endangered Species

- ✓ Urban areas can be modified to provide habitats for wildlife that people can enjoy. This can be an important method of biological conservation.
- ✓ Cities can even be home to rare or endangered species. They can provide all the needs—physical structures and necessary resources such as food, minerals, and water—for many plants and animals.



谢谢大家!