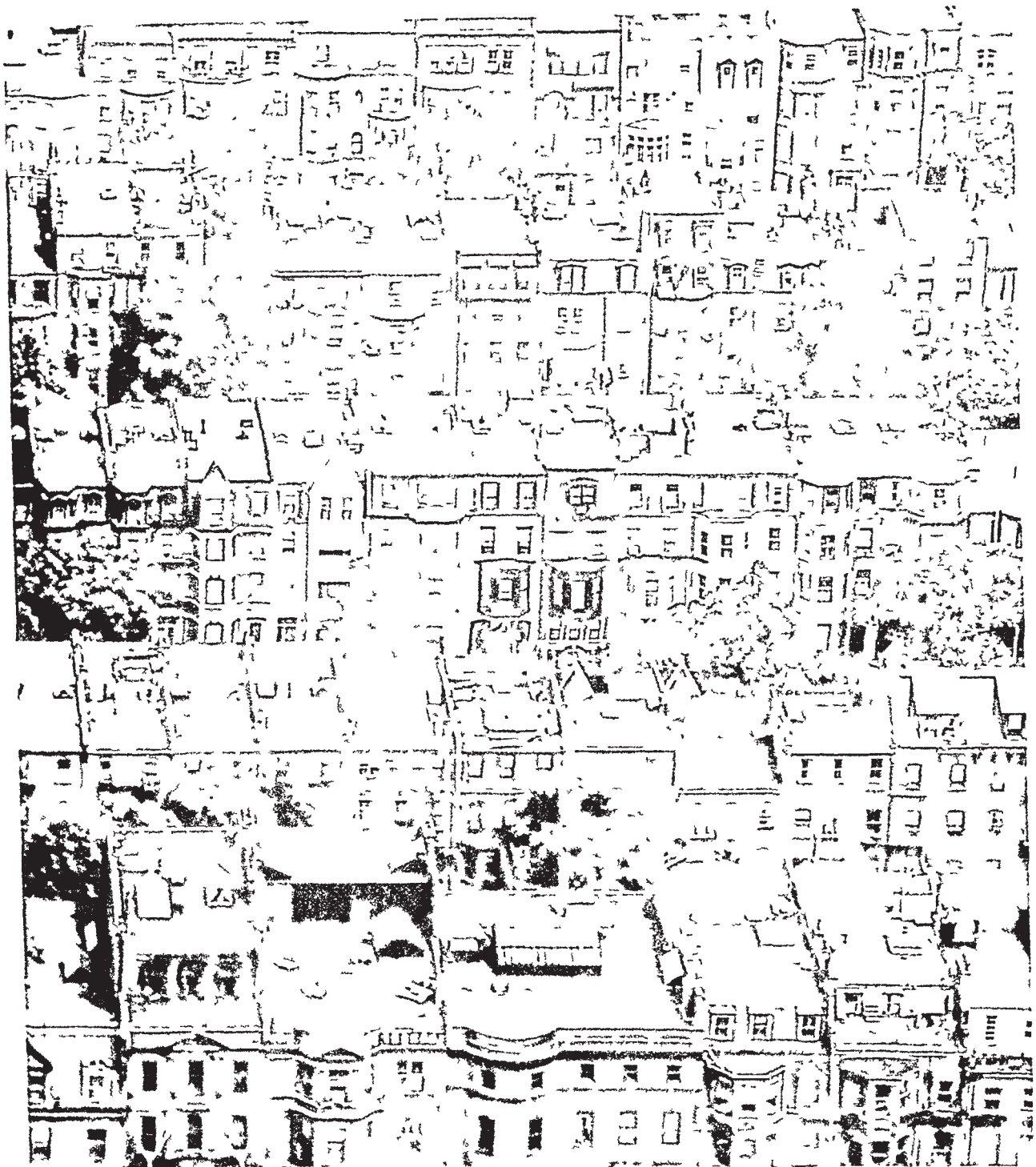


The Urban Mosaic



Picking out patterns in your own city is, in some ways, a difficult matter. As you walk or drive through your city, its intricacy may dazzle, and its form may sometimes seem puzzlingly chaotic. It is often hard to imagine why city functions are where they are, why people cluster where they do. Why does one block have high-income housing and another, slum tenements? Why is a new factory so near the airport? Why is the black ghetto next to the central business district? Why does the highway run through one neighborhood and around another? Why does the subway system connect the suburbs to the downtown area but provide no transportation to and from inner-city neighborhoods? And just when you think you are beginning to see some patterns in your city, you may also note that those patterns are swiftly changing. The house you grew up in is now part of the business district. The row of houses across the street from your old grade school has been replaced by a bowling alley, laundromat, high-rise office building, or perhaps a giant parking lot. The central city that you roamed as a child looks dead. A suburban shopping center thrives on what was once rubble-strewn vacant lots. If you go back to visit the Little Italy of your childhood, you may find a thriving soul-food restaurant where the Italian grocery store once stood.

Chapter 10 focused on cities as points in geographic space. The goal of this chapter is geographically quite different. We will try to orient ourselves within cities to gain some perspective on the patterns in them. In other terms, the two chapters differ in scale. The earlier chapter let us see cities from afar, as small dots diffusing across space and interacting with one another and with their environment. In this chapter, we will study the city as if we were walking its streets.

Our tour guides in this close-up view of the city will be five familiar themes of cultural geography. Through culture region, we will examine spatial differences within cities. Cultural diffusion will show how these internal and regional differences develop. Cultural ecology will permit us to see the role of the physical environment within the structure of the city. And through cultural integration, we will see what a finely woven fabric the city really is. Of course, the visual impact of these elements is revealed in the urban landscape, a "townscape" perceived in different ways by different people.

URBAN CULTURE REGIONS

Like society, the city is composed of many different groups. And just as people of similar interests seek one another out for conversation, people of like mind and like circumstances tend to cluster together in neighborhoods. Consequently, the theme of culture regions can be applied to those parts of the city where people live who share similar traits—such as values, income, language, religion, or race. Most city dwellers are intuitively aware of these urban culture regions. Visual clues—such as size and condition of housing, dress styles, or kinds of cars on a street—help categorize some areas as high-income, others as slums; some as Polish neighborhoods, others as Chinese.

Looking at these urban regions, the cultural geographer seeks answers to such questions as: Why do people of similar values cluster together? How can urban culture regions be defined? What patterns are apparent within culture regions?

Social Areas

To begin answering these questions, we should distinguish between *social* and *ethnic* urban culture regions. In a social area, people share such social traits as income, education, and stage of life. An ethnic area is shared by people of similar ethnic background who share race or language. An example of a social area would be an upper income neighborhood. An example of an ethnic area is a Chicano neighborhood. Material on ethnic regions is found in Chapter 9.

One way to define social areas is to isolate one social trait and plot its distribution. The United States Census is a common source of such information because the districts used to count population, called *census tracts*, are small enough to allow the subtle texture of social areas to show. For example, Figure 11-1 shows the rough distribution of income in Berkeley, California. Census tracts with similar average incomes have

Often social areas within the city can be intuitively delimited simply by looking at the landscape. Compare this photograph with the one on p. 385.

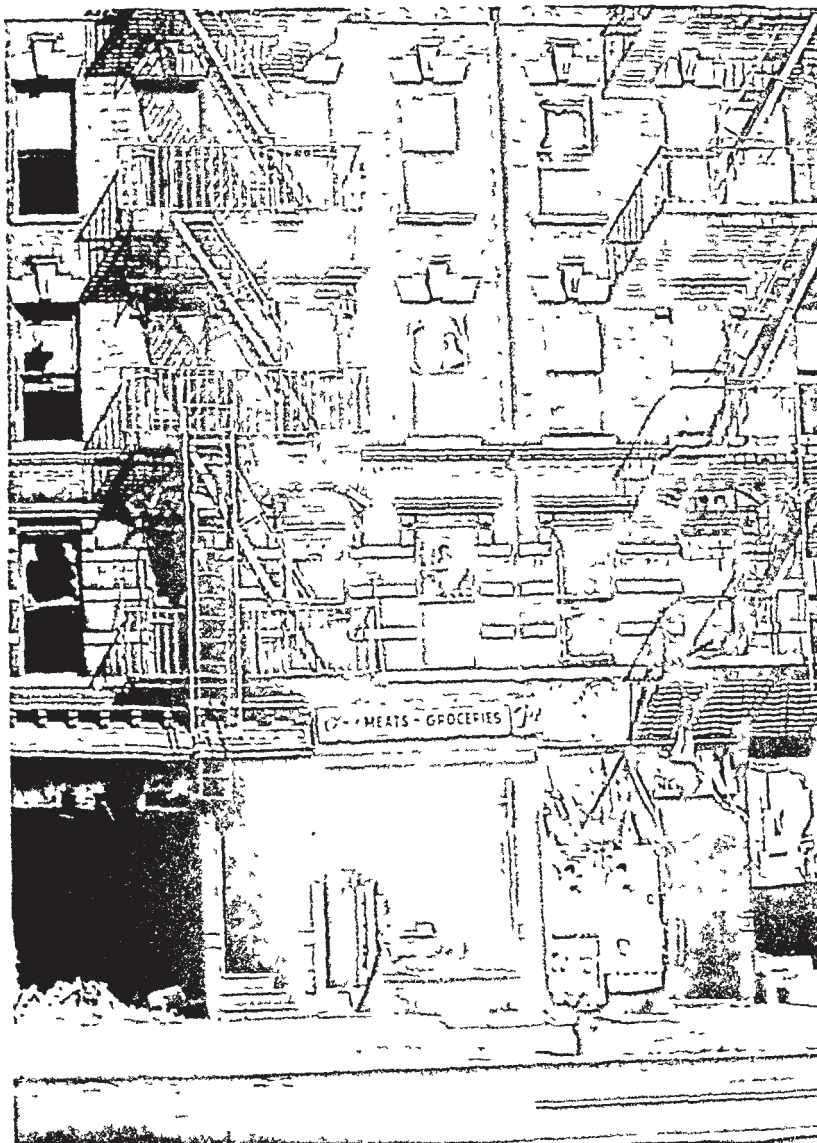
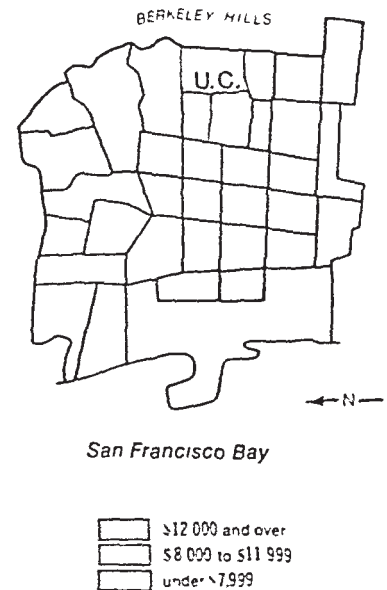


FIGURE 11-1

The map shows the high and low-income areas of Berkeley based on the median family income for each census tract. The areas of highest income are located in the Berkeley-Oakland hills, whereas the areas of lowest income are either directly adjacent to the UC campus in the south, or in the flatlands of the west, where low-income housing is mixed with industrial and commercial uses. Students and ethnic minorities dominate the low-income areas and compete for the limited stock of low-rent housing in the city. The upper-income areas are predominantly white families living in newer housing.



been lumped together, showing areas of high, middle, and low income. These areas, in a crude way, correspond to the social stratification of the city. High-income areas are mostly in the hilly area to the east, where whites dominate. Lower income areas are on the flatlands, closer to the bayfront industrial areas, and are made up of students and minorities. Similar mapping could be done with other social traits taken from the census, such as age, education, or percentage of families below poverty level.

Another approach is to correlate various social indicators. For example, politicians have long known that districts with certain demographic characteristics (such as age, income, and occupation) tend to vote certain ways. There might be a correlation between, say, Democratic voting and Catholic working-class neighborhoods. What politicians know from experience, urban analysts try to formalize through statistical studies. They look at the degree of correlation between factors such as income, occupation, age, and ethnicity, and then their results can be translated into a pattern of multiple-factor urban social areas.

But it is easy to misinterpret these results. A statistical correlation between groups exhibiting certain characteristics says nothing about an individual. This misinterpretation is called the *ecological fallacy*, because it surfaced from statistical studies done in the field of human ecology. An illustration of this fallacy follows.

Data from the 1930 census on the percentage of blacks in each state and the percentage of illiterates show a high statistical correlation. One might conclude that a large number of blacks are illiterate. But that is not true. When the data are examined closely, one sees that southern states with the highest number of blacks are also those with the highest number of illiterate whites. Similar misinterpretations can come from correlation studies done comparing urban groups.

Neighborhoods

Social areas are not merely statistical definitions. They are also areas of shared values and attitudes, of interaction and communication. The concept of a *neighborhood* is often used to describe small social and ethnic areas where people with shared values and concerns interact on a daily basis. For example, if we consider only census figures, we might find that parents between thirty and forty-five years of age, with two or three children, and earning between \$16,000 and \$20,000 a year cover a fairly wide area in any given city. Yet, from our own observations, we know that this broad social area is probably composed of smaller units of interaction—areas where people gather for social events, where they know they can find friends or advice. These units would be neighborhoods.

People of similar values cluster together in neighborhoods to reduce social conflict. Where neighbors share values about home maintenance, child rearing, and public order, there is little need to worry about these topics from day to day. People can rest secure that their neighbors feel the same way. Any “deviants” will face such social coercion that they will probably choose to live elsewhere. Consequently, some of the minor conflicts of daily life lose their importance in a neighborhood. People can turn their attention to work, home, or broader social issues. Public order is protected by the neighborhood.

People usually choose a place to live with this in mind. Most people seek areas where people like themselves live. If there is a big difference in the backgrounds of neighbors, they must then constantly worry about potential conflict. Perhaps you have seen firsthand the unsettling effect on a neighborhood when a distinctly different family—in income, background, or race—moves in.

In short, a neighborhood is a place where a resident can feel at ease. The importance of living in a congenial neighborhood often overwhelms the disadvantages an area may offer. For instance, a study of Durham and Greensboro, North Carolina, found that when people had to choose between “a very good but inconveniently located neighborhood” and “a less desirable but conveniently located neighborhood,” the residents chose the good neighborhood by a three to one margin. Even bad housing conditions may not erase from people’s minds the benefits of living in a certain neighborhood. One study discovered that, although half of New York City’s Puerto Rican immigrants were dissatisfied with their living quarters, only 26 percent were also dissatisfied with their neighborhoods. This also reflects the fact that in urban, rather than suburban, neighborhoods, much living and human interchange take place in the streets and not at home.

In viewing neighborhoods geographically, one warning should be issued. People living in neighborhoods defined by outsiders often do not hold the same definition. The sociologist Herbert J. Gans studied a largely Italian working-class area in Boston known as the West End. By all external criteria—economic, social, and cultural—the West End was a neighborhood. But Gans found that the concept of the West End as a single neighborhood was foreign to the West Enders themselves. Although the area had long been known to outsiders as the West End, the residents themselves divided it up into many subareas. Ironically, only

Social areas within the city can be delimited by certain traits taken from the census, such as income, education, or family size. How would you characterize the social area in this picture? Is it an area of high, medium, or low income? How about life stage and family size?



BOSTON'S WEST END AND URBAN RENEWAL

The West End, an aging Boston neighborhood dominated by Italians, was seen by outsiders as a slum. Planners and government officials viewed it as an eyesore contaminating elegant, upper-class Beacon Hill and the downtown shopping area. "Real estate men," according to sociologist Herbert Gans, "had long felt that the area was 'ripe' for higher—and more profitable uses." In the late 1950s, the West End was slated for "urban redevelopment." This meant that the neighborhood's old, low-rent structures would be torn down and a new neighborhood of luxury apartment houses would be built—not, of course, for the West Enders, who would be "relocated" elsewhere.

Planners felt that, in addition to rebuilding the central city, they would be doing a favor to the West Enders by moving them out of a human cesspool. Unfortunately, the West Enders failed to agree. The vast majority of them had no desire to leave their "slum," which they

saw as an attractive low-rent community. The day after the government gave the go-ahead signal for redevelopment, one young Italian told Gans: "I wish the world would end tonight. I wish they'd tear the whole damn town down, damn scab town. I'm going to be lost without the West End. Where the hell can I go?" A typical West End comment was: "It isn't right to scatter the community to all four winds. It pulls the heart out of a guy to lose all his friends."

To the West Enders, according to Gans, "the idea that the city could clear the West End, and then turn the land over to a private builder for luxury apartments seemed unbelievable." The average West End thought: "The whole thing is a steal, taking the area away from the people, and giving it to some guys who had paid off everyone else. It is just someone making money at our expense."

In fact, the West Enders were not far wrong in defining the social injustice done to them. The financial

effort expended on their needs (including relocation) amounted to about 1 percent of the clearance and rebuilding cost for the whole neighborhood. Yet, as Gans points out, "The real cost of relocation . . . was very much higher, and was paid in various ways by the people who had to move. In short, the redevelopment of the West End was economically feasible only because of the hidden subsidies which the residents provided—involuntarily, of course."

"I was told," Gans adds, "that before the West End was totally cleared—and even afterwards—West Enders would come back on weekends to walk through the old neighborhood and the rubble-strewn streets."

Adapted from Herbert J. Gans, The Urban Villagers. Copyright © 1962 by The Free Press of Glencoe, Illinois, a Division of The Macmillan Company.

the threat of "redevelopment"—that is, the destruction of the neighborhood—led residents to think of the West End as a single entity.

CULTURAL DIFFUSION IN THE CITY

The patterns of activities we see in the city result from thousands of individual decisions made regarding location. Where should we locate our store, in the central city or in the suburbs? Where should we live, downtown or outside the city? The end result of such decisions might be expansion at the city's edge or the relocation of activities from one part of the city to another. The cultural geographer looks at such decisions in terms of expansion and relocation diffusion.

To understand the role of diffusion, let us divide the city into two major areas—the inner city and the outer city. Those diffusion forces that result in residents, stores, and factories locating in the inner or central city are *centralizing forces*. Those that result in activities locating outside the central city are called *decentralizing forces*. The pattern of

homes, neighborhoods, offices, shops, and factories in the city results from the constant interplay of these two kinds of forces

Centralization

Examining the advantages of centralization can best be accomplished by breaking them into two categories economic and social advantages

Economic Advantages. An important economic advantage to central-city location has always been accessibility For example, imagine that a department store seeks a new location Its success depends on whether customers can reach the store easily If its potential market area is viewed as a full circle, then naturally the best location is in the center There, customers from all parts of the city can gain access with equal ease Before the automobile, a central-city location was particularly necessary because public transportation—such as the streetcar—was usually focused there A central location is also important to those who must deliver their goods to customers, because it provides equal transportation time and costs to all the customers Bakeries and dairies usually located as close as possible to the center of the city so that their daily deliveries would be most efficient

Location near regional transportation facilities is another aspect of accessibility Many a North American city grew up with the railroad at its center. Hence, any activity that needed access to the railroad had to locate in the central city In St. Louis, Chicago, Minneapolis-St. Paul, Buffalo, and other urban areas, giant wholesale and retail manufacturing districts grew up around railroad districts Thus they became “freight-yard and terminal cities” for the produce of the nation Today, although these areas have often been abandoned by their original occupants, a walk by the railroad tracks will give the most casual pedestrian a view of the modern “ruins” of the railroad city

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Photoduplication Service
Washington, D.C. 20540



Transportation systems are an important centralizing force, not simply for the delivery of goods to the central city, but also to convey those who work and shop downtown, as illustrated in this picture of New York City commuters. What transportation systems focus activity in the downtown of your city?

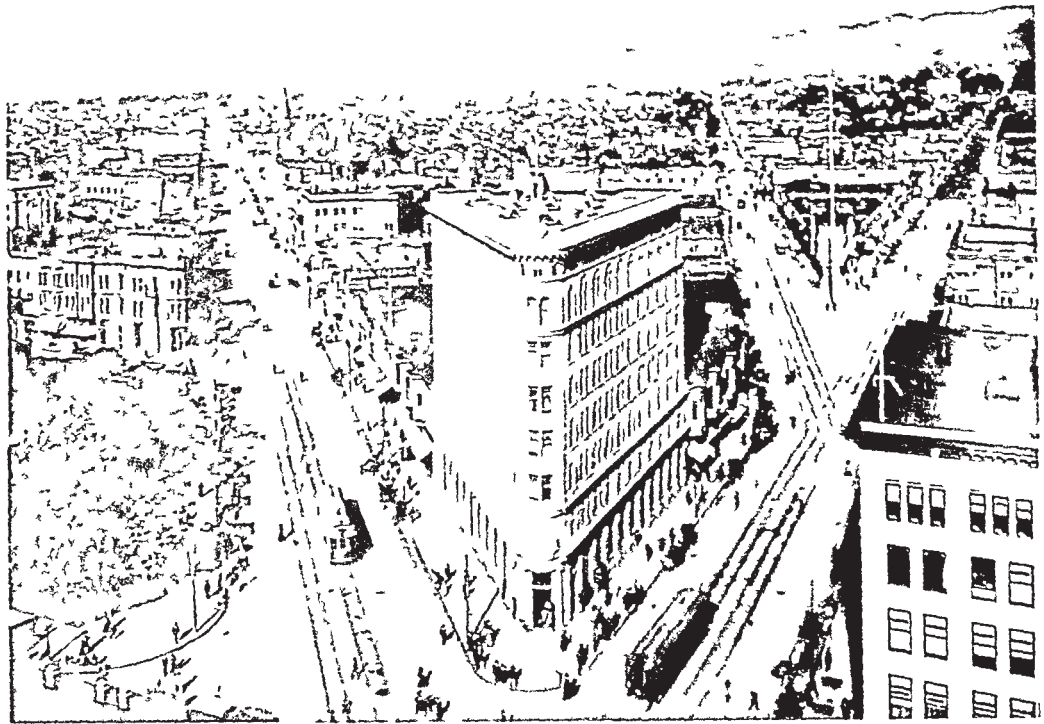
Another major economic advantage of the inner city is agglomeration, or clustering, which results in mutual benefits for businesses. For example, retail stores locate near one another to take advantage of the pedestrian traffic each generates. A large department store generates a good deal of foot traffic, so that any nearby store will also benefit. A number of cities around the world, including Atlanta, Pittsburgh, Montreal, and Munich, have actually closed specific downtown areas to motorized traffic, thereby creating pedestrian malls for downtown strollers and shoppers, hoping to create a pleasant environment that will attract more foot traffic.

Historically, offices have clustered together in the central city because of their need for communication. Remember, the telephone was invented only in 1875. Before that, messengers hand-carried the work of banks, insurance firms, lawyers, and many other services. Clustering was essential for rapid communication. Even today, there is a distinct tendency for office buildings to cluster, because face-to-face communication is still important for the business community. In addition, central offices take advantage of the complicated support system that grows up in a central city and aids everyday efficiency. Printers, bars, restaurants, travel agents, office suppliers, and others must be in easy reach.

Social Advantages. Three social factors have traditionally reinforced central-city location: historical momentum, prestige, and the need to locate near work. The strength of historical momentum should not be underestimated. Many activities remain in the central city simply because they began there long ago. For example, the financial district in San Francisco is located mainly on Montgomery Street. This street originally lay along the waterfront. San Francisco's first financial institutions were established there in the Gold Rush of 1849 because it was the center of commercial action. Goods were being shipped from there to the Mother Lode region by river barge, and gold was being brought down by packet. In later years, however, land filling extended the shoreline. Today, the financial district is several blocks from the bay. The financial district that began at wharfhead remained at its original location, even though other activity moved with the changing shoreline.

The prestige associated with the downtown area is also a strong centralizing force. For some activities, it is still necessary to have a central-city address. Think how important it is for some advertising firms to be on New York's Madison Avenue or for a stockbroker to be on Wall Street. This extends to many activities in cities of all sizes. The "downtown lawyer" and the "uptown banker" are examples. Residences have often been located in the central city because of the prestige associated with it. Most cities have remnants of high-income neighborhoods close to the downtown area. Although this trend has weakened in North America—downtown areas have become more congested and noisy, and transportation has encouraged suburban residences—it still is important elsewhere. London and Paris have very prestigious neighborhoods directly in the downtown area. The same is true for Latin American cities, where the power elite have traditionally lived in the city center.

Probably the strongest social force for centralization has been the desire to live near one's employment. Until the development of the electric trolley in the 1880s, there was little alternative for most urban



dwellers but to walk to work. This meant that most people had to live near the central city, because most employment was there. Upper income people had their carriages and cabs, but others had nothing. In early Victorian London, "pedestrians rather than carriages dominated the street scene. Clerks, tradesmen, and workers thronged the sidewalks on their way to and from work in central London. Some 100,000 people a day, for example, walked over the toll free London Bridge across the Thames, and about 75,000 over the toll free Blackfriars Bridge."¹

The "horsecar," which came along in the 1850s, somewhat reduced central-city residential congestion. It was essentially a bus drawn along tracks by horses, and it traveled about four miles (six and a half kilometers) in three quarters of an hour. However, only with the trolley—which covered six to eight miles (nine and a half to thirteen kilometers), with stops, in one half hour—did the middle class begin its exodus from the inner city. This electric powered streetcar, first introduced in Richmond, Virginia, in the late 1880s, may have been an early factor in the declining prestige of the downtown area. According to Sam Bass Warner, Jr., the electric streetcar's major failing "was its grinding gears and pounding steel wheels. By raising the sound levels of urban streets to intolerable heights the streetcars drove the rich from their customary conspicuous locations on the city's main thoroughfares. Quiet isolation became a fundamental amenity in wealthy neighborhoods and the goal of middle class homeowners."²

This photograph of Oakland in 1916 shows the important role played by the electric streetcar in urban development. The straight avenues radiate out from the downtown and were planned to facilitate subdivision along streetcar lines. Residents could then use the streetcar to draw on work and shopping opportunities in the central city, while living in a less congested suburban environment.

¹Tuin 1974 pp. 174-175

²Warner 1972 p. 38

The working poor had no possibility of escaping the noise. They simply had to accept the unacceptable. They accepted as well the elevated train whose tracks passed over (and through) their neighborhoods, creating a sunless world below. These poor, who still walked to work, were left in inner-city residences. Their residences were often the oldest in the city and consequently the most deteriorated and the cheapest to be found. Thus, as the middle class moved out to the "streetcar suburbs" on the edges of the city, the low-income workers increasingly dominated the inner city. Here began the clear-cut separation of rich and poor that we still see in urban areas today. In North American cities, this exodus of the middle class coincided with a period of great flow of European and Asian workers. Many inner-city areas became the ethnic neighborhoods that were discussed earlier.

Decentralization

Decentralizing forces encourage relocation diffusion, such as the movement of a shop or residence from the downtown to the suburbs. Decentralizing forces also promote expansion diffusion, such as the location of a new shop in the suburbs. The forces behind decentralization fall into the same two general categories (economic and social) that were used to explain centralization. Now, however, everything is reversed. People and businesses are moving from the city instead of into it.

Economic Advantages. Changes in accessibility have been a major reason for decentralization. The department store that originally located in the central city may now find that its customers have moved to the suburbs. They no longer shop downtown. As a result, the department store may move to a suburban shopping center. The same process also occurs among industries such as food-processing plants. They must move away to minimize transportation costs. The activities that were located downtown because of the railroad may now find trucking more effective. They relocate closer to a freeway system that only skirts the downtown area. And many offices now locate near airports so that their executives and salespeople can fly in and out more easily.

Although agglomeration once served as a centralizing force, its former benefits have now become liabilities in many downtown areas. These disadvantages involve such things as increased rents as a result of the high demand for space; congestion in the support system, which means delays in getting supplies or standing in endless lines for lunches; and traffic congestion, which makes delivery to market time-consuming and costly. Some downtown areas are so congested that traffic moves more slowly today than it did at the turn of the century. Traffic studies of midtown New York City show that the average automobile moves at a snail's pace of six miles (nine and a half kilometers) per hour. According to a 1907 study, horse-drawn vehicles moved through the same area at an average speed of eleven and a half miles (eighteen and a half kilometers) per hour, almost twice as fast.

Employees, experiencing high rents, traffic jams, and other inconveniences of central-city living, demand higher wages as compensation. This adds to the cost of doing business in the central city, and many firms choose to leave rather than bear such additional costs. As a result, many

firms have left New York City. Most have chosen to locate in smaller suburbs removed from Manhattan. They claim that it costs less to locate there and that their employees are happier and more productive because they do not have to put up with the turmoil of city life.

There can also be benefits of clustering in new suburban locations, such as in industrial parks, where the costs of utilities and transportation links are shared by all the occupants. Similar benefits can come from residential agglomeration. Suburban real estate developments take advantage of clustering by sharing costs of schools, parks, road improvements, and utilities. New residents much prefer moving into a new development when they know that a full range of services is available nearby. Then they will not have to drive miles to find, say, the nearest hardware store. It is to the developer's advantage to encourage construction of nearby shopping centers.

Social Advantages. A number of social factors reinforce decentralization, such as loss of downtown prestige, sentiment attached to the suburbs, and new employment patterns.

The downtown area might once have lured people and businesses into the central city because it was a prestigious location. But once it begins to decay, once shops close and office space goes begging, there may be a certain stigma attached to it. This may drive residents and commercial activities away. Investors will not sink money in a downtown area that they think has no chance of recovery, and shoppers will not venture downtown when streets are filled with vacant stores, transients,

WORKING IN THE SUBURBS

Along with poverty, wealth, crime, pollution, and fine restaurants, another landmark of urbanization has moved to the suburbs—jobs. Today, one out of four suburbanites, at most, commutes to a job inside city limits. The vast majority live and work in the suburbs. The forces of decentralization now push both large corporations and small service industries out of their traditional locations in central-city areas.

A comparison of the census figures for 1960 and 1970 reflects the startling suddenness of this change. In 1960, there were about 12 million jobs in cities and only 7 million in their suburbs. In other words, the city controlled about 61 percent of the jobs in a metropolitan area. By 1970, however, jobs in cities had actually dropped 7 percent, to 11,224,000. Jobs in

suburbs had risen 44 percent, to 10,158,000. In 1970, the central city still managed to maintain a bare majority—52 percent—of the total metropolitan jobs (a figure that has undoubtedly been reversed in recent years), but the suburbs in nine of the fifteen largest metropolitan areas had either equaled or passed them as the prime location for jobs. For instance, in Washington, D.C., the suburbs had gathered over 55 percent of all jobs, despite heavy government employment in the inner city. In other areas, the figures were similar, although perhaps less dramatic.

There are equally startling figures for job loss in central cities. In an extreme case, Detroit's inner-city jobs dropped by 23 percent. Of the fifteen largest central cities, none

lost jobs, four barely held their own, and only two cities in Texas actually gained jobs (because of laws allowing them to incorporate suburbs within city limits). Symbolic of these trends was a rise in the number of "reverse commuters," who take a daily trip from city to suburb for their employment. Between 1960 and 1970, the numbers of reverse commuters rose from 4 percent of metropolitan employees to 7 percent.

What do you think such a startling change in employment patterns means for the future organization of our society?

Source: Jack Rosenthal, "Cultural Boom Is Carrying Urbanity to the Suburbs," New York Times, September 7, 1972. Copyright © 1972 by The New York Times. Reprinted by permission.

pawnshops, and secondhand stores. One of the persistent problems faced by cities is how to reverse this image of the downtown area so that people will once again consider it the focus of the city. Chambers of commerce spend millions of dollars each year putting out literature that tries to create a new image of the central city.

Sentiment and prestige attached to the suburbs is a significant decentralizing force. There has been a long-standing preference in the United States and Canada for the single-family dwelling and large lot. These have been most readily obtained where land values are lower, away from the city center. And because the suburbs were originally dominated by upper-income people, socially mobile families have considered a move in that direction a step upward.

The need to be near one's workplace has historically been a great centralizing force, but it can also be a very strong decentralizing force. At first the suburbs were "bedroom communities," from which people commuted to their jobs in the downtown area. This is no longer the case. In most metropolitan areas, most jobs are not in the central city but in outlying districts. Now people work in suburban industrial parks, manufacturing plants, office buildings, and shopping centers. Thus a typical journey to work involves *lateral commuting*—that is, travel from one suburb to another. As a result, most people who live away from the city center actually live closer to their workplace. A testimony to this is a freeway system at rush hour; traffic is usually heavy in all directions, not just to and from the city center.

The Costs of Decentralization

Unfortunately, decentralization has taken its toll. Many of the urban problems now burdening North American cities are direct products of rapid decentralization that has taken place in the last thirty years. These problems plague both inner cities and suburbs.

Vacant storefronts, empty offices, and deserted factories testify to the movement of commercial functions from central cities to suburbs. Retail sales in North American central cities have steadily declined, losing business to suburban shopping centers. Industries have relocated in spacious suburban industrial parks where taxes are lower, land costs cheaper, and transportation connections better. Even offices are finding advantages to suburban location. Like industry, offices capitalize on lower costs and easier access to new transportation networks.

What are cities doing to reverse this trend? Many cities have mounted special campaigns to combat central-city desertion. They offer tax incentives to those who stay or wish to locate in the downtown; and permits for new central buildings are often rushed through special channels that cut planning red tape. But most common is the downtown redevelopment project.

Urban renewal can have several goals, ranging from revival of retail trade, to construction of new central-city office space, to redevelopment of inner-city housing. The most common redevelopment strategy focuses on three interconnected components of city life: jobs, housing, and retail sales. The first task is to revive downtown employment patterns, often by constructing new office facilities competitive with outlying centers, or by concentrating on a specialized function. Many cities design redevelop-

ment projects that cluster new financial institutions together. Banks, insurance firms, and stock brokerage houses can be found in the new high rises.

Once people work in the city, they might be tempted to move back from the suburbs if appealing housing is available. So a second goal of redevelopment is construction of middle income inner city housing. Usually these projects will be located close to the new office complex. Finally, with people both working and living in the downtown once again, retail sales can be expected to pick up. This is the third phase of many renewal plans. Pedestrian malls, shops clustered around fountains and open spaces, restaurants, and numerous specialty shops can be found in the newly planned redevelopment shopping areas. These new retail centers are usually located near both offices and new housing so as to draw workers during lunch hours and the new residents on their way home from work. In fact, many redevelopment projects combine all three elements into one superblock—residences, shops, and workplaces connected by elevated pathways removed from street level congestion.

Urban redevelopment can also be designed to renew the deteriorated housing stock of low rent residences. However, because some see the continued presence of lower income people in the central city as conflicting with revival of a viable retail sector, politicians are often reluctant to approve such plans. A constant criticism of renewal projects has been that they destroy low-rent housing and replace it with middle or high rent dwelling units. Poor people—who are usually the elderly and minorities—are displaced and forced to move into other low rent areas of the city, simply aggravating the problem of urban poverty.

This is not to judge all urban renewal as bad. There are many humane renewal projects that have combined both economic revitaliza-

One of the most apparent expressions of urban decentralization is the sprawling city illustrated in this aerial photograph of San Jose, California.



tion of the inner city with housing and jobs for society's less fortunate. It can be done. Yet all agree that it is politically and economically more difficult than the project that simply constructs housing for high- and middle-income city dwellers.

Decentralization has also cost society millions of dollars in problems brought to the suburbs. Where rapid suburbanization has been the case, sprawl has usually resulted. A common pattern is *leapfrog* or *checkerboard development*, where housing tracts jump over parcels of farmland resulting in a mixture of open lands with built-up areas. This pattern results because developers buy cheaper land farther away from built-up areas, thereby cutting their costs. Furthermore, home buyers often pay premium prices for homes in subdivisions surrounded by farmlands.

This form of development is costly because it is more expensive to provide city services, such as police, fire protection, sewers, and electrical lines, to those areas lying beyond open, unbuilt parcels. Obviously, the most cost-efficient form of development is adding new housing directly adjacent to built-up areas. That way the costs of providing new services are minimal. Costs are considerably higher when parcels of open land must be bridged.

Furthermore, sprawl extracts high costs because of increased usage of cars. Public transportation is extremely costly and inefficient when it must serve a low-density checkerboard development pattern, so costly that many cities and transit firms cannot extend lines into these areas. This means that the auto is the only form of transportation there. More energy is consumed for fuel, more air pollution is created by exhaust, and more time is spent in commuting and everyday activities. Hence, society pays again for the costs of decentralization.

We shouldn't overlook the costs of losing valuable agricultural land to urban development. Farmers cultivating the remaining checkerboard parcels have a hard time making ends meet. They are usually taxed at extremely high rates, since their land has high potential for development, and few can make a profit when taxes eat up all their resources. Often the only recourse is to sell out to subdividers. So the cycle of leapfrog development goes on.

But many cities are now taking strong measures to curb this kind of sprawling growth. Some cities, like San Jose, California, one of the most rapidly growing cities of the 1960s, try to focus new development on the empty parcels of the checkerboard pattern. This is called "in-filling." Instead of new growth extending the sprawling outer edge of the city, it will take place within the existing urban area, where services are already available and can be provided at lower costs.

Other cities are tying the number of building permits granted each year to the availability of urban services. If schools are already crowded, water supplies inadequate, and sewer plants overburdened, the number of new dwelling units approved for an area will reflect this lower carrying capacity (see box on Petaluma).

So, in summary, the costs of decentralization are many. Decayed central cities and overburdened suburbs are part of the toll. Higher energy consumption and increased air pollution are also products of our sprawling cities. Social costs, such as inner-city poverty and ghettoization, can also be attributed to urban decentralization.

CONTROLLING URBAN GROWTH: THE PETALUMA CASE

Do cities have the legal right to control their own growth by shutting the doors to newcomers? This becomes an increasingly complicated and controversial question as more and more cities plan ways to curb urban sprawl.

One of the best-known growth control plans was developed in Petaluma, California, a small town of 32,000 people lying about 40 miles north of San Francisco. Once a sleepy center for chicken ranches, Petaluma began sprawling beyond its Victorian downtown during the 1960s as subdividers carved out acres of housing tracts. But in the early 1970s, the city council took strong measures to limit growth. They adopted a plan whereby only 500 home-building permits would be awarded each year. This is roughly half the number granted during the boom years. Each permit would be granted only after careful evaluation of the proposed structure. Was it of

moderate cost? Did it have adverse effects on the environment? Was it in a school district that could absorb more children?

Resistance to the new growth limitation plan quickly solidified. Not only did the building industry object, but they were joined by civil rights groups who saw growth control laws as possible vehicles of discrimination. Civil libertarians have long viewed many types of suburban zoning as subtle means of keeping out low-income minority peoples. Laws such as large-lot minimums, strict architectural control, or bans against apartment houses generally act to push up housing prices, thereby closing the door on lower-income peoples. Civil rights groups saw the Petaluma plan as another threat to minority group mobility.

So the Petaluma plan was challenged in court as violating the constitutional "right to travel," a

legal right traceable to the Magna Carta. Building industries, labor unions, and civil rights groups pushed the challenge through the legal hierarchy. Petaluma—with financial support from other cities that were interested in their right to control growth—stood by its plan. Lower-court decisions were overruled by higher courts, so that at this writing the Petaluma plan stands as a legal means of controlling growth. Many other cities, seeing that unlimited growth can be an economic burden rather than an asset, have conceived ways of limiting growth and have taken legal impetus from the success of the Petaluma plan.

However, it can be expected that continued challenges of growth control plans will come from both *civil rights groups and the housing industry*. It will be years before the complicated legal issues of growth control are settled.

THE CULTURAL ECOLOGY OF THE CITY

Cities are affected by the physical environment and, equally, urbanization profoundly alters the effects of natural processes. The theme of cultural ecology is helpful in organizing information about these city-nature relationships.

The Urban Ecosystem

In the first chapter of this book, ecology is defined as the study of the relationship between an organism and its physical environment. To study this relationship, we examine both organism and environment as one unit through which the flow of energy or matter can be traced. This is called the *ecosystem*. We can apply this concept to the city in order to better understand the relationships between urban populations and the physical environment.

There are four important concepts related to the ecosystem approach: input, storage, output, and feedback. To illustrate, let us examine just one component of the urban ecosystem: water. Obviously, a city needs water to survive, so it imports a given amount each day, either from local sources—such as lakes and reservoirs, or from long distances via

canals and aqueducts. This is the *input* of the system. What happens to it as it moves through the city?

Water is used in households, industry, stores, and offices; using the terminology of the ecosystem, we say that it is transformed and leaves the system in other forms. These are the *outputs*. Some water is consumed by people; hence it temporarily becomes part of the body systems. Other water becomes part of different products, such as cheese or drinks, and, after transformation, may leave the city's system as goods are exported to other markets. Still other water is used for industrial cooling and, as it evaporates, returns to the atmospheric system as vapor. And a small amount of water is not used, but rather is stored within the system for future use, just the way organisms store energy. But most of the water—about 95 percent—is simply used to convey wastes from one point to another; from home to sewer plant, from factory to river, from sidewalk to gutter. This output is a most troublesome aspect of the urban system.

Feedback is a crucial part of any system. It is the repercussions on a system when an element is returned in modified or changed form by other components of the system. A simple example would be if a city used water from a lake both for its water supply and also as a dumping area for sewage. As more effluent is discharged into the lake, water quality decreases, and the city must expend more energy (measured both in money and activity) to protect its fresh-water supply.

A more complicated example—and in no way has this relationship been conclusively proven—is the way that city-produced air pollution may alter weather patterns so that a water supply system is strained, either by drought or by flooding. Further examples of the interconnectivity within the urban ecosystem will be apparent in the following discussion of the geologic, meteorologic, and hydrologic components of the urban environment.

The Urban Geologic Environment

In the previous chapter, under the discussion of site and situation, we saw that cities are both affected by—and affect—the physical environment. Let us explore further the relationships between urbanization and the geologic environment.

To begin with, topography can influence urban development in three ways: the direction of city growth, the routing of transportation, and the patterning of social areas. However, we must emphasize that these potential effects are dependent on a number of cultural variables. The most important variables concern a society's technological level, the amount of energy and capital available for modification of the geologic environment, and, lastly, the stage in a city's development. In other words, the geologic environment may have a great effect on those cities in early stages of growth, where there are alternatives to expending energy and money on modifying terrain, or where the technology is lacking for bulldozing, landfill, or high-stress building construction. Whereas at later stages of growth, in a rich, highly industrialized culture, there will be far more examples of humans modifying the geologic environment.

Let us look at the way terrain might influence early stages of city growth. Cities usually expand first on those areas where building costs are lowest. This means that flat, well-drained lands that are close to trans-

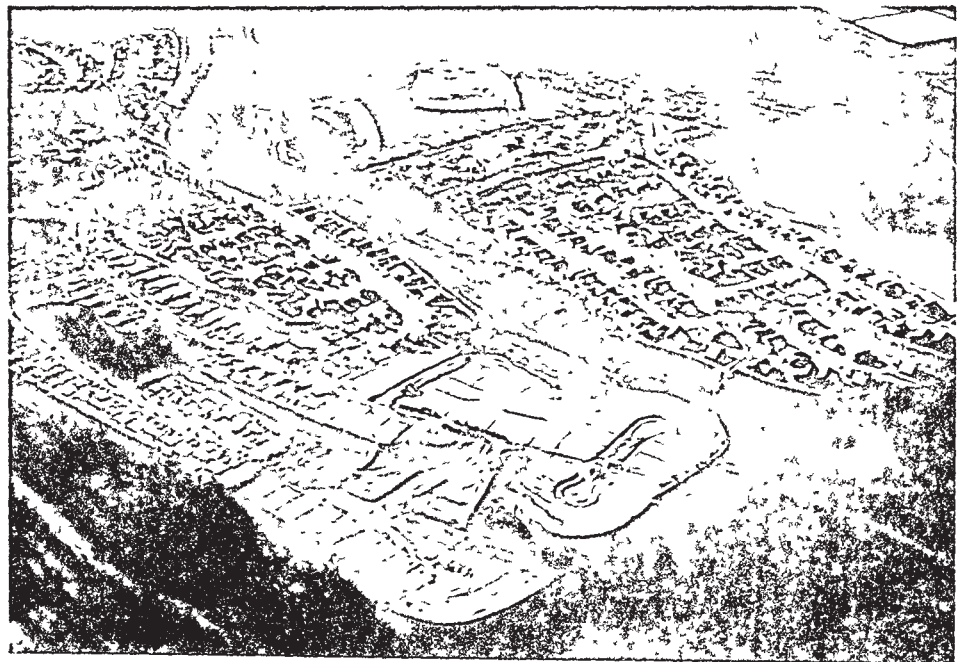
portation and adjacent to existing urban activities will be built upon first. These site characteristics are also attractive to other uses, such as agriculture, and the competition between farming and urban growth remains an important issue today (see the discussion in this chapter on "costs of decentralization"). But as topography varies, building costs increase. Areas of hills, marshes, and floodplains may be built upon only at later stages of a city's growth when there are fewer alternatives.

The increased costs of site preparation, such as grading hills or draining swamps, can have two very different consequences. On the one hand, the increased cost of building may be passed on to the consumer—meaning that those who buy the houses pay more, and the area will be occupied by higher-income groups. On the other hand, other aspects of construction may be cut in order to compensate for increased site preparation costs. Lots may be smaller, houses undersized, and shortcuts taken in construction methods so that the finished product is of lower quality. This means that lower-income groups will probably occupy the area.

Environmental feedback may also blemish an area. Former swamps or marshes may have flooding problems, hillsides may slide, or unstable foundations and flooded basements may lower market prices so that an area of former middle-price homes becomes accessible to lower-income people. Unfortunately, they are the ones least able to bear the costs of pumping out basements or reinforcing foundations. It seems unjust that they must bear the costs of poor environmental planning.

Lastly, transportation systems can be affected by terrain, and since there is a close link between transportation and urban development, the resulting urban pattern may express these relationships. The first urban transportation system was the horse-drawn streetcar, which was obviously restricted to level parts of the city, since horses could not pull car

When land values are high and pressure for housing intense, terrain rarely stands in the way of the sub-divider, as illustrated by this cut-and-fill in California



and passengers up or down hills. Slight gradients could be negotiated by smaller horse-drawn carriages; those who could afford such conveyances had access to hilltop building sites. But it was only with the cable car that hills became accessible to the middle class. Starting in San Francisco in 1873, cable cars came into widespread use in American cities. However, cable cars had problems in cold, wet climates because of freezing in the cable conduits, so a better solution to public transportation needs was sought.

Electric trolley systems profoundly altered the pattern of urban development beginning in the 1890s. But, like the horse-drawn carriage, they had limited hill-climbing abilities. Only slight gradients could be negotiated, so trolley lines ascended slopes only when it was possible to follow hillside contours. Often a network of steep stairways and paths connected neighborhoods with streetcar lines. In the end, it was only the automobile that led to widespread building on steep urban slopes. And even this form of development has been influenced by factors such as frequency of heavy snowfalls and ice storms.

The possibility of serious environmental feedback can influence urban patterns. In some parts of the world, the potential of damage from earthquakes is severe. The threat of destruction from earthquakes has always been great in California; however, if one examines the pattern of development, it is appalling to see how much construction has taken place in vulnerable areas. Filled lands, such as on bay margins, are areas where ground shaking will be worst, yet millions of people reside on these areas in California. Other construction has taken place directly on major faults where continual movement—known as creep—slowly rips buildings apart. Widespread development is found in floorplains immediately downstream from huge dams that could collapse from a major quake.

Only in the 1970s has California taken steps to prevent construction on the hundreds of active faults crisscrossing urban areas. When the inevitable major earthquake comes, the toll will be high.

Although California is notorious for its earthquake hazard, the possibility of major damage from a quake is not limited just to that area. Some of the strongest recorded earthquakes have been in the central and eastern portions of the United States. But few measures are being taken in those areas to protect urban dwellers from potential disaster, either by requiring adjustments to existing buildings or planning growth for areas less vulnerable to earthquake damage.

Urban Weather and Climate

Cities alter just about all aspects of local weather and climate. Temperatures are higher in cities, rainfall increases, as does fog and cloudiness, and atmospheric pollution is much higher near cities.

The cause behind these alterations is no mystery. Because cities pave over large areas of streets, buildings, parking lots, and rooftops, about 50 percent of the urban area is a hard surface. Rainfall is quickly carried into gutters and sewers, so that little standing water is available for evaporation. This means that temperatures will be higher, since heat is removed from the air during the normal evaporation process.

Furthermore, cities generate enormous amounts of heat. This comes not just from heating systems of buildings, but also from automobiles, industry, and even from human bodies. One study shows that on a winter day in Manhattan, the amount of heat produced in the city is $2\frac{1}{2}$ times that reaching the ground from the sun. (During the summer, solar heating is greater than human-produced heat.) The end result of this heat generation is to produce a large mass of warmer air sitting over the city. This is called the urban heat island. (See Figure 11-2)

As a result of the heat island, yearly temperatures will average 3.5 degrees F. warmer than in the countryside; they can easily be twice as much warmer during the winter, when city-produced heat is greatest.

There will also be significant temperature differences within the city. In winter, heavily traveled streets will be 2 or 3 degrees F. warmer than untraveled side streets; places where autos stand for a while, like stoplights, can be another 3 degrees F. warmer. Furthermore, low spots in the city, where cold air collects, will be much colder than higher places. And wooded areas are warmer than bare blocks.

During the summer, the city center is warmer than the suburbs. Often there can be a 10 degree F. difference between downtown and outlying residential areas, which is a result of suburban lawns and parks stabilizing temperatures by using up heat through evaporation and releasing heat at night faster than paved areas. Concrete areas tend to store heat longer at night, which leads to a build-up of temperatures over a series of warm days.

Precipitation (rain and snowfall) is also affected by urbanization. Because of higher temperatures within the urban area, snowfall will be about 5 percent less than in the surrounding countryside. However, rainfall can be 5 to 10 percent higher. This is a function of two factors: first, the large number of dust particles in urban air, and, second, the higher city temperatures. Dust particles are a necessary precondition for condensation, for they offer a focus around which moisture can adhere.

University Central Library, Jodhpur

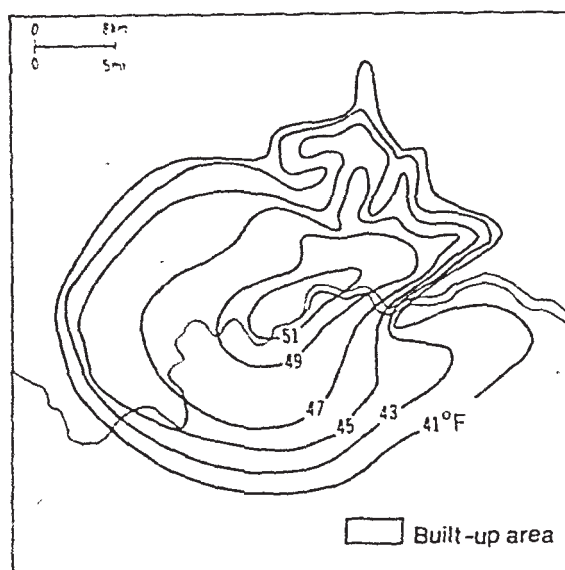


FIGURE 11-2

The London heat island forms a dome over the city. Notice the marked contrast in temperature between the built-up central part of the city and the surrounding "Green Belt." Where would a heat island center over your city? (After Chandler.)

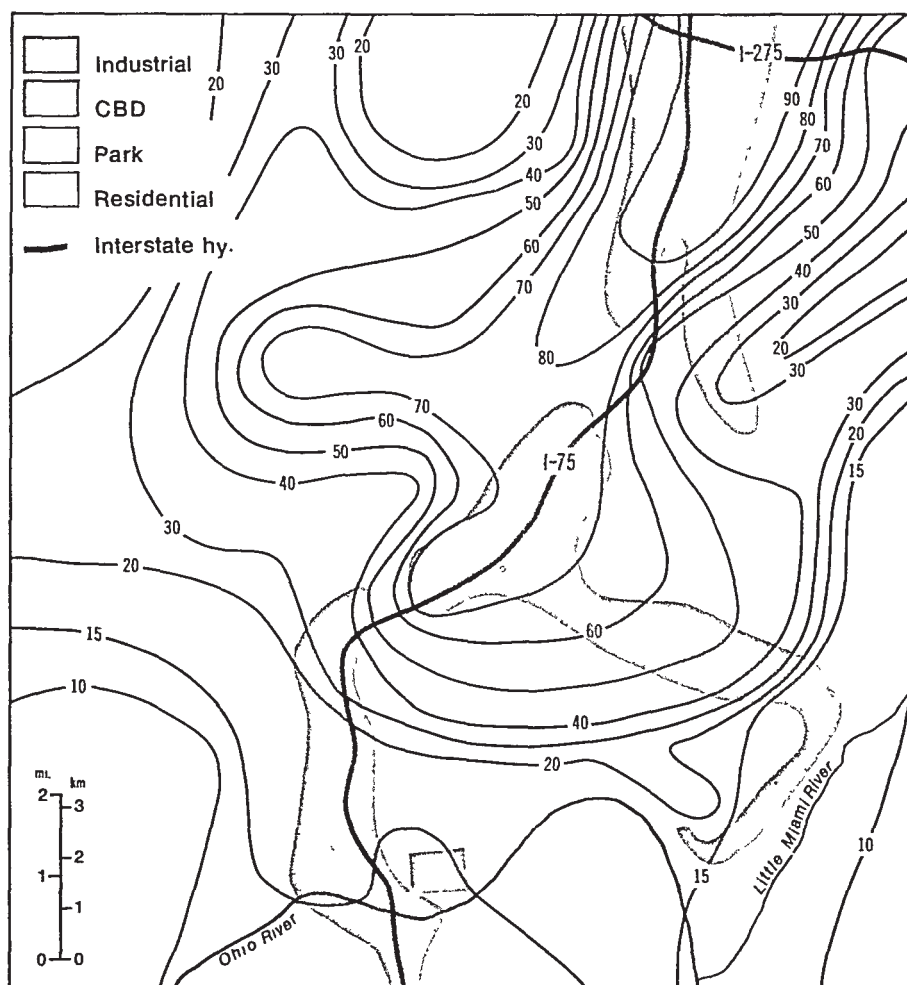
So where there is a greater number of dust particles, condensation will take place more easily. That is why fog and clouds are usually more frequent around cities. (See Figure 11-3)

And once condensation takes place, rainfall is not far behind. Rainfall increases on the order of 10 percent have been documented immediately downwind from cities. For example, thunderstorms in the London area produce 30 percent more rainfall than in the countryside. Some urban climatologists argue that they can see a weekday rainfall increase pattern: rainfall is less on weekends because dust particle generation—from autos and industry—is reduced.

City-generated air pollution is one of the most serious problems of our times. No longer is air pollution simply a nuisance. It can cause serious illness, at times death; it damages agriculture near cities; and it extracts a high cost from every urban dweller. Unless pollution can be halted, it may actually be the limiting factor on growth. Some suggest that fresh air—not water—will determine the ultimate carrying capacity of the Los Angeles basin (See box on Los Angeles air pollution). Federal and

FIGURE 11-3

The dust dome over Cincinnati, Ohio is shown here. Values show the concentration of particulate matter in the air at 3000 feet elevation, May 27, 1970. The higher the value, the greater the amount of particulate matter (After Bach and Hagedorn.)



CITIES, AUTOS, AND AIR POLLUTION: THE LESSONS OF LOS ANGELES

Air pollution affects virtually all of the world's cities. For simplicity, pollution-suffering urban centers can be broken down into two categories: "brown air" cities, which suffer from photochemical smog produced mostly by autos, and "grey air" cities, where industrial smog generated by coal and oil burning is the major pollution problem. Most of what we know about brown air cities comes from lessons learned in Los Angeles over the last 30 years.

Air pollution first became troublesome in the 1940s, when particulate matter increased to some 400 tons per day. This came mostly from outdoor burning and industrial smokestacks, so strict emission ordinances were passed in 1947. Although particulate fallout decreased, the city was still bothered by increasing amounts of yellow-brown haze. Its source remained a mystery until the early 1950s, when a professor at Cal Tech accidentally identified the Los Angeles smog as a complex mixture

of hydrocarbons. Southern California sunlight baked the original pollution until secondary pollutants, such as ozone, were produced; hence the name photochemical smog.

But the source of the hydrocarbons was not known. At first the city pointed the finger at the numerous oil refineries in the area and ordered them to control their emissions. But the smog still worsened. Only in 1953 was the auto identified as the major producer of hydrocarbons in the United States.

Los Angeles turned to the auto industry, which agreed to study the problem, but its research was given a low priority in Detroit. Only after constant prodding by Los Angeles did the industry respond. Eight years later, the first simple crankcase emission control devices appeared on California cars. These eliminated about 20 percent of the hydrocarbons discharged by an auto, and only after more elaborate devices were required in 1966 did

total hydrocarbon emissions in the Los Angeles airshed begin decreasing.

Unfortunately, another problem arose. Although hydrocarbons decreased, nitrogen oxides increased. This resulted from higher temperatures inside high-compression engines triggering a reaction that ended in the discharge of harmful nitrogen. One pollution problem had been replaced by another. The solution to the nitrogen oxide problem may come with lead-free gasoline and catalytic converters. However, since only newer cars will carry these devices, the millions of older cars will continue to discharge nitrogen dioxide. Furthermore, experts predict that emissions can be cut 50 to 75 percent in the next 10 to 15 years, but that the auto population will increase 100 percent, thereby putting us back at square one. The only successful solution lies with decreased usage of autos and an alternative to the internal-combustion engine.

local air quality agencies are experimenting with regulations limiting further growth and development in those areas suffering from persistent air pollution.

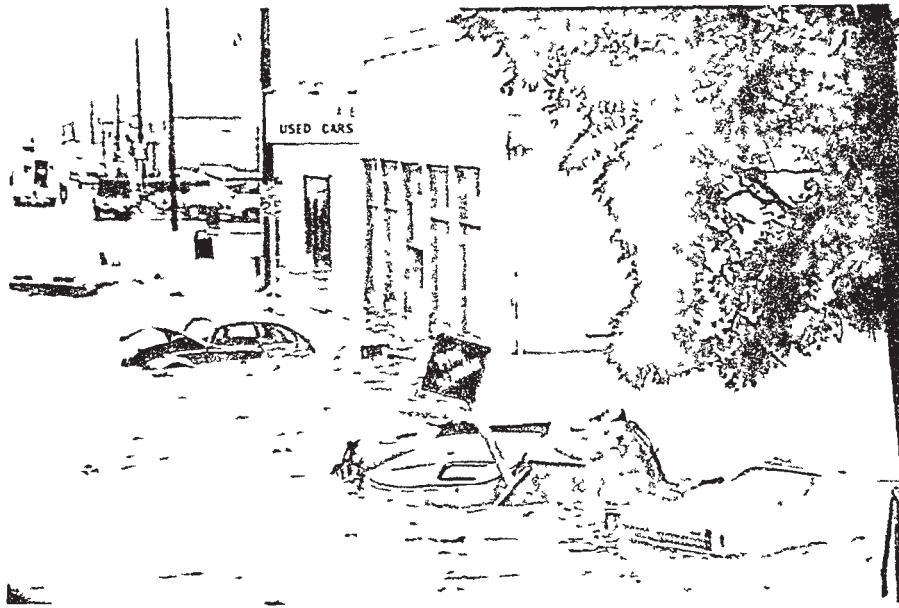
Much has been written about air pollution, and we refer readers to references listed at the end of this chapter for additional material.

Urban Hydrology

The city is not only a great consumer of water, but it also alters runoff patterns in a way that increases the frequency and magnitude of flooding. We will first discuss urban water demands, then the problems of urban flooding.

Within the city, residential areas are usually the greatest consumers of water. This could vary depending on the kind of industry found in a city, but as a general statement, we see each person using about 60 gallons per day in a residence. This contrasts with commercial areas, where there is only a 26 gallon per day use rate per person.

Of course, residential demand varies. It is higher in drier climates than where rainfall is adequate for garden water; it is greater where lots



Often urbanization disturbs the natural hydrology so that both frequency and magnitude of flooding are increased. This flood resulted from an afternoon thunder shower in Virginia.

are larger, and it is also higher in middle and high income neighborhoods than in lower-income areas. Higher income groups usually have a larger number of water using appliances, such as washing machines, dishwashers, and swimming pools.

However, price influences water demand. People use less water when price increases. Recent periods of drought in the West demonstrate that residents can both use considerably less water and find alternatives to fresh water consumption. Many of the rationing plans adopted during the recent California drought restricted per capita daily use to around 40 gallons. Toilets (which use about seven gallons per flush) were flushed less, showers were shortened, and household "grey water" was used for gardens.

This isn't to suggest that only Western cities are vulnerable to drought. The eastern United States experienced severe water shortages in the mid-1960s, and England suffered from a two year drought in the mid 1970s. In both cases, city dwellers were forced to ration water.

As meteorologists forecast increased climatic variability, meaning that more frequent droughts are a distinct possibility, cities must prepare for more efficient water usage. Some politicians and planners argue that storage capacity must be increased through building more dams and reservoirs. Others see this as a faulty strategy, for these increased water supplies might trigger rapid growth that will put the city in an even more vulnerable position during inevitable periods of drought. More water leads to more people, more people consume more water, and reduced rainfall means that more people will suffer from less water. The best strategy will combine development of ample storage and delivery systems with reduced residential and commercial consumption.

Let us turn now to the problem of urban floods. It was noted earlier that urbanization seems to increase both the frequency and the magni-

tude of flooding. Why might this be? Cities create large impervious areas where water cannot soak into the earth. Instead, precipitation is converted into immediate runoff. It is forced into gutters, sewers, and stream channels that have been straightened and bared of vegetation, resulting in more frequent high-water levels than are found in a comparable area of rural land. Furthermore, the time period between rainfall and peak runoff is reduced in cities, there is less lag than in the countryside, where water runs across soil and vegetation into stream channels and then into rivers. So, because of hard surfaces and artificial collection channels, runoff is concentrated and immediate.

Several studies show that flooding becomes five or six times more frequent in an urbanized watershed, and because pressures on land from city growth often lead to the development of floodplains, the scenario is set for disaster. Floodplains are, by definition, areas subject to natural flooding, so it should come as no surprise that rivers reclaim their full channels every now and then. And when urbanization increases the frequency of flooding, building on floodplains becomes increasingly hazardous.

So, in conclusion, we can see that the urban ecosystem is sensitive to any kind of alterations. Disruptions such as landslides, flooding, air pollution, temperature increases, and earthquakes are events that we must expect as cities expand. We must develop skills and understanding that will lead to sensitive environmental planning—that is, planning capable of predicting disruptions in natural systems resulting from urban growth, and capable of promoting city expansion in ways that will make the least impact on the physical environment.

CULTURAL INTEGRATION AND MODELS OF THE CITY

In our look at centralizing and decentralizing forces, we saw that many factors influence the location of an activity within a city. A logical follow-up question is: Does a predictable land-use pattern result from the interplay of these factors? One method of seeking an answer is to create models that describe and simplify the relationships among the different social, economic, and geographic factors. Various academic disciplines have long sought to isolate the most important processes at work in a city. The goal is to derive a model that describes the pattern of a city and explains how it evolved. Following a discussion of urban processes, the three most widely used models are described below.

There are a number of processes at work in a city, leading to different social and economic patterns. Seven are briefly discussed here. The first is *concentration*, which refers to the differential distribution of population and economic activities in a city and the manner in which they have focused on the center of the city. A related process, already described in this chapter, is *centralization*. This refers not only to the focusing of activity in the central city, but also to its clustering around important activity points, such as transportation routes, factories, or major stores. *Decentralization* was defined earlier in the chapter; it refers to the location of activity away from the central city. *Segregation* is the sorting out of population groups due to conscious preferences for associating with one group or another through bias and prejudice. A

somewhat similar process operates amongst economic activities, we call this *specialization*. The process through which a new activity or social group enters an area has traditionally been called *invasion*. And if that new use or social group gradually replaces the former occupants, this illustrates the process of *succession*. Both of these terms have been adopted from plant ecology and were originally used to describe changes in vegetation.

With these seven processes in mind, let us examine how they might influence urban patterns. We shall do so by looking at three models of city structure.

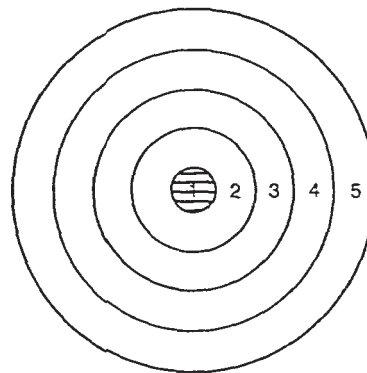
Concentric Zone Model

The *concentric zone model* was developed in 1925 by Ernest W. Burgess, a sociologist at the University of Chicago. Although his model closely resembles Chicago (if the east side were not cut off by Lake Michigan), his intent was simply to construct a theoretical model of urban growth.

Figure 11-4 shows the concentric zone model with its five zones. At first glance, you can see the effects of residential decentralization. There is a distinct pattern of income levels from the CBD (central business district) out to the commuter's zone. This shows that, even at the beginning of the auto age, American cities expressed a clear separation of social groups. The extension of trolley lines into the surrounding countryside had a lot to do with this pattern.

FIGURE 11-4

The concentric zone model is shown in this diagram. Each zone represents a different type of land use in the city. Can you identify examples of each zone in your community?



- 1 CBD (central business district)
- 2 Transition zone
- 3 Blue-collar residential
- 4 Middle-income residential
- 5 Commuter residential

Zone 2, a transitional area between the CBD and residential Zone 3, was characterized by a mixed pattern of commercial and residential land use. Rooming houses, small apartments, and tenements attracted the lowest income segment of the urban population. Often this zone included slums and skid rows. Here also many ethnic ghettos began. Landowners, while waiting for the CBD to reach their land, erected shoddy tenements to house a massive influx of foreign workers. An aura of uncertainty was characteristic of life in Zone 2, because commercial activities rapidly displaced residents as the CBD expanded.

Zone 3, the "workingmen's quarters," was a solid blue-collar arc, located close to the factories of Zones 1 and 2. Yet Zone 3 was more stable than the zone of transition around the CBD. It was often characterized by



The transitional zone in the city contains vacant and deteriorated buildings. Broken windows and boarded storefronts are part of the landscape. Where is the transitional zone in your city?

FIGURE 11-5

Residential areas of Chicago in 1920 were used as the basis for many studies and models of the city (After Hoyt)

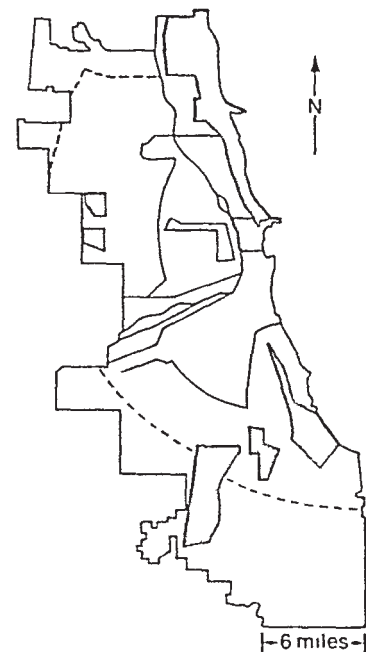
ethnic neighborhoods blocks of immigrants who had broken free from the ghettos in Zone 2 and moved outward into flats or single-family dwellings. Burgess suggested that this working-class area, like the CBD, was spreading outward, because of pressure from the zone of transition and because blue-collar workers demanded better housing.

Zone 4 was a middle-class area of "better housing." From here, established city dwellers, many of whom moved out of the central city with the first streetcar network, commuted to work in the CBD.

Zone 5, the commuter's zone, consisted of higher-income families clustered together in older suburbs, either on the farthest extension of the trolley or on commuter railroad lines. This zone of spacious lots and large houses was the growing edge of the city. From here, the rich pressed outward to avoid the increasing congestion and social heterogeneity brought to their area by an expansion of Zone 4.

Burgess's concentric zone theory represented the American city in a new stage of development. Before the 1870s, an American metropolis, such as New York, was a city of mixed neighborhoods where merchants' stores and sweatshop factories were intermingled with mansions and hovels. Rich and poor, immigrant and native born rubbed shoulders in the same neighborhoods. However, in Chicago, Burgess's hometown, something new occurred. In 1871, the great Chicago Fire burned out the core of the city, leveling almost one-third of its buildings. The city was then rebuilt on a new concentric pattern that segregated classes. This segregated city started with a "core of poverty" and worked its way out in what one scholar has called "rings of rising affluence."

However, as you can see from Figure 11-5, the actual residential map of Chicago does not exactly match the simplicity of Burgess's con-



- CBD (central business district)
- Low-income residential
- Middle-income residential
- High-income residential

centric zones. For instance, it is evident that the wealthy continue to monopolize certain high-value sites within the other rings, especially Chicago's "Gold Coast" along Lake Michigan. According to the concentric zone theory, this area should have been part of the zone of transition. Burgess accounted for certain of these exceptions by noting how the rich tended to monopolize hills, lakes, and shorelines, whether they were close to or far from the CBD. Critics of Burgess's model also were quick to point out that, even though portions of each zone did exist in most cities, rarely were they linked in such a way as to totally surround the city. Burgess countered that there were distinct barriers, such as old industrial centers, that prevented the completion of the arc. Still other critics felt that Burgess, as a sociologist, overemphasized residential patterns and did not give proper credit to other land uses—such as industry, manufacturing, and warehouses—in describing the urban mosaic.

Despite these criticisms, concentric zone theory was fairly accurate in describing the cities of 1925. In fact, many of the zones can still be seen in contemporary cities, particularly the zone of transition around the central business district. It is still a jumbled mixture of land uses, neither totally residential nor totally commercial. Usually it is still the area of skid rows and slums. It is easily recognized by its pawnshops, rescue missions, large parking lots, rooming houses, transient hotels, old factories, and—since the 1950s—massive urban renewal projects, which seek to "upgrade" the land by replacing older residential buildings with convention centers, offices, and parking garages. Because these projects usually displace the transient population, they in effect expand the zone of transition. Skid rows are like bumps under the carpet: They can be moved by sweeping the surface, but they never completely disappear.

Sector Model

Homer Hoyt, an economist who studied housing data for 142 American cities, presented his *sector model* of urban land use in 1939. He maintained that high-rent residential districts ("rent" meaning capital outlay for the occupancy of space, including purchase, lease, or "rent" in the popular sense) were instrumental in shaping the land-use structure of the city. Because these areas were reinforced by transportation routes, the pattern of their development was one of sectors or wedges (see Figure 11-6) rather than concentric zones.

Hoyt suggested that the high-rent sector would expand according to several factors. First, a high-rent sector moves from its point of origin near the CBD, along established routes of travel, toward another nucleus of high-rent buildings; that is, a high-rent area directly next to the CBD will naturally head in the direction of a high-rent suburb, eventually linking the two in a wedge-shaped sector. Second, a high-rent sector will progress toward high ground or along waterfronts, when these areas are not used for industry. The rich have always preferred such environments for their residences. Third, a high-rent sector will move along the route of fastest transportation. Fourth, a high-rent sector will move toward open space. A high-income community rarely moves into an occupied lower-income neighborhood. Instead, the wealthy prefer to build new structures on vacant land where they can control the social environment.

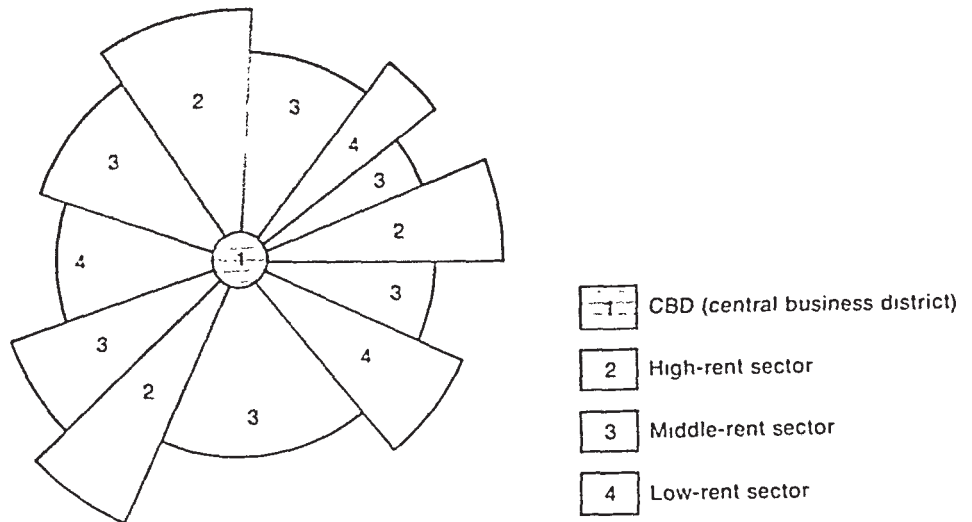


FIGURE 11-6

Another model of urban land use is the sector model. In this model zones are pie-shaped wedges radiating along main transportation routes.

As high-rent sectors develop, the areas between them are filled in. Middle-rent areas move directly next to them, drawing on their prestige. Low-rent areas fill in the remaining areas. Thus, moving away from major routes of travel, rents go from high to low.

There are distinct patterns in today's cities that echo Hoyt's model. He had the advantage over Burgess in that he wrote later in the automobile age and could see the tremendous impact that major thoroughfares were having on cities. However, when we look at today's major transportation arteries—which are generally freeways—we see that the areas surrounding them are often low-rent districts. According to Hoyt's theory, they should be high-rent districts. Freeways are rather recent additions to the city, coming only after World War II. In a sense, they were imposed on an existing urban pattern. To minimize the costs of construction, they were built as often as possible through low-rent areas, where the costs of land purchase for the rights of way were less. This is why so many freeways rip through ethnic ghettos and low-income areas. Economically speaking, this is the least expensive route. This will continue to be the case until low-income neighborhoods organize effective political resistance against such disturbances.

Multiple Nuclei Model

Both Burgess and Hoyt assumed that a strong central city affected patterns throughout the urban area. However, as the city increasingly decentralized, districts developed that were not directly linked to the CBD. In 1945, two geographers, Chauncey Harris and Edward Ullman, suggested a new model, the *multiple nuclei model*. They maintained that a city developed with equal intensity around various points, or "multiple nuclei" (see Figure 11-7). In their eyes, the CBD was not the sole generator of change. Equal weight must be given to an old community on the city outskirts around which new suburban developments clustered, to an

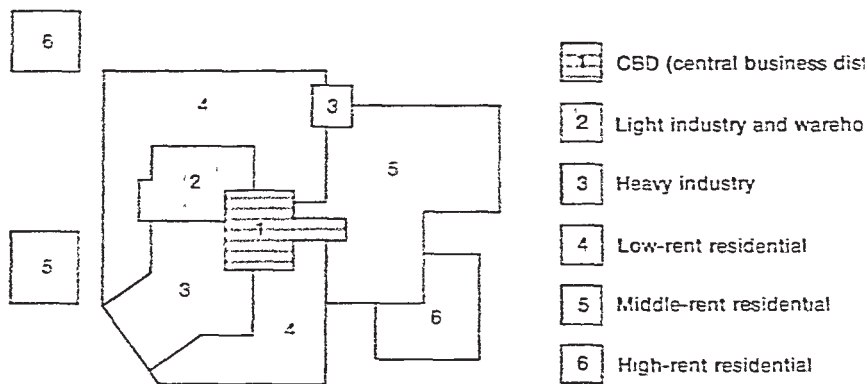


FIGURE 11-7

The multiple nuclei model is shown in this diagram. This model was devised to show that the CBD is not the sole force in creating land-use patterns within the city. Rather, land-use districts may evolve for specific reasons at specific points elsewhere in the city, hence the name multiple nuclei.

industrial district that grew from an original waterfront location, or to a low-income area that developed because of some social stigma attached to the site. In other words, the city grew from a number of unrelated points, not from a single center.

Harris and Ullman rooted their model in four geographic principles. First of all, certain activities require highly specialized facilities, such as accessible transportation for a factory or large areas of open land for a housing tract. The second principle is that certain activities cluster together because they profit from mutual association. One such cluster would be banks, used-car lots, and jewelry stores. Third, certain activities repel each other and will not be found in the same area. Examples would be high-rent residences and industrial areas, or slums and expensive retail stores. Fourth, certain activities could not make a profit if they paid the high rent of the most desirable locations. Therefore, they seek lower-rent areas. For example, new-car dealers may like to locate where pedestrian traffic is greatest in order to lure the most people into their showrooms. However, they need great amounts of space for showrooms, storage, service facilities, and used-car lots. Therefore, they cannot afford the high rents that the most accessible locations demand. They compromise by finding an area of lower rent that is still relatively accessible.

The multiple nuclei model, more than the other models, seems to take into account the varied factors of decentralization in the structure of the North American city. The concentric zone theory and the sector theory are rather deterministic. They emphasize one single factor (residential differentiation in the concentric zone theory or rent in the sector theory) to explain the city. But the multiple nuclei theory encompasses the whole spectrum of economic and social possibilities. Harris and Ullman could probably appreciate the variety of forces working on the city because they did not confine themselves to seeking one strict explanation. As geographers, they tried to integrate the disparate elements of culture into a workable model.

URBAN LANDSCAPES

Urban areas, like all places occupied by humans, have cultural landscapes. Indeed, the human-made landscape is nowhere more evident and overpowering than in the city. Here nature is quite subdued, and

humans rule the landscape totally. These urban landscapes, or townscapes, differ greatly both within cities and from one urban culture to another

Street Plan

One major facet of any townscape is the street plan, or layout of routeways. Americans are perhaps so accustomed to the grid pattern, or "checkerboard" layout, of streets that they often assume that this form is dominant everywhere in the world. The American love affair with the grid pattern led to its application even in areas of rough terrain, such as San Francisco. The grid pattern for streets apparently originated several thousands of years before the Christian era in the prehistoric Indus Valley. Then it spread slowly westward through the Middle East, Greece, and the Roman Empire. Much later, this plan was revived in Central and Western Europe and diffused to the Americas.

By contrast, most European, Asian, and African cities have very irregular street plans. Streets meet at odd angles with no apparent planning, and square or rectangular blocks are rare. Thoroughfares are uncommon, and the flow of traffic is seriously hampered. Many cities of southwestern Asia are dominated by a mazelike pattern of narrow dead-end streets and walkways. To persons accustomed to grid-pattern towns, such irregular layouts can be frustrating.

Types of Structures

Cities also differ greatly in the types of buildings they contain. The American city typically is dominated by skyscrapers, single-family residences surrounded by private yards, and glass and plastic shopping centers amid seas of asphalt. Most buildings are new. In Europe, however, skyscrapers are rather uncommon, and the skyline is dominated by church spires. The large majority of people live in multistory apartments, and stores are not concentrated in shopping centers. The line between residential area and shopping district is blurred, because many proprietors live above their shops. Typically, the European city boasts structures of considerable age—perhaps the remnants of a town wall, an old cathedral, a medieval town hall, or an ancient fortress.

Perception of the Urban Landscape

A city consists of physical objects, such as streets, buildings, parks and fountains. We call these objects, which exist in space, the landscape. But there is also a psychological city in each person's mind. On the basis of this city of the mind, we find our way around the "real" city, make decisions about where to live or shop, and decide whether to approve or oppose changes in the city.

Our urban images result from a process of selection called "perception." As you probably know, living itself is a process of selection. We do not see all that we "see"; that is, our brains do not choose to take in all the information that lands on the retinas of our eyes. The same can be said for the other senses. We do not hear all that we hear, nor feel all that we touch, nor smell all that we smell.

If we were not selective, our brains would be overwhelmed by useless information. A hungry person driving down a street will quickly note the hamburger stand on the far corner but will probably not take in the row of old brownstone houses or the gas station or the variety store, even though all of them are closer than the hamburger stand. In other words, what we choose to perceive is a function of our purpose. We take in only bits of information from the overwhelming range of possibilities.

THE HANDWRITING ON THE WALL

Graffiti have always been part of the urban landscape, from ancient Rome to modern-day New York, from the bathroom wall to war-torn Belfast. Furthermore, due mostly to the aerosol spray can and the felt-tip pen, wall-writing is on the increase, adding still another financial burden to city budgets. New York City spent \$1.5 million in 1972 to erase graffiti while the Philadelphia Transit Authority spends over \$1 million each year to repaint its rolling stock and cover the markings of the graffiti artists.

Why do people do it? Some are frustrated individuals seeking to make their mark on an alienating society. The more brazen the mark the greater the status. In Philadelphia, the master graffitist is "Cornbread," whose spray-can markings cover the city, even to the point of welcoming new arrivals to the airport and reportedly defacing a TWA jet with "Cornbread" just as it left the terminal.

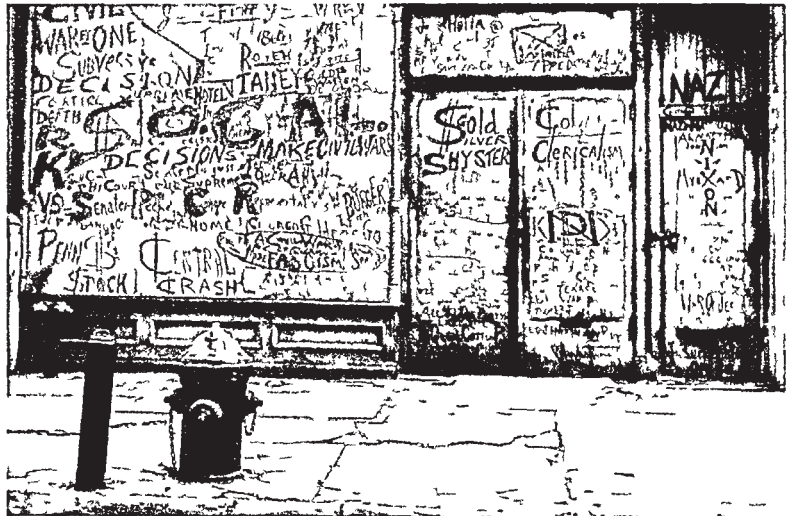
Political upheaval has always nurtured graffiti. The walls of Berkeley are mute indicators of the turbulent decade from the Free Speech Movement of 1964 to anti-war protests into the 1970s. Walls became people's bulletin boards as messages were passed about protests, meetings, and boycotts. Written graffiti gave rise to posters which can be mass-produced, yet have the same essential purpose as wall markings.

Probably the category of graffiti that most interests the geographer is that which speaks to territorial

claims or the definition and protection of "turf." Street gangs in New York and Philadelphia have long used graffiti to delimit their territory, posting warnings at the borders against incursion by outsiders or using wall space deep within their territory to list members or spread the gang's reputation. Ethnic neighborhoods are commonly defended through graffiti, as in Belfast, where Catholics and Protestants are involved in a bloody civil rights struggle. Protestant neighborhoods are easily detected by their pro-British, anti-Catholic graffiti, whereas the Catholic neighborhoods are bounded with anti-Protestant and anti-British slogans. Residents have no difficulty telling one group's territory from another, therefore they know which is safe and which hostile.

Similar use of graffiti is seen in cities where neighborhoods are experiencing change, such as when blacks are moving in. Often walls will be covered with racist markings, open threats, and slogans of ethnic pride. The recent court-ordered busing of blacks into the Irish area of South Boston gave rise to an explosion of pro-Irish, anti-black graffiti.

As crude and offensive as such wall messages may be, they are nevertheless an expression of neighborhood defense and the protection of territory. Perhaps because such graffiti flourish when groups are in conflict and probably recognize the inevitable loss of territory, the expression "the handwriting is on the wall" has become a common part of our vocabulary.



in the "real world" and interpret them on the basis of our past experiences, our values, and our desires. In other words, we base our decisions to a large extent on images created by our brain.

Differing Images of the City. As an example of how individually each of us perceives the city, imagine a couple who are visiting San Francisco for the first time. On a stroll, with no other purpose than to "see" the city, they approach Union Square. The plaza is surrounded by large downtown hotels and department stores; the sidewalks are crowded with pedestrians; the streets are jammed with cable cars, buses, and cars. In the square itself, benches are filled with office workers taking in the noon sun. Street musicians beat on bongo drums, and a few derelicts move among the crowd asking for spare change.

Our two tourists form completely different images of this scene on the basis of their different experiences and value systems. The woman, who was raised in New York City, enjoys the scene tremendously. She associates busy street life with pleasant memories of her youth. The crowd is friendly, the sun is enjoyable, and the music is strangely stimulating. She wants to stay. But her companion, raised in a small Montana town, does not like cities. In fact, the derelicts remind him of the time in Chicago when a drunk pursued him for blocks insisting that he hand over his spare change. He has never quite forgotten the embarrassment and anxiety of that moment. The office workers sitting on the benches remind him of his job at home and all the work that awaits his return. The traffic is noisy, the bongo drummers are irritating, and the derelicts are somehow threatening. Different perceptions result in different decisions. He wants to leave. She insists on staying.

This probably happens hundreds of times every day. In a city of a million inhabitants, there are a million different images. But people with similar experiences, similar values, and similar desires are likely to share images—that is, there will be great areas of overlap between the mental cities each of them carries.

However, one group's images may be drastically different from another group's images. Black teenagers in New York City will undoubtedly hold mental images of that city quite different from those of a group of Wall Street stockbrokers. For one thing, the way they travel around the city is likely to be different. Thus they will be exposed to a different set of visual clues. The teenagers, traveling mostly by subway, may well have a far-reaching "underground" map of New York but aboveground know little beyond their own ghetto area. The brokers, traveling in their own cars or perhaps by taxi, make their way around the surface of the city with ease, yet have to ask directions as soon as they step through a subway turnstile. For each of these groups, the other's "turf" is probably unfamiliar territory. To the broker, Harlem is a virtual blank on the map; and to the black teenager, the fashionable areas of the city are places of danger where he or she may be considered with suspicion or stopped by a police officer. In short, the experiences and values of the stockbrokers and black teenagers are so different that the same visual clues will be interpreted in completely different ways.

Measuring Perceptions of the City. During the last twenty years, social scientists have been concerned with measuring people's perceptions of the urban landscape. They assume that if we really know what

people see and react to in the city, we can ask architects and urban planners to design and create a more humane urban environment, one that we would respond to in a positive manner.

Kevin Lynch, an urban designer, pioneered a method for recording people's images of the city. He assumed that all people have a mental map. After all, they must find their way about their cities in the course of daily life. Lynch then figured out ways that people could convey their mental maps to others. With this information, he could discover which parts of the urban landscape are being used as visual clues by which people. What do people react favorably to or negatively to? What do they block out?

On the basis of interviews conducted in Boston, Jersey City, and Los Angeles, Lynch (1960) suggested five important elements in mental maps of cities: (1) *Pathways* are the routes of frequent travel, such as streets,

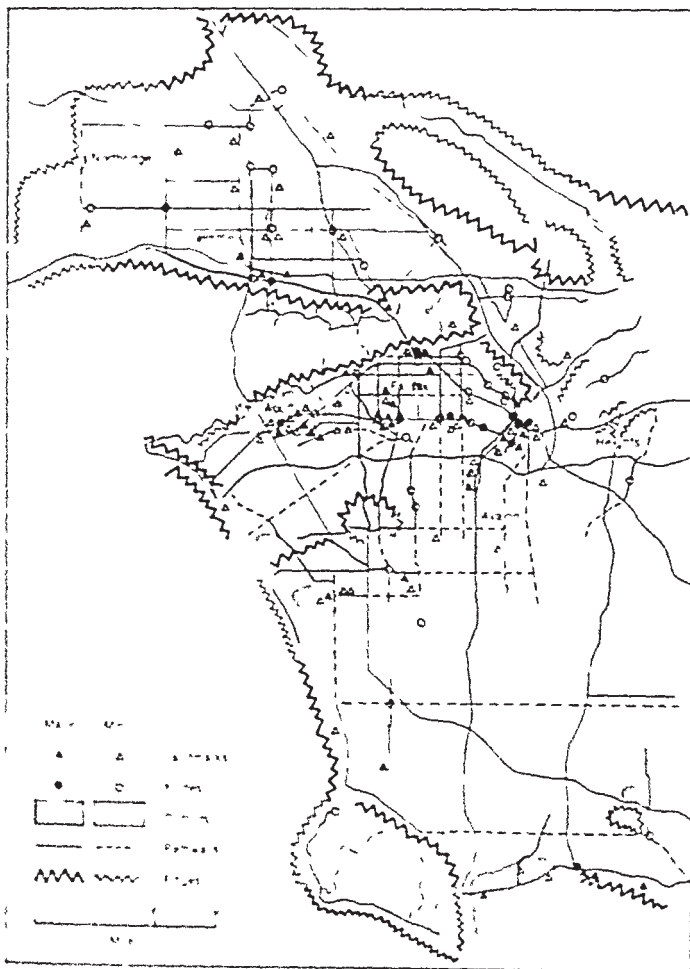
FIGURE 11-8

Compare the map of physical form and land use in Los Angeles to the image of the city. The image is a map compiled from many mental maps described by residents. Note the differences between the two maps. How do you think this exercise would turn out in your city?



freeways, and transit corridors. We experience the city from the pathways. Therefore, they become the threads that hold our maps together. (2) *Edges* are boundaries between areas, or the outer limits of our image. Mountains, rivers, shorelines, and even major streets and freeways are commonly used as edges. They tend to define the extremes of our urban vision, then we fill in the details. (3) *Nodes* are strategic junction points, such as breaks in transportation, traffic circles, or any place where important pathways come together. (4) *Districts* are small areas with a common identity, such as ethnic areas and functional zones (for instance, the CBD or a row of car dealers). (5) *Landmarks* are reference points that stand out because of shape, height, color, or historic importance. The city hall in Los Angeles, the Washington Monument in Washington, D C , or the golden arches of a McDonald's hamburger stand are all landmarks.

1. *Map of Central American Countries*



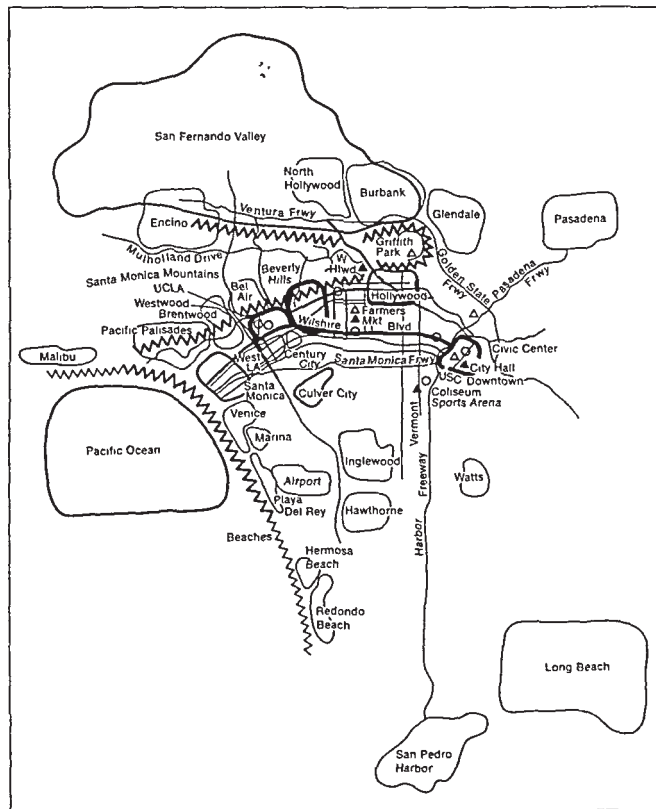
Using these concepts, Lynch saw that some parts of the cities were more legible than others. Overall, Lynch discovered, legibility comes when the urban landscape offers clear pathways, nodes, districts, edges, and landmarks. The less legible parts of the city do not offer such a precise landscape. Thus it is more difficult for a person to form a mental map of that area. And further, some cities—such as Boston—are more legible than other cities. For example, Lynch found that Jersey City is a city of low legibility. Wedged between New York City and Newark, Jersey City is fragmented by railroads and highways. Residents' mental maps of Jersey City have large blank areas in them. When questioned, they can think of few local landmarks. Instead, they tend to point to the New York City skyline just across the river.

FIGURE 11-9

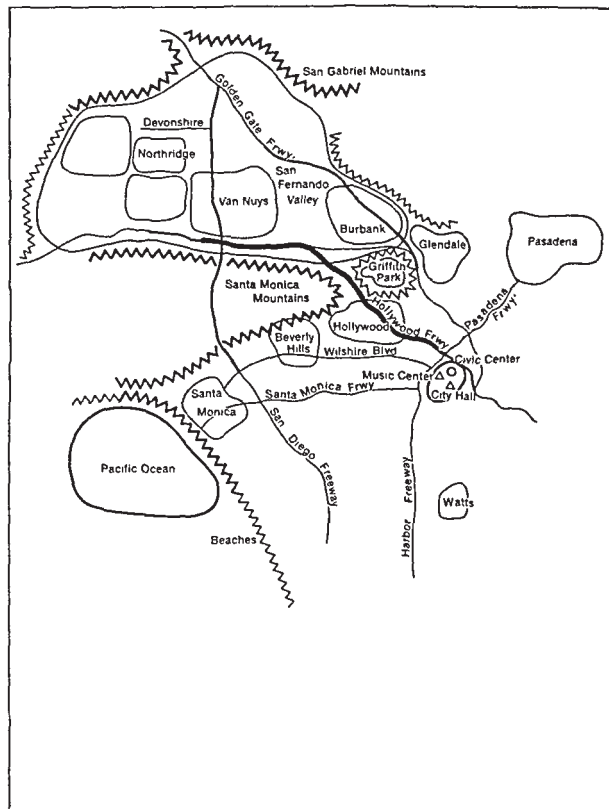
Compare these four mental maps of Los Angeles. Those for Westwood and Northridge illustrate the comprehensive mental images carried by upper middle-income people who have high mobility and move freely around the urban region. In contrast, the mental maps for two low-income groups, Avalon and Boyle Heights, show less knowledge of the city, which is a function of limited mobility. What causes a group to have reduced mobility? Both are minority areas. (From: *The Visual Environment of Los Angeles* (Los Angeles Dept. of City Planning, 1971.)

In 1970, the planning department of the City of Los Angeles undertook a comprehensive study to see what images different residents held of Los Angeles. Figure 11-8 shows the composite mental map of hundreds of residents. Note the important role of the mountains as visual edges. When visible, they set limits to the image of the Los Angeles basin. However, the mountains often are hidden by smog, which deprives Angelenos of an important point of reference.

In Los Angeles, freeways obviously serve as the major pathways. Note that, in areas without freeways, there are large voids in the mental



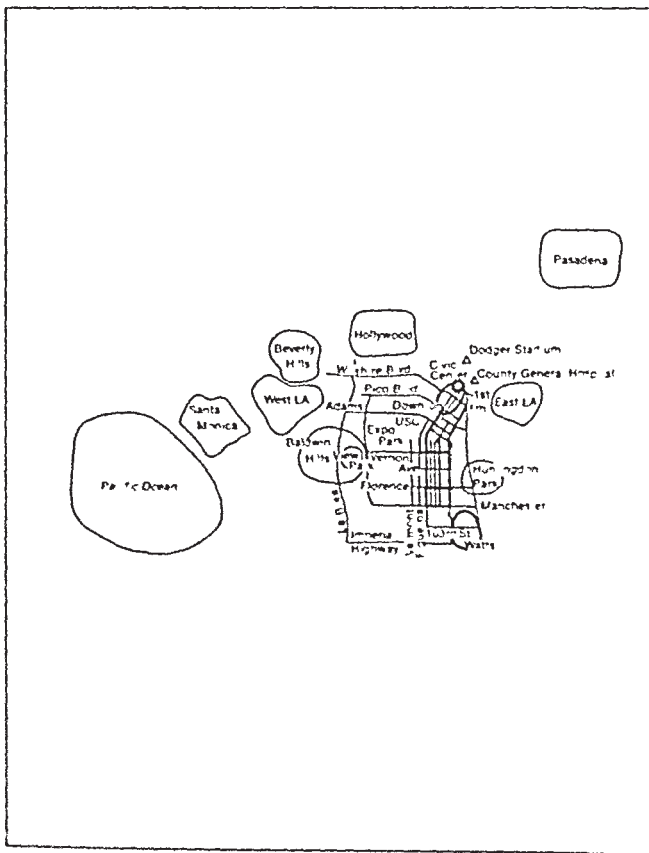
(a) Westwood



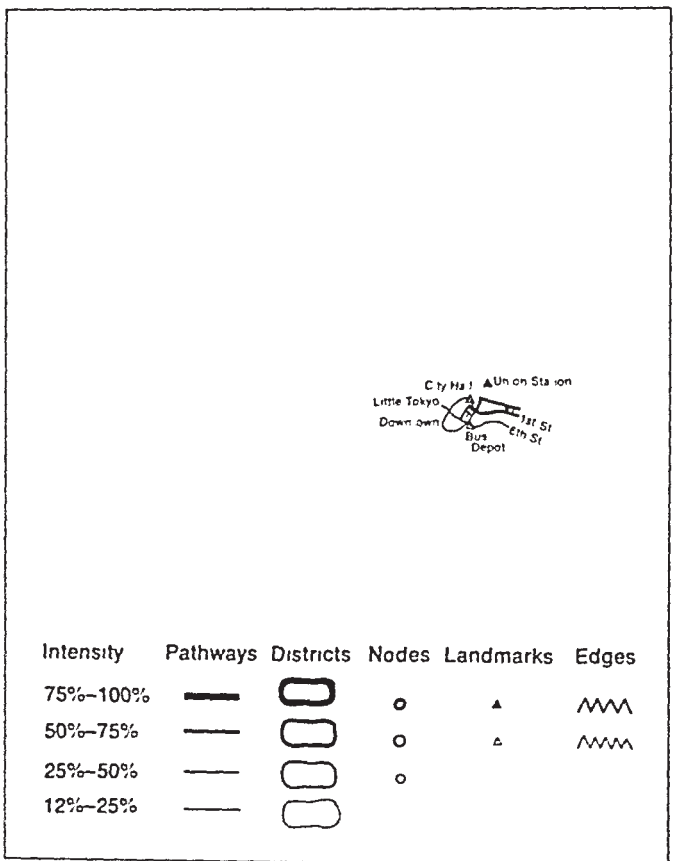
(b) Northridge

maps. This demonstrates the important role that pathways play in our image of a place. Some people seem to know how to get to a certain point only by the freeway, even though it may be faster and shorter to cut across town. However, rarely is a person's mental map changed with updated information.

Figure 11-9 illustrates how different social groups have vastly different images of the same city. Residents of the upper-income communities of Westwood and Northridge are highly mobile, traveling throughout Los Angeles for work, recreation, and services. As a result, their mental maps are rather comprehensive. In contrast, Avalon and Boyle Heights are low-income communities where social discrimination and economic hardship inhibit physical mobility. Boyle Heights is largely Mexican-American, so a language barrier further aggravates the situation. As you can see, the mental maps held by residents of these two communities are far less comprehensive than the images held by Westwood and Northridge residents. It is important to recognize that a limited mental map reinforces social isolation, which in turn furthers the plight of these communities. People rarely venture into unfamiliar areas, thus they miss potential job opportunities or other activities that might better their situation. Therefore, the mental map is both a product of isolation and a cause of it. People rarely have images of places where they haven't been,



(c) Avalon



(d) Boyle Heights

and they don't go into areas where they lack psychological reference points in the form of an urban image.

Other studies of urban perceptions focus on other topics. Researchers investigate the boundaries of neighborhoods, knowledge of shopping facilities, attitudes toward the downtown area, and the way children learn about the city and form mental maps. Geographers—as well as psychologists, anthropologists, sociologists, and urban planners—are constantly developing new ways to study the cities in the minds of urban dwellers.

CONCLUSION

The internal structure of a city expresses great variety. People and activities spread themselves across the city in an intricate urban mosaic. But we see that *there is order to the pattern. The concept of culture region* is useful in examining social areas and activity areas within a city.

We also see that two major forces are at work in the cities: one that works to centralize activities in the inner cities; the other, decentralization, working to locate activities in the suburbs. The latter is the dominant process currently at work in North American cities. But the costs of decentralization run high—not just to the suburbs, where growth causes problems, but also to the inner cities, where decay and deterioration take a high economic and social toll.

The cultural ecology of a city is a complicated matter, for urbanization has substantially altered many aspects of the physical environment. In many cases, this alteration has reached the point where feedback from the environment—in the form of landslides, air pollution, or floods—damages the cities. Increasing care will have to be taken to assure that natural systems are not turned against urban dwellers.

But not all patterns and processes within the cities are explained by economic or physical theories. Each individual carries around a unique mental image of his or her city. This perception of the urban landscape forms a mental map that is the basis for decisions. There are similarities between the images held by people of similar experiences. But images held by groups with different backgrounds and experiences may differ dramatically. It is not enough to simply describe and explain a city; we also need to know how it is perceived by people, since this is the basis for action.

GLOSSARY

CBD the central business district of a city.

Census tracts small districts used by the United States Census Bureau to survey the population.

Centralizing forces diffusion forces that encourage people or

businesses to locate in the central city.

Concentric zone model a social model that depicts a city as five areas bounded by concentric rings.

Decentralizing forces diffusion forces that encourage people or

businesses to locate outside the central city.

Dust dome a pollution layer over a city that is thickest at the center of the city.

Ecological fallacy an invalid statement about individuals drawn

from statistical material on groups

Ecosystem a unit through which the flow of matter or energy is traced

Feedback repercussions on a system when an element is returned in modified form

Heat island an area of warmer temperature at the center of a city, caused by the urban concentration of heat-retaining concrete, brick, and asphalt

Lateral commuting traveling from

one suburb to another in going from home to work

Legible city a city that is easy to decipher, with clear pathways, edges, nodes, districts, and landmarks

Multiple nuclei model a model that depicts a city growing from several separate focal points

Neighborhood a small social area within a city where residents share values and concerns and interact with one another on a daily basis

Particulate matter bits of matter

spewed into the air by incinerators, car exhausts, tire wear, industrial combustion, and so forth

Sector model an economic model that depicts a city as a series of pie-shaped wedges

Social cultural area an area in a city where many of the residents share social traits such as income, education, and stage of life

Townscape the urban landscape, including the layout of streets and the characteristic structure of buildings

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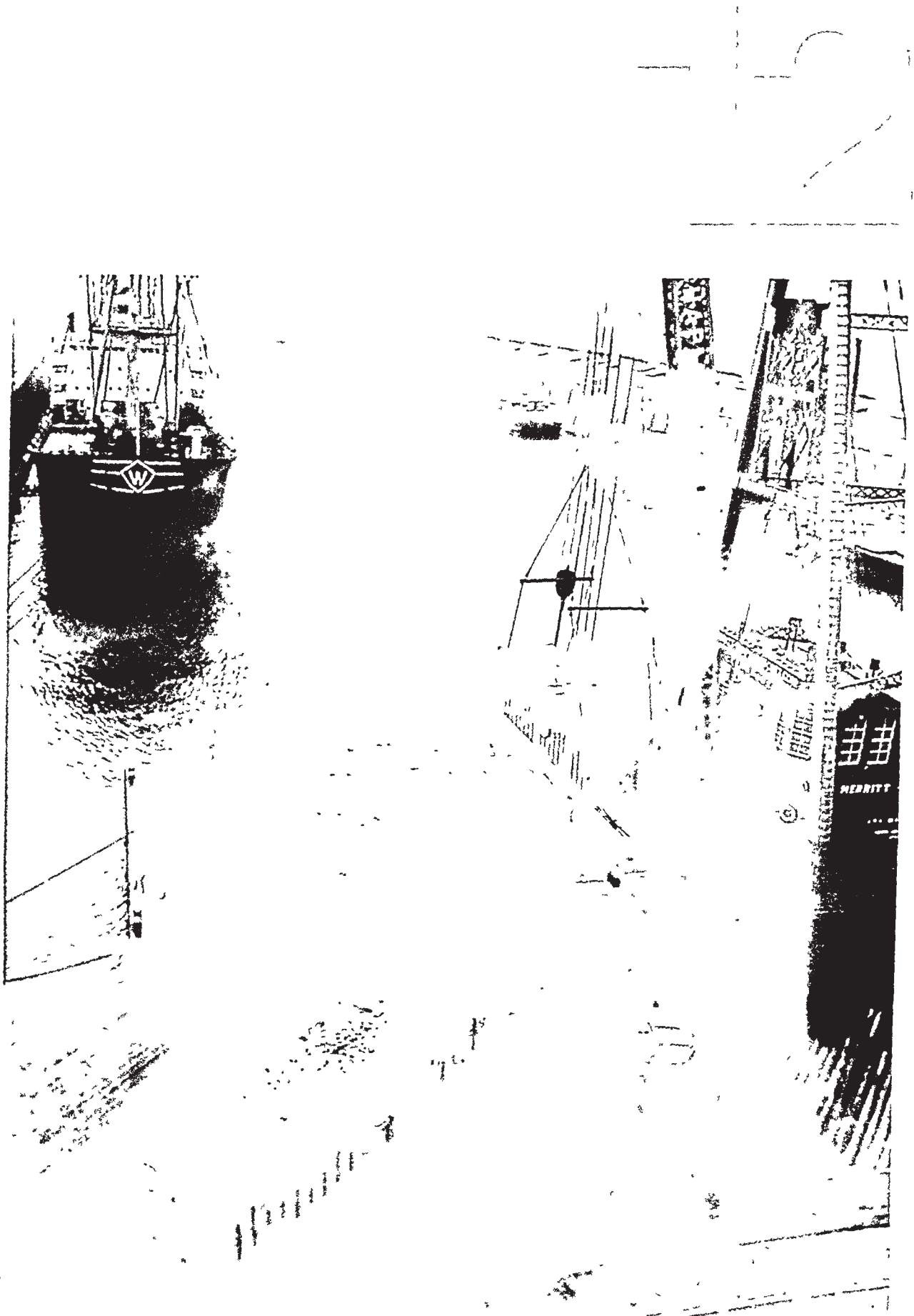
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Industry and the Web of Transportation



There have been two great economic "revolutions" in human development. The first of these was the domestication of plants and animals, which occurred in our dim prehistory. This agricultural revolution, discussed in Chapter 3, ultimately resulted in a huge increase in human population, a greatly accelerated modification of the physical environment, and major cultural readjustments. The second of these upheavals, the *industrial revolution*, is still taking place. We live today at a pivotal point in the destiny of our species, for we are witnesses to this second revolution.

The industrial revolution, which began in the eighteenth century, released for the second time in history undreamed-of human productive powers. Suddenly, whole societies were able to engage in the seemingly limitless multiplication of goods and services. Rapid bursts of human inventiveness followed, as did gigantic population increases, and a massive, often unsettling remodeling of the environment. Today, the industrial revolution, with its churning up of whole populations and its restructuring of ancient cultural traditions, is still running its course. There are lands still largely untouched by its machines, factories, transportation devices, and communication techniques. Western nations, where this revolution has been underway the longest, are still feeling its sometimes painful, sometimes invigorating effects.

This chapter concentrates on the industrial revolution as the cultural geographer sees it. Industry, of course, is a livelihood, and livelihood is a facet of culture. In Western culture, the majority of the population owe their livelihood either directly or indirectly to industry and its related products and services. Add to this the uneven spatial distribution of industrial and transport facilities, and you can understand the cultural geographer's interest in this topic.

On an individual level, there is scarcely a facet of American life that has not been affected in a major way by the industrial revolution. A Friday night out might involve a drive in a car to a single outlet in a nationwide chain of restaurants, where you can order fried chicken raised several states away on special enriched grain, brought by refrigerated truck to a deep freeze, and cooked in an electric oven. Later, at a movie, you might buy a candy bar manufactured halfway across the country and have a soft drink delivered to you by a machine that has its own ice. Then you would enjoy a series of machine-produced pictures passing in front of your eyes so fast that they seem to be moving. You could just as easily pick almost any other moment in your life, from sleep, with its permanent-press contoured sheets and its mass-manufactured alarm clocks, to your pet cat, with its chemical flea collar, canned food, and distemper shots. What you discover is that just about every object and every event in your life is affected, if not actually created, by the industrial revolution.

The cultural geographer distinguishes three types of industrial livelihood. *Primary industries* are those involved in extracting natural resources from the earth. Fishing, lumbering, and mining are examples of primary industries. Agriculture is also a primary industry, but it was treated in Chapter 3.

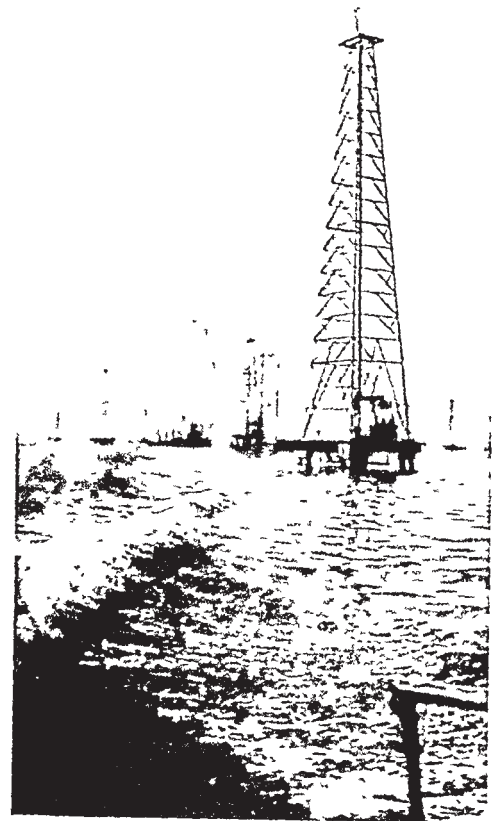
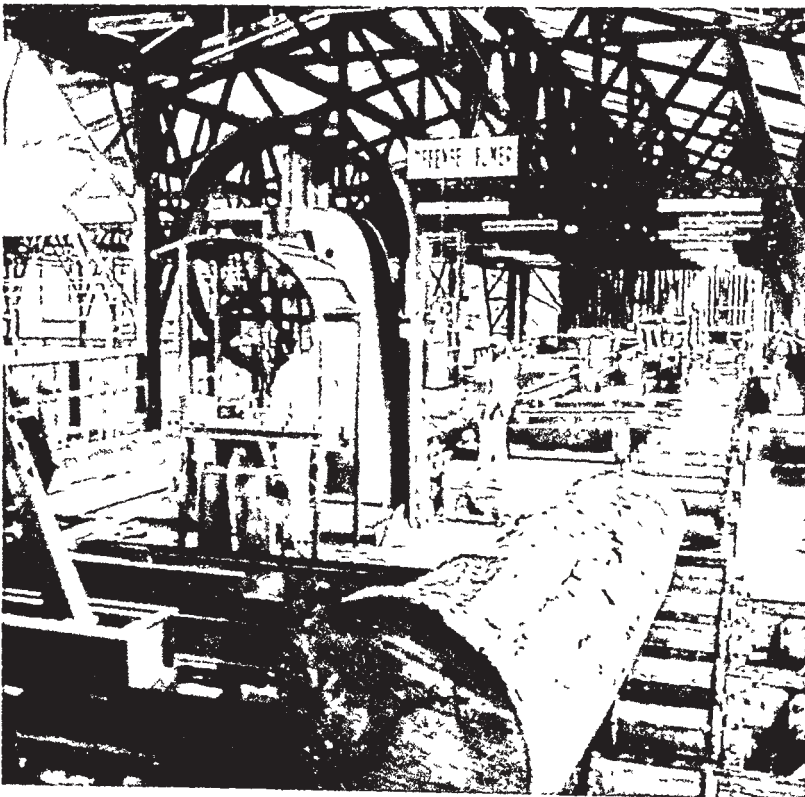
Secondary industry is the processing stage, commonly called manufacturing. It lies at the very heart of industrial activity. Secondary industries process the raw materials extracted by primary industries,

transforming them into more usable forms. Ore is converted into steel; logs are milled into lumber, fish are processed and canned. As a rule, several steps are involved in manufacturing. In this secondary stage, many factories turn out products that serve as raw materials for other secondary industries. Thus, steel mills provide steel for automobile factories, and lumber mills provide building materials for the construction industry.

Tertiary economic activity does not involve either the extraction of resources or the manufacture of goods, but instead the distribution of goods and services. Tertiary institutions include wholesale and retail outlets, banking and other financial services, governmental and educational services, medical facilities, and the many other business and service functions upon which we depend daily. A filling station, a department store, a post office, a hospital, and a university are all tertiary activities. Part and parcel of this tertiary stage is the system of transportation and communication. Highways, railroads, airlines, pipelines, telephones, radios, and television are all vital to the distribution of goods and services.

Primary, secondary, and tertiary industries should not, however, be thought of as totally separate operations that can be dealt with separately from one another. The worker in Detroit who gets laid off because her plant is moved to Singapore, the Argentinian who drinks a cola bottled in Argentina while watching "Kojak" on his American-made TV, and the lumberman who buys a Japanese table made with wood he cut in Oregon

An example of a primary industry, this lumber mill is in Gabon, a nation of equatorial Africa. Where are the lumber mills in North America? Why there? The oil industry has become one of the most controversial primary activities in recent years. Shortages and repeated price increases have made every citizen of the industrialized world aware of our dependence on this primary industry. The oil wells shown here are in Lake Maracaibo, Venezuela. Why has the industrial revolution become so dependent on oil?



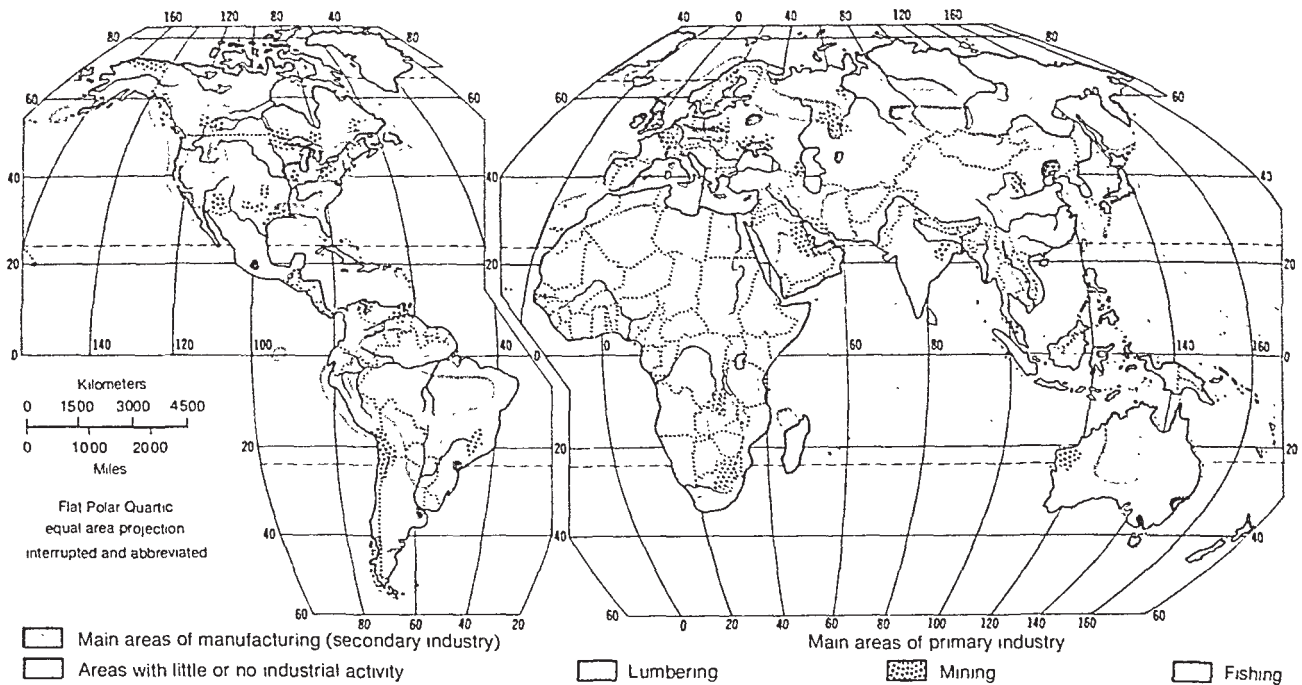


FIGURE 12-1

Industrial areas appear on all continents. Manufacturing is concentrated in relatively small areas, and large regions support little or no industry.

are all involved in an interconnected economic system of global proportions. Single corporate entities called conglomerates may own scores of industries of all three types in a variety of fields. As a result, corporate planning, whether in the United States, Japan, Germany, or elsewhere, goes on at all three levels at once. Scholars, for instance, have pointed out that labor costs and other factors have increasingly led United States corporations to send secondary industries overseas and export their products back to the United States. In turn, tertiary or service activities, rather than actual factory production, make up the employment of a larger and larger proportion of America's work force.

Because industrialization is closely interwoven with the physical environment and with other facets of culture, because industry is unevenly distributed, because the industrial revolution is a series of ideas spreading by means of cultural diffusion, and because entire landscapes have been remolded and often deformed by industrialization, we can profitably apply the five themes of cultural geography to the study of industry. Thus, we will discuss industrial regions, the diffusion of industrial innovations, industrial ecology, the place of industry in cultural integration, and the industrial landscape.

INDUSTRIAL REGIONS

Each type of industrial activity—primary, secondary, and tertiary—displays unique spatial patterns. Geographers, applying the theme of culture region, refer to these as industrial regions, and Figure 12-1 reveals some of these patterns.

Primary Industry

Primary industries extract both renewable and nonrenewable resources. *Renewable resources* are those that can be used without being permanently depleted, such as forests, water, fishing grounds, and agricultural land. *Nonrenewable resources* are those that are depleted when they are used, such as minerals.

Many primary industries, especially those engaged in mining, are spread widely across the earth. In fact, many regions that lack significant manufacturing activity have major primary industries. Figure 12-1 shows the main areas of primary and secondary industry. As a rule, however, primary industries are more likely to develop in conjunction with manufacturing districts. Zones of primary industry distant from manufacturing centers are likely to spring up only if the resource is very valuable and rare, and thus worth enough to withstand the cost of transporting it long distances. On the other hand, almost every major area of secondary industry is surrounded by a "halo" of primary activity.

Secondary Industry

Most of the world's industrial activity is found in the midlatitudes of the northern hemisphere, especially in parts of the United States, Europe, the Soviet Union, and Japan. This is particularly true of manufacturing. In the United States, many secondary industries are clustered in the northeastern part of the country, a region often referred to as the American Manufacturing Belt (see Figure 12-2). On the opposite Atlantic shore, manufacturing is concentrated in the central core of Europe, surrounded by a less industrialized periphery (see Figure 12-3). Most Soviet manu-

FIGURE 12-2

Major Manufacturing Regions of Anglo-America. The largest and most important region is still the American Manufacturing Belt, the traditional industrial core of the United States. Dispersal of manufacturing to other regions has occurred mainly since World War II. What factors might explain the location of these regions?

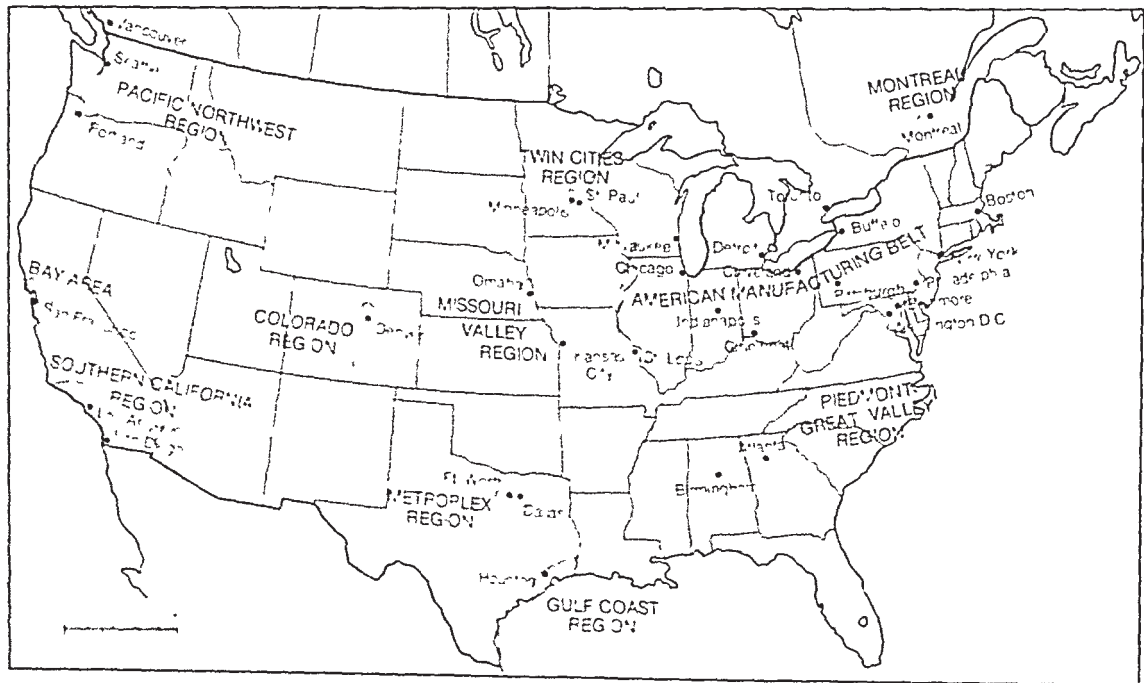
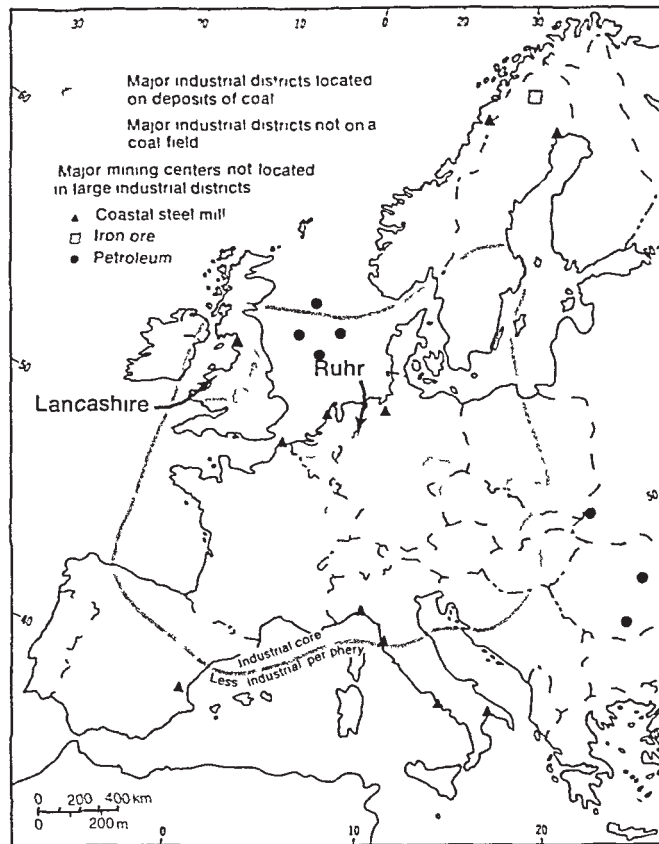


FIGURE 12-3

Industrial areas of Europe are plotted on this map. An industrialized core is surrounded by a less industrialized area. How does this compare to the pattern in North America?



facturing is in the western third of the Soviet Union, while Japan's industrial complex is concentrated around the shore of the Inland Sea and throughout the southern part of the country (see Figures 12-4 and 12-5)

Many different types of manufacturing are found within the world's major regions. These often display considerable spatial segregation, so that a single industrial district might be composed of several zones, each dominated by a particular kind of industry. Figure 12-6 shows this segregation in the Ruhr district of West Germany. Iron and steel manufacture might be concentrated in one of these zones, chemical factories in another, textiles in a third, and automobile manufacture in a fourth.

Beyond the major manufacturing areas of the world are numerous countries in which secondary industries have been established but are still not fully developed. Many, if not most, of these nations received their industrial beginnings as producers of raw materials for manufacturing countries. Now they are attempting to develop the manufacturing capability to process their own raw materials, rather than simply exporting them and buying the finished products from other countries. Brazil and Mexico are such nations. Oil-rich nations such as Iran and Saudi Arabia are also moving toward a manufacturing capability, accomplishing this by investing some of the wealth they are accumulating through petroleum sales. Success in such industrial development will depend in

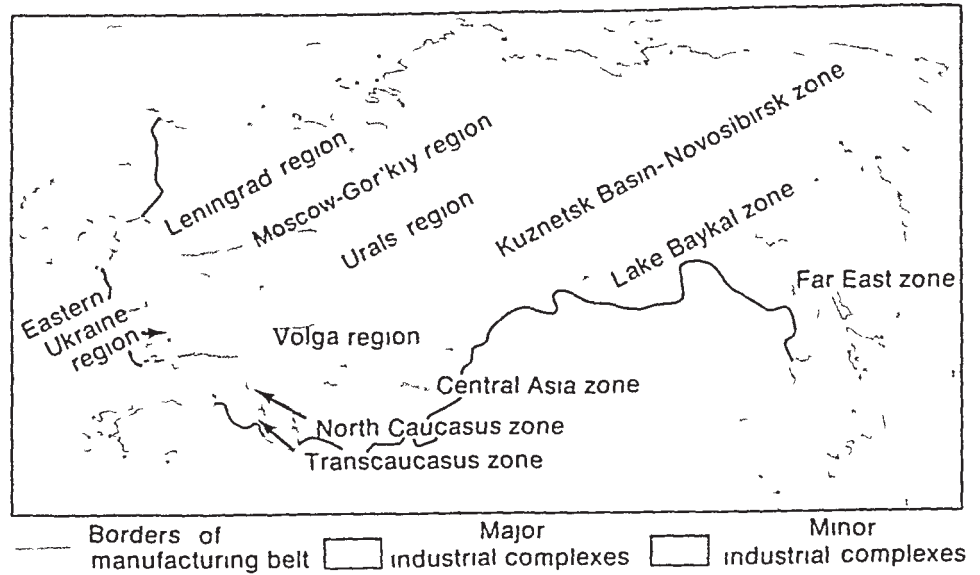


FIGURE 12-4

The Soviet manufacturing belt developed close to Europe. In spite of Soviet attempts to disperse their industry, it remains concentrated in the western third of the country. What political and economic problems does this cause for the nation? (In part after R. E. Lonsdale and J. H. Thompson, "A Map of the U.S.S.R.'s Manufacturing," *Economic Geography*, 36 (1960), 36-52.)

part on whether the nation in question has good access to the major shipping lanes of the world. Landlocked countries are handicapped in this respect.

Finally, there are many nations that have little industrial development and very few prospects of acquiring it. In ex-colonies, commercial plantation agriculture is often the only type of economic activity that even approaches the description of "industry." Some nations lack even that. Many of the newly independent nations of Africa fall into this category, particularly those in the interior of the continent. Typically, they are hampered by a lack of natural resources as well as poor transportation connections, both internally and with the rest of the world.

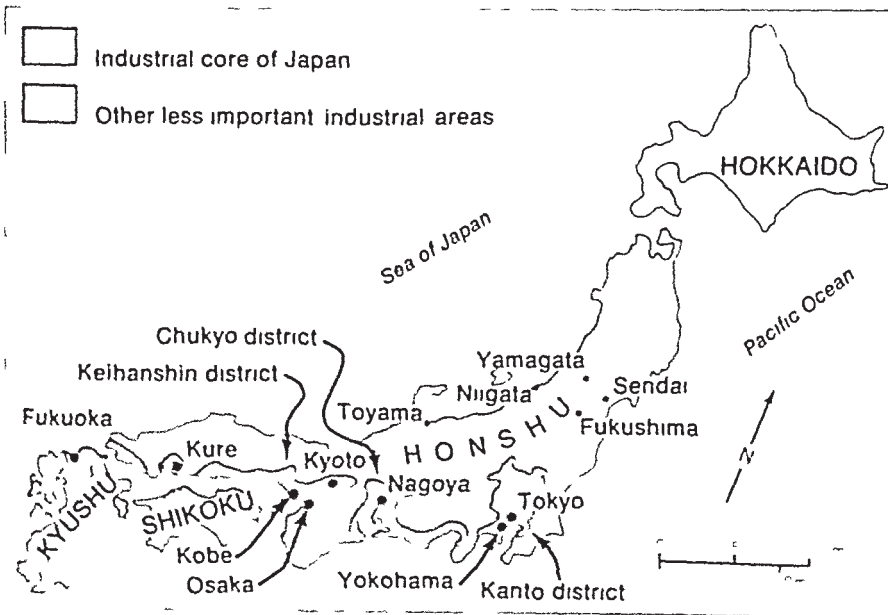


FIGURE 12-5

Japanese industrial areas manufacture products for the entire world. (In part, after John H. Thompson and Michihiro Miyazaki, "A Map of Japan's Manufacturing," *Geographical Review*, 49 (1959), 1-17.)

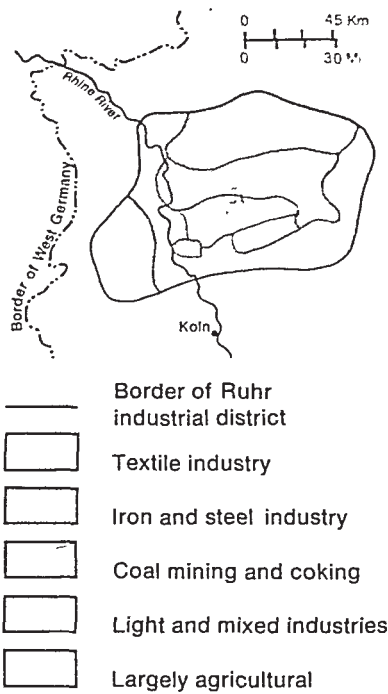


FIGURE 12-6

The Ruhr industrial district in West Germany is the single most important industrial area in all of Europe. Note the spatial segregation of different types of industry and the relatively small size of this particular district. What kinds of industry cluster together within your community?

Tertiary Industry

The distribution of transportation facilities, key to tertiary activity, closely parallels the spatial pattern of primary and secondary industry. Modern industries require well-developed transport systems, and every industrial district is served by a network of such facilities. Figure 12-7 maps the number of persons per motor vehicle by country. However, there are major regional differences in the relative importance of the various modes of transport. In the Soviet Union, for example, highways are of very little significance; railroads, and to a lesser extent waterways, carry most of the transport load. In the United States, on the other hand, highways are very important, while the railroad system is in decline. Many western European nations rely heavily on inland waterways. However, regional contrasts can be seen even within an area as small as Europe: The Netherlands moves 86 percent of all goods by river and canal; France has traditionally emphasized railroads at the expense of highway construction; and Italy uses highways far more than either railways or waterways.

Beyond the industrialized regions, transport systems are much less developed. In most of Africa, interior Asia, and other nonindustrial regions, motorable highways and railroads are rare. One notable exception to this generalization is India. In spite of a relatively low level of industrialization, India has a good network of railroads, largely a legacy of British colonial rule.

Some culture regions, then, are highly industrial and well served by transport facilities, while others are little touched by the manufacturing and transport technology of the industrial world. How did such spatial patterns evolve? Why are industry and transportation so unevenly distributed? Perhaps the best device for beginning the explanation of this phenomenon is the theme of cultural diffusion, and the best approach, the cultural-historical method.

ORIGIN AND DIFFUSION OF THE INDUSTRIAL REVOLUTION

The world map of industrialized and nonindustrialized regions is a good measure of how far the industrial revolution has spread, how far the cultural diffusion of this revolution's technological ideas has proceeded. Until the industrial revolution, the large majority of people were concerned with the most basic of primary economic activities—acquiring from the land the necessities of survival. Society and culture were overwhelmingly rural and agricultural. To be sure, industry existed in this setting, since humans are by nature makers of things. For as long as our biological species has existed, we have fashioned tools, weapons, utensils, clothing, and other objects. But traditionally these items were made by hand, laboriously and slowly. Before about A.D. 1700, virtually all such manufacture was carried on in two rather distinct systems: *cottage* (or household) *industry* and *guild industry*.

Cottage industry, by far the most common, was practiced in farm homes and rural villages, usually as a sideline to agriculture. Objects for

family use were made in each household, and most villages had a cobbler, miller, weaver, and smith who worked part-time at these trades in their homes. Skills were passed from parents to children with little formality.

By contrast, the guild system consisted of professional organizations of highly skilled, specialized artisans engaged full-time in their trades and living in towns and cities. Membership in a guild was attained through a long apprenticeship, during which the master craftsman taught the apprentice the secrets of the profession. The guild was a fraternal organization of artisans skilled in a particular craft, so that there were guilds for weavers, glassblowers, silversmiths, potters, and so on.

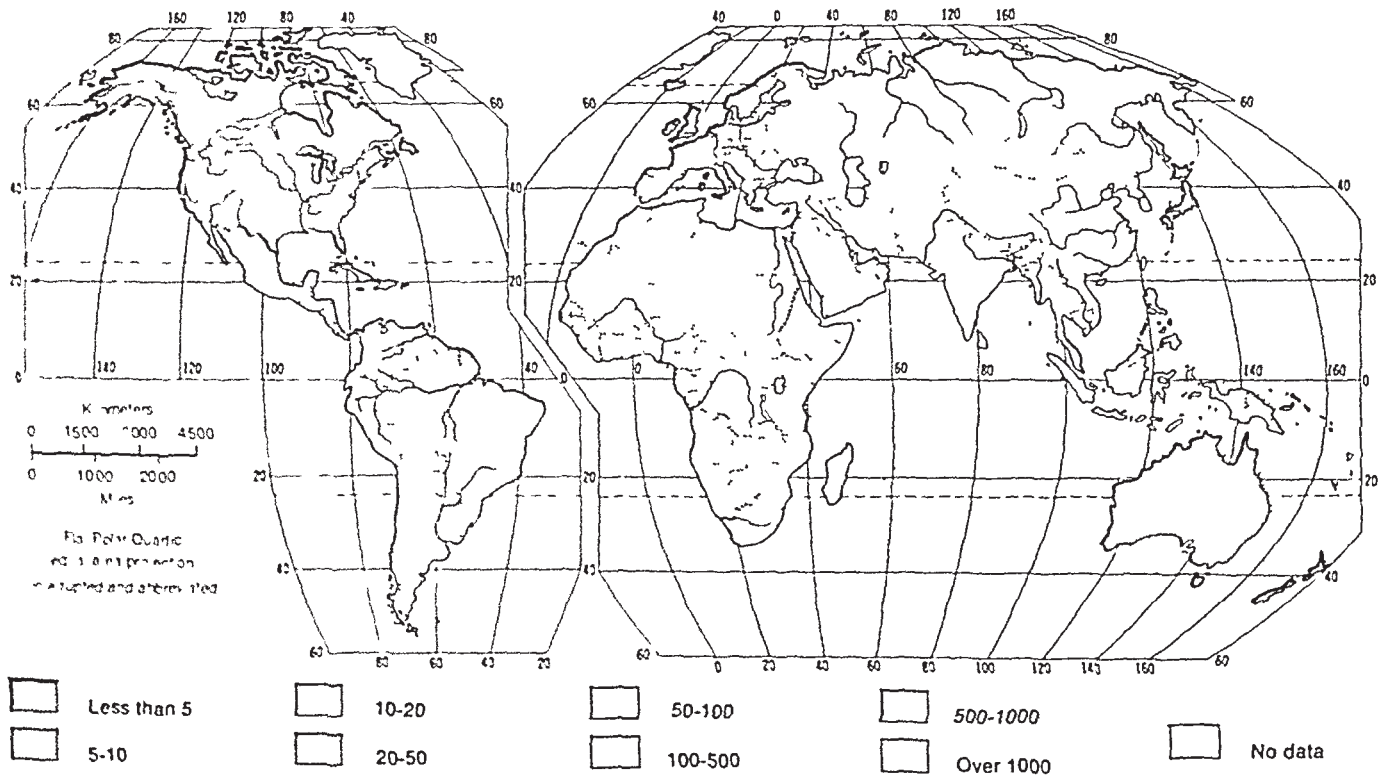
Origins of the Industrial Revolution

While the cottage and guild systems were different in many respects, they did share one trait. Both depended on hand labor and human power. Because they shared this characteristic, both were changed radically by the coming of the industrial revolution. These changes were so basic as to render the traditional systems largely obsolete.

First, human hands were replaced by machines in the fashioning of finished products, rendering the word *manufacturing* ("made by hand") technically obsolete. No longer would the weaver sit at a hand loom and painstakingly produce each piece of cloth. Instead, large mechanical looms were invented to do the job faster and more economically (though not necessarily better). Second, human power was replaced by various forms of inanimate power. The machines were driven by water power,

FIGURE 12-7

The number of persons per motor vehicle (cars and trucks) about 1970 is mapped here. The most highly industrialized nations have the largest numbers of cars and trucks per unit of population. Estimate the number of people per vehicle in your neighborhood. (United Nations Statistical Yearbook)



THE CONTINUING COSTS OF INDUSTRIALIZATION

The industrial revolution was not an impersonal event. It took a continuing toll in human pain, human misery, and even death. While the process of industrializing production made fortunes for some, it maimed others. *The Jungle*, Upton Sinclair's muckraking novel of 1906, exposed the terrifying working conditions in Chicago's meat-packing industry at the turn of the century:

"There were the men in the pickle-room . . . scarce a one of these that had not some spot of horror on his person. Let a man so much as scrape his finger pushing a truck in the pickle-room, and . . . all the joints in his fingers might be eaten by the acid, one by one. Of the butchers and floor-men, the beef-boners and trimmers, and all those who used knives,

you could scarcely find a person who had the use of his thumb; time and time again the base of it had been slashed, till it was a mere lump of flesh which the man pressed the knife to hold it. . . . There were those who worked in the chilling-rooms, and whose special disease was rheumatism; the time-limit that a man could work in the chilling-rooms was said to be five years. There were the wool-pluckers, whose hands went to pieces even sooner than the hands of the pickle-men; for the pelts of the sheep had to be painted with acid . . . and as for the other men, who worked in tankrooms full of steam . . . their peculiar trouble was that they fell into the vats; and when they were fished out, there was never enough of them left to be worth exhibiting, sometimes they would be

overlooked for days, till all but the bones of them had gone out to the world as Durham's Pure Leaf Lard."

In case you think that such industrial working conditions were a turn-of-the-century matter, the government Bureau of Labor Statistics reported that during the five years of World War II, 88,100 workers were killed and 11,112,600 injured in major manufacturing and nonmanufacturing industries—a figure about eleven times larger than total American casualties from the war itself.

The Sinclair excerpts are quoted from Roger Butterfield, The American Past, p. 330. Copyright © 1947 by Roger Butterfield, renewed © 1975 by Roger Butterfield. Reprinted by permission of Simon & Schuster, Inc.

the burning of fossil fuels, and later by hydroelectricity and the energy of the atom. Men and women, once the proud producers of fine handmade goods, became tenders of machines.

From the beginning, these changes had a double-edged effect. As the perceptive Alexis de Tocqueville commented after visiting the industrial city of Manchester, England, in 1835: "From this foul drain the greatest stream of human industry flows out to fertilize the whole world. From this filthy sewer pure gold flows. Here humanity attains its most complete development and its most brutish, here civilization works its miracles and civilized man is turned almost into a savage." The peasants or agricultural laborers who provided the first generation of factory hands often blamed the machines themselves for the miseries in their new lives. The word *sabotage* probably comes from the acts of French peasant factory workers who jammed their machines with their wooden shoes (*sabot*).

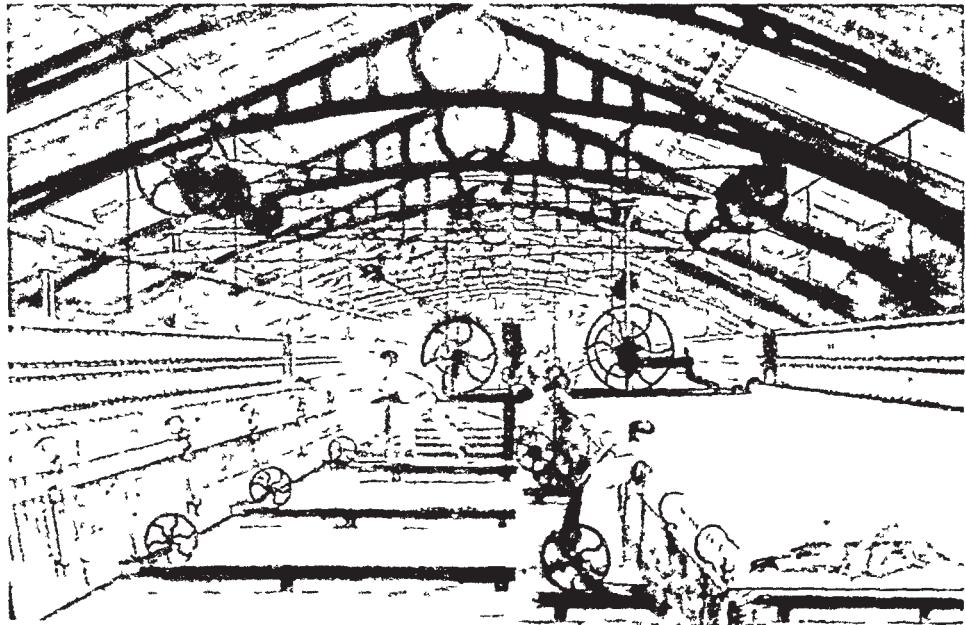
We know a lot more about the origins and diffusion of the industrial revolution than we do about the beginnings of agriculture. The industrial revolution is a matter of recorded history and has been studied in great detail. We can pinpoint its origin. The industrial revolution began in England in the early 1700s, though it is possible to trace its antecedents back even earlier. Within a century and a half of its beginnings, this economic revolution had greatly altered all three levels of industrial activity.

Textiles The initial breakthrough came in the secondary or manufacturing stage. More exactly, it occurred in the British textile industry, centered at that time in the district of Lancashire in western England. At first the changes were modest and on a small scale. Mechanical looms were invented, and flowing water, long used as a source of power by grain millers, was harnessed to drive the looms. During this stage, manufacturing industries remained largely rural, scattered about at the sites where rushing streams could be found, especially waterfalls and rapids. Later in the eighteenth century, the invention of the steam engine provided a better source of power, and a shift away from water-powered machines was made.

In the beginning, the industrial revolution was really a cotton revolution. In England, until about 1830, "factories" or "industry" meant the production of cotton cloth. No other industry even remotely approached the million and a half people directly or indirectly involved in Britain's textile production. This cloth trade had grown with the British Empire. In 1850, for instance, one-quarter of all Lancashire cloth exports went to colonial India. Furthermore, the explosion of the British textile industry proceeded hand in hand with the preservation of the slave-fueled plantation economy of the American South. American raw cotton was fed continuously into the seemingly insatiable Lancashire textile mills. In the United States, too, the first factories were textile plants.

"Manufactured" Metals Traditionally, metal industries had been small-scale, rural enterprises. They were carried on in small forges situated near ore deposits and relied on forests to provide charcoal for the smelting process. The chemical changes that occurred in the making of steel were not understood even by the guildsmen who used them, and much ritual, superstition, and ceremony were associated with steelmaking. Techniques had changed little since the beginning of the Iron Age, two thousand years before.

The first major industry of the industrial revolution was the production of cotton cloth. This etching, dated 1835, shows cotton being spun into thread. The textile industry was characteristic of manufacturing in the United Kingdom. What industries are characteristic of your area?



The industrial revolution radically altered all this. The old traditions, techniques, and rituals of steelmaking were swept away and replaced with a scientific, large-scale industry. Coke, which is nearly pure carbon and is derived from high-grade coal, replaced charcoal in the smelting process. Large blast furnaces were invented to replace the forge, and efficient rolling mills took the place of hammer and anvil. Mass production of steel was the result, and the new industrial order was built of steel. Other manufacturing industries made similar transitions, and entirely new types of manufacturing arose, such as machine-making.

Mining. Primary industries were also revolutionized. The first to feel the effects of the new technology was coal mining. The adoption of the steam engine necessitated huge amounts of coal to fire the boilers, and the conversion to coke in the smelting process further increased the demand for coal. Fortunately, Britain had large coal deposits. New mining techniques and tools were invented, so that coal mining became a large-scale, mechanized industry. Because coal was heavy and bulky, it was difficult to transport. As a result, manufacturing industries began flocking to the coalfields in order to be near the supply. Similar modernization occurred in the mining of iron ore, copper, and other metals needed by rapidly growing industries.

Railroads. The industrial revolution also affected the tertiary sector, most notably in the form of rapid bulk transportation. The traditional wooden sailing ships gave way to steel vessels driven by steam engines, canals were built, and the British-invented railroad came on the scene. The principal stimulus that led to these transportation breakthroughs was the need to move raw materials and finished products from one place to another, both cheaply and quickly. The impact of the industrial revolution would have been minimized had not the distribution of goods

The invention of the railroad played a vital role in the development of the industrial revolution. This old print depicts the Phoenix locomotive and carriage. How is the railroad involved in industry in your area?

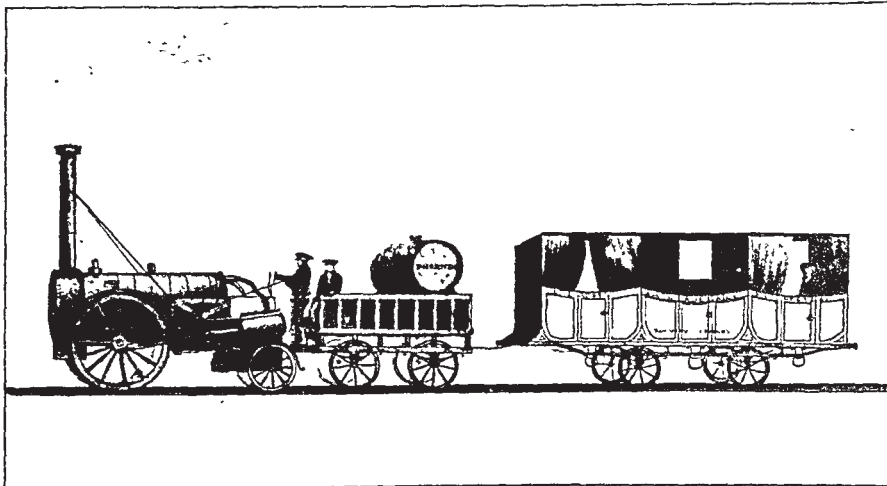


PLATE XXIII
THE "PHOENIX" LOCOMOTIVE AND CARRIAGE.

and services also been improved. It is no accident that the British, creators of the industrial revolution, also invented the railroad and initiated the first large-scale canal construction.

It should be realized, however, that the development of all three sectors of industry was closely intertwined. The English railroad was the creation of the coal mines. The first modern railway ran from the inland coalfield of Durham to the English coast. The earliest locomotive drivers were all hired out of coal areas. In turn, the iron and steel industries, the basic core of the industrial system, were mainly the creation of the railroad. It was the burst of railroad building that provided Britain's tiny iron industry with a demand large enough to justify investment in its expansion. For a single mile of rail, 300 tons of steel were needed for track alone. As a result, the first two decades of railroad building, 1830-1850, saw iron and steel production increase from 680,000 to 2,250,000 tons. In the same period, the output of coal, which first fostered the development of the railroad, soared from 15 million to 49 million tons, in part to stoke the growing steel industry.

DISTANCE IN THE PREINDUSTRIAL AGE

Our lives are a constant adventure in shrinking space. With a car, we're just minutes from a friend miles away. The airplane has put us within jet-lag distance of Paris, Moscow, or Calcutta. Rockets are bringing the solar system into our distance calculations. In such an age, it is hard to imagine what an obstacle distance often proved to be before the industrial revolution. But until the eighteenth century, every human activity had to grapple with the fierce resistance distance put up. Weather, human desires, and physical obstacles like mountains, seas, wide rivers, straits, or marshes stood between the trader and the market, the army and its object of conquest, the traveler and his destination, or even a letter and its intended recipient.

In the preindustrial age, letters often traveled faster than other goods simply because "news" was so important to kings and courts, governments and armies. Yet the record of those centuries is filled with the constant fretting of officials

about the irregularity of the mails. The Cardinal de Rambouillet writes to Charles IX in 1570 that it is a waste to send letters to him, "because the negligence of the postmasters in carrying Your Majesty's dispatches [is] so great that the said dispatches often spend a month or six weeks on the road between the Court and Lyons. So that when I receive them, the time when I could have availed myself of them and had occasion to execute the orders contained in them is often, to my very great sorrow, past."

A record of 10,000 letters sent to Venice, Italy, in the early sixteenth century shows clearly what a factor distance was in the preindustrial world. Letters from nearby Genoa took an average of 6 days to arrive, London, 27, Constantinople, 37, Lisbon, 46, Damascus, 80. But these average figures hardly tell the whole tale. Changing human and climatic conditions lent a striking elasticity to mail delivery. Deliveries from Paris ranged from a maximum of 34 days to a minimum of 7 days,

Barcelona, 77 to 8, and Florence, 13 to 1, to pick three places at random. Zara, which was separated from Venice by only a short stretch of the Adriatic Sea, held the record. Its letters, depending upon sailing conditions, took from a maximum of 25 to a minimum of 1 day to arrive. Compared to other goods, however, letters moved briskly across the map. Sixteenth-century Italian businessmen normally assumed that it took even their privileged goods three months to reach London.

In fact, before the eighteenth century, distance had been a relatively constant factor for centuries. In terms of travel, the Mediterranean was about the same "size" in the sixteenth century as it had been in Roman times over 1000 years earlier. Traveling times did not change much until the nineteenth century.

Source: Fernand Braudel, The Mediterranean and the Mediterranean World in the Age of Philip II (New York: Harper & Row, 1972) vol. 1, p. 356.

THE RAILROAD: A DAGGER IN THE URBAN HEART

The spread of the railroad in the nineteenth century had an explosive impact on the quality of urban life. Can you imagine what it must have been like when railroad builders drove their tracks like daggers into the heart of the city? Here, Lewis Mumford, the noted urban historian, recalls for us what a revolution the railroad really was in human existence:

"In [the new industrial] scheme, the town itself consisted of the shattered fragments of land, with odd shapes and inconsequential streets and avenues left over between the factories, the railroads, the freight yards and dump heaps. In lieu of any kind of over-all municipal regulation or planning, the railroad itself was called upon to define the character and project the limits of the town. Except in certain

parts of Europe where old-fashioned bureaucratic regulations happily kept the railroad stations at the outskirts of the historic city, the railroad was permitted, or rather, was invited to plunge into the very heart of the town and to create in the most precious central portions of the city a waste of freight yards and marshalling yards, economically justifiable only in the open country. These yards severed the town's natural arteries and created an impassable barrier between large urban segments: sometimes, as in Philadelphia, a veritable Chinese wall.

"Thus the railroad carried into the heart of the city not merely noise and soot but the industrial plants and the debased housing that alone could thrive in the environment it produced. Only the hypnotism of a

new invention, in an age uncritically enamored of new inventions, could have prompted this wanton immolation under the wheels of the puffing Juggernaut. Every mistake in urban design that could be made was made by the new railroad engineers, for whom the movement of trains was more important than the human objects achieved by that movement. The wastage of space by railroad yards in the heart of the city only furthered its more rapid extension outward; and this in turn, since it produced more railroad traffic, gave the extra sanction of profits to the misdemeanors so committed."

*Adapted and excerpted from Lewis Mumford, The City in History, p 461
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Diffusion from Britain

For a century, Britain maintained a virtual monopoly on its industrial innovations. Indeed, the British government actively tried to prevent the diffusion of the various inventions and innovations that made up the industrial revolution, because they gave Britain an enormous economic advantage and contributed greatly to the growth and strength of the British Empire. Nevertheless, this technology finally diffused beyond the bounds of the British Isles (see Figure 12-8). Continental Europe was the first to receive its impact. In the last half of the nineteenth century, the industrial revolution took firm root in Germany, Belgium, and other nations of northwestern and central Europe. The diffusion of railroads in Europe provides a good index to the spread of the industrial revolution there (Figure 12-9). The United States began rapid adoption of this new technology about 1850, followed a half century later by Japan, the only major non-Western nation to undergo full industrialization. In the first third of the present century, the diffusion of industry and modern transport spilled over into the Soviet Union.

In the United States, the spread of the railroad affected both the distribution of industries within cities and within regions. Steel mills, refineries, meat-packing plants, and other industrial complexes sprang up at major rail terminals. Wherever it went, the railroad concentrated industry; yet, at the same time, its presence allowed for a greater regional diversification of industrial tasks. Small cities began to specialize in the production of specific industrial goods based on local skills and resources,

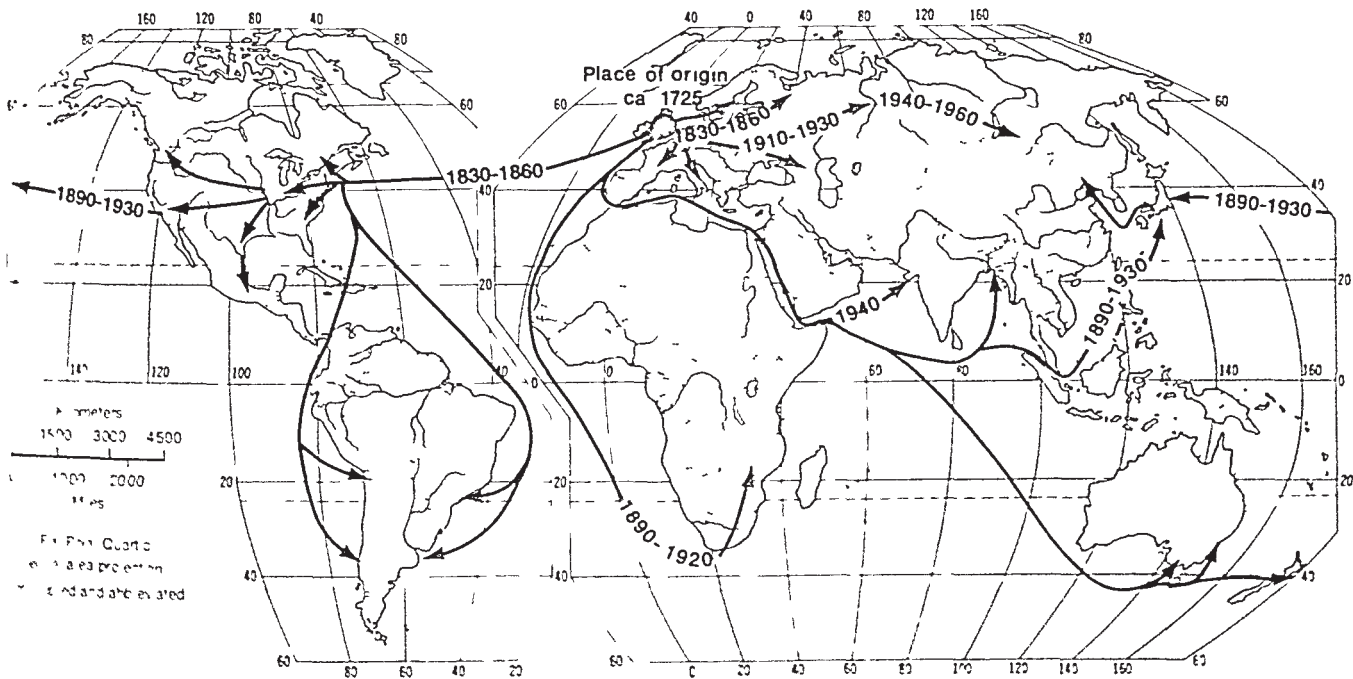
as parts of large, railroad-linked industrial clusters. By 1916, the American rail network had reached its height with 254,000 miles of track, carrying 77 percent of all intercity freight tonnage, and 98 percent of intercity passengers.

Few cultures exposed to industrial innovations have proved resistant to them. However, the spread of the industrial revolution could be halted or even reversed by determined political administrators. A striking example was Britain's deliberate deindustrialization of its Indian colony to create a market for its cotton products. India's textile industry had traditionally exported cotton goods to all parts of the world. As late as 1815, India exported to England cotton goods worth fifty times the British cotton goods it imported. However, imperial Britain, which had used high tariffs to protect its own cotton production, opened India to "free trade." Using its imperial power, it caused India's old industrial centers to die. Dacca, for instance, became partly overgrown with jungle, and skilled Indian workers were forced into the countryside to take up agricultural pursuits. In the end, India, once a great cotton textile producer, exported only raw cotton to Britain, where it was turned into textile goods and sent back to India to be bought.

Britain's political and military pressure helped it to conquer a world market for its exploding industrial plant. In a sense, then, it "spread" the industrial revolution across the planet. However, in practical terms, it turned its colonies into giant plantations or mines for the production of raw materials to be processed in Britain. India's actual industrialization was set back at least half a century. Probably only the independence of the United States, due to its revolutionary war against Britain, saved it from a similar fate. The United States government's imposition of a high protective tariff barrier helped its weak businesses survive the nineteenth-century onslaught of cheap British industrial goods.

FIGURE 12-8

The diffusion of the industrial revolution has changed cultures in much of the world.



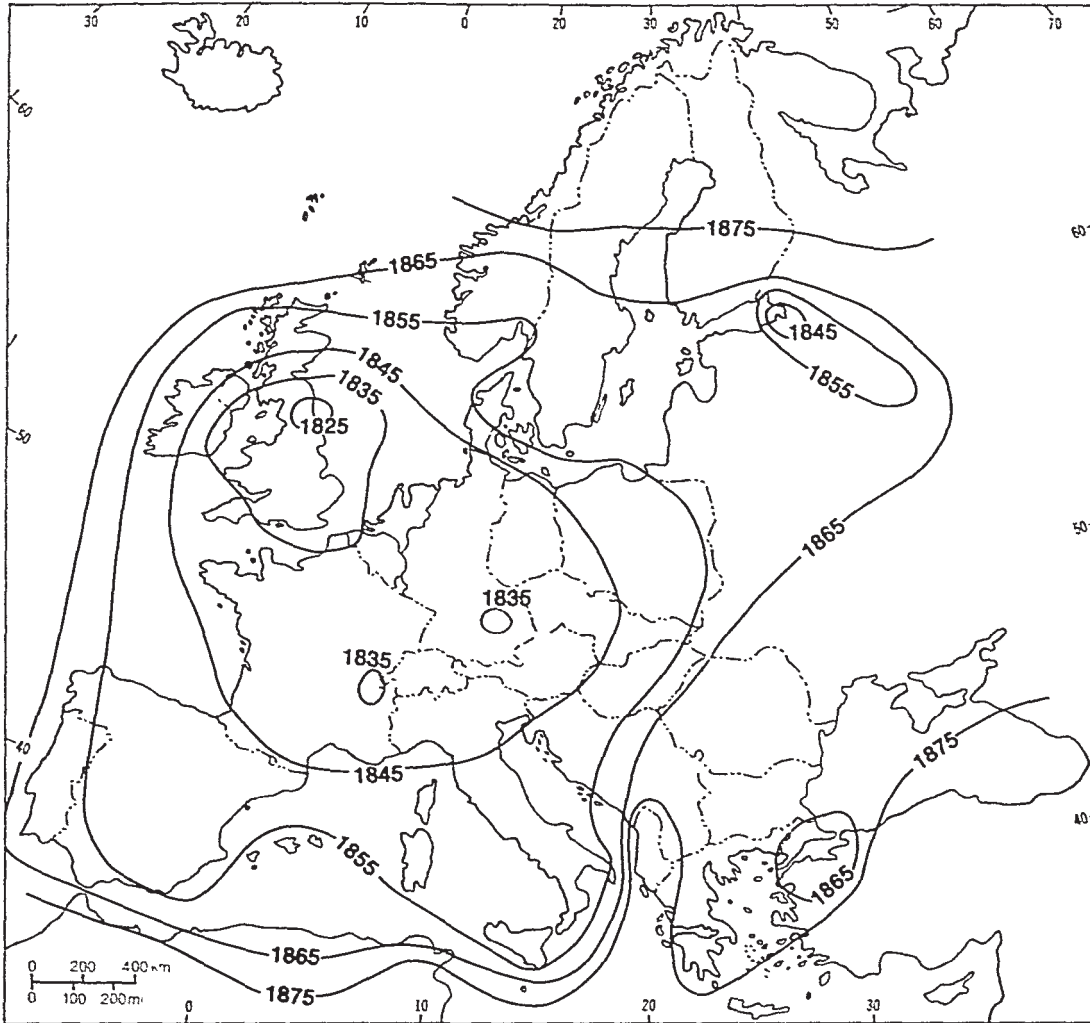


FIGURE 12-9

The diffusion of the railroad in Europe. The industrial revolution and the railroad spread together across much of the continent.

Results of Industrial Diffusion

As early as 1870, the spread of industrialization had produced the gap between the "developed" and the "undeveloped" countries that is so familiar to us today. In the following century, only Japan, the Soviet Union, and perhaps China really succeeded in bridging that gap. Present-day industrial expansion in the age of corporate globalism seems to be intensifying this gap, in many cases increasing the dependence of less industrialized on more industrialized nations. The modern-day equivalent of Britain's deindustrialization of India is the siphoning off of corporate profits from the nonindustrialized world. Between 1960 and 1968, for instance, American-based corporations took, on the average, 79 percent of their net profits out of Latin America. As a result, the industrialization of "undeveloped" countries is actually increasing the power of the world's leading industrial nations. In fact, today we face a world in which, while industrial technology has spread everywhere, the basic

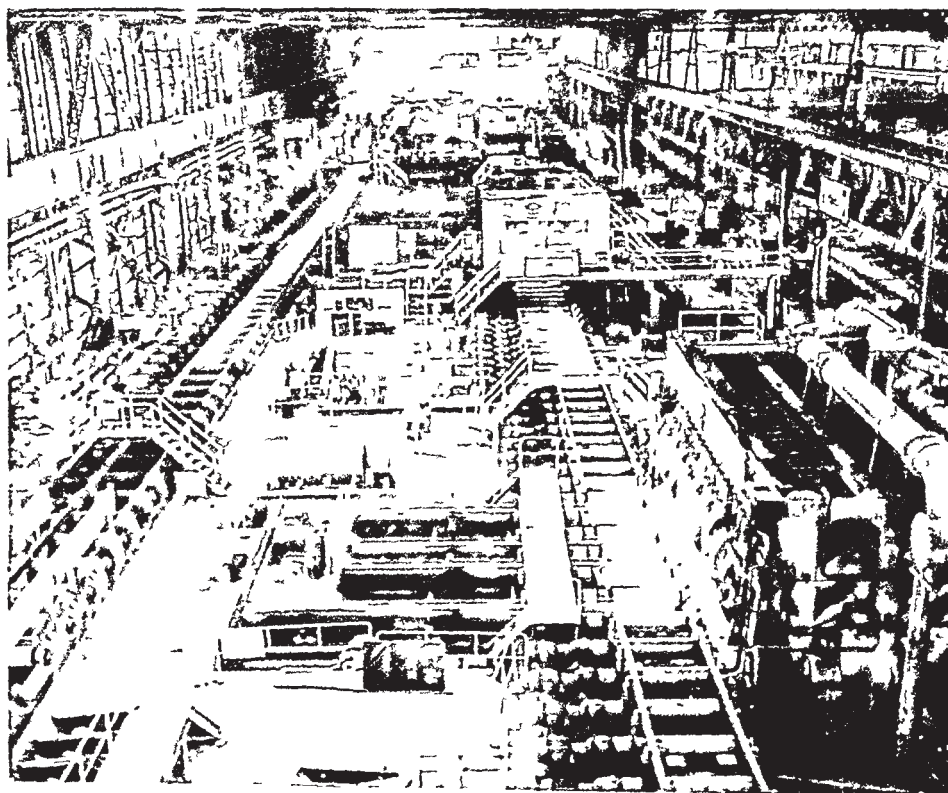
industrial power of the planet is more centralized than ever. It has been suggested that if present trends continue, by 1985 about 300 global corporations will control most of the nonsocialist world's productive assets. These corporations have their headquarters mainly in those areas where the industrial revolution took root earliest—the midlatitude countries of the northern hemisphere. A more modest prediction by economist Judd Polk is that by the year 2000, a few hundred companies will produce goods and services equaling \$4.2 billion, or approximately 54 percent of the value of all goods and services in the world.

Within cultures, actual barriers to industrial diffusion have usually been economic or physical in nature, based on remoteness or shortage of necessary natural resources. As a result, we are well advised to look into the themes of cultural ecology and cultural integration for a better understanding of the spatial distribution of industries and the causal interaction of industry and environment, industry and culture.

INDUSTRIAL ECOLOGY

The diffusion of the industrial revolution has occurred only at enormous environmental expense. By its very nature, the technology of modern industry consumes nonrenewable resources and destroys the natural environment. Massive pollution of the air and water seems to be an unavoidable by-product of mechanized industrial processes, at least in our present state of knowledge. While pollution and environmental alteration could be significantly reduced, can they ever be totally elimin-

This Japanese steel mill is typical of many heavy industrial plants. Because the manufacturing techniques of secondary industry have diffused to many parts of the world, factories in many nations look similar. What types of industry found in your community would you expect to see in other parts of the world?



ated if mechanized culture is to maintain its industrial base? Perhaps in the final analysis we will find that industrialization, which has become so integral a part of our culture in the past two centuries, is simply ecologically untenable and cannot be maintained.

Our experience with industrialization has been too short and shallow to permit an adequate perspective on the problem. In the United States, we have lived with the industrial revolution for a little over one century. What would the ecological impact of this system be after two centuries, ten centuries, twenty centuries? We can only guess, but many experts are not optimistic. What we do know is that the technology of the industrial revolution has demanded that we modify our habitat on a previously undreamed-of scale, and at the same time it has provided us with the tools and techniques to carry out that massive modification.

But if the industrial revolution has brought accelerated environmental change, it has also been governed in part by the same environment. The spatial distribution of industry in particular has been influenced by environmental considerations. To be sure, many factors are involved in industrial location, but some of these are environmental.

Raw Materials

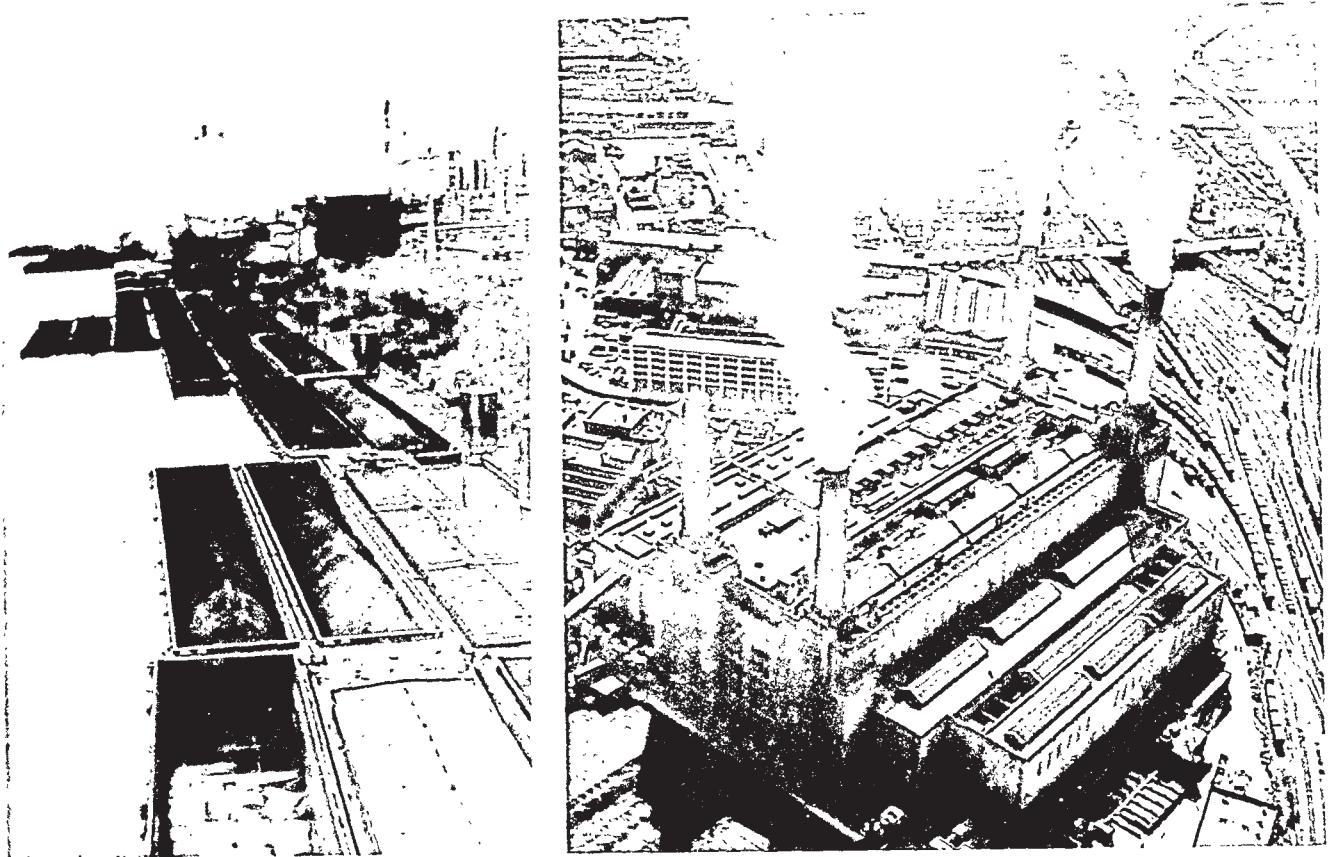
In the early stages of the industrial revolution, industries grew where the raw materials were. The reason was simple. The development of efficient means of mass transportation only came about a century after the beginning of the revolution. Before about 1830 or 1840, it was impossible to move bulky, heavy raw materials very far. In the last century and a half, the attraction of industry to raw materials has steadily decreased because of improved transportation facilities, yet it has not been eliminated altogether.

As a rule, we can say that manufacturers will locate near their raw materials if there is a great loss of weight or bulk in the manufacturing process, or if the finished product is less perishable than the raw materials from which it is made. The refining of minerals, the manufacture of iron, steel, and paper, and the canning of fish are examples of industries attracted for these reasons to the source of raw materials.

In industrial location, we should also recognize the phenomenon called *industrial inertia*. This refers to the tendency of industries to remain in their initial location, even after the forces that attracted them there cease to act. Thus, some industries that were drawn to the sources of raw materials in the 1700s or early 1800s, before the advent of modern modes of transportation, remain in the same location. This inertia occurs because capital investment in the form of land and structures would have to be sacrificed if the industry were relocated. In addition, the present labor force would be difficult to relocate with the industry. It is not uncommon to find industries that remained in the same place even after the nonrenewable raw materials that originally attracted them were completely exhausted.

Energy Supply

The quantity of energy consumed by industries, measured either as a total amount or per unit of goods produced, has increased greatly since the beginning of the industrial revolution. In a proper sense, energy was



not "consumed" at all when water power was used, because water is a renewable power source. Rather, the rapid increase of power use began with the shift from water power to the steam engine and accelerated with the subsequent adoption of other power sources, in particular, electricity.

During the early part of the industrial revolution, long-distance shipment of fossil fuels, from which inanimate power was derived, was too costly to be economically feasible. As a result, industrial plants requiring large amounts of energy were forced to locate where water power or coal was available. Later inventions, such as the railroad, pipeline, motorized barges, and sea-going tankers, have largely removed this restriction on location. The harnessing of electricity and development of high-tension power lines further reduced the locational pull of power supplies.

A few types of manufacturing are still strongly attracted to the sites of energy production. One of these is the aluminum industry, which consumes huge amounts of electricity in the process of converting the raw material bauxite into aluminum. Hydroelectric sites are preferred, since the electricity generated by falling water is renewable and hence cheaper than electricity generated by burning coal or petroleum products. Since electricity cannot be transmitted great distances without considerable loss of power from the transmission lines, location near the hydroelectric facility is best. Hydroelectric sites have attracted aluminum industries to relatively remote places such as Soviet Siberia and the Pacific coastal mountains of Canada. So great are the needs for electric

The location of industry is influenced by the location of raw materials and energy supply, among other factors. The steel plant on the left benefits by locating close to sources of coal in Pennsylvania. Enormous quantities wait nearby for use in the manufacturing process. The Battersea Power Station shown on the right is encircled by railroad lines carrying coal to the plant. In turn, the power plant supplies electricity for industries in a large area near London.

power in this industry that such remote places, hundreds or even thousands of miles removed from the sources of bauxite and the markets for aluminum, are economically practical.

The world entered a new phase of energy consumption when many of the leading oil-producing nations banded together to form OPEC, the Organization of Petroleum Exporting Countries. Because of OPEC actions, the price of petroleum soared, reaching more nearly its valid market value. The "problem" in this case, however, is not one of industrial location as related to energy source and not one of energy transport, but rather the cost of energy at the wellhead. It seems unlikely, therefore, that rapidly increasing energy costs will cause any significant relocation of manufacturing industries, because transportation expenses constitute a smaller than ever proportion of total energy costs.

Restrictions of Terrain and Climate

Few industries are excluded from an area because of the nature of the terrain, the surface of the land. Only in cases where very large amounts of land are required, or where special characteristics such as the ability to support heavy loads are required, does terrain become a major factor in industrial location. Since suitable terrain can generally be found within a region, terrain becomes an important factor only when specific terrain characteristics must be paired with other site characteristics. One example would be an industry that requires both level land and a port, which is true of some steel mills relying on imported ore.

The role of climate in industrial location is hardly more significant than that of terrain. Our increasing ability to control indoor atmospheric conditions has greatly reduced the impact of climate and weather in choosing location. We can now heat, cool, humidify, or dehumidify any structure. However, modifications of natural atmospheric conditions can be achieved only through the application of energy and the use of machinery, each of which adds to the cost of operations. For this reason, the location of a factory in an area where substantial air conditioning is required will be practical only if there are compensating advantages. For example, the cost of humidifying cotton textile mills in dry climates, necessary to prevent fibers from breaking in the cloth-making process, can be justified only if the needed cotton is grown nearby.

Thus, industry both shapes the environment and is influenced by it. But even more pronounced relationships exist between industry and the other facets of culture. With that in mind, let us turn now from cultural ecology to the theme of cultural integration.

THE INDUSTRIAL COMPONENT IN CULTURAL INTEGRATION

The list of factors influencing industrial location includes far more than the considerations of raw materials, energy, terrain, and climate. In a very broad sense, literally every aspect of culture is involved in the analysis of industrial location. Among the most important are economic and political factors. Industry has a broader role in culture as well—creating cultural changes.

The Economic Element in Industrial Location

In capitalist systems, most of the dominant factors affecting the location of an industry are economic. We will now turn our attention to these

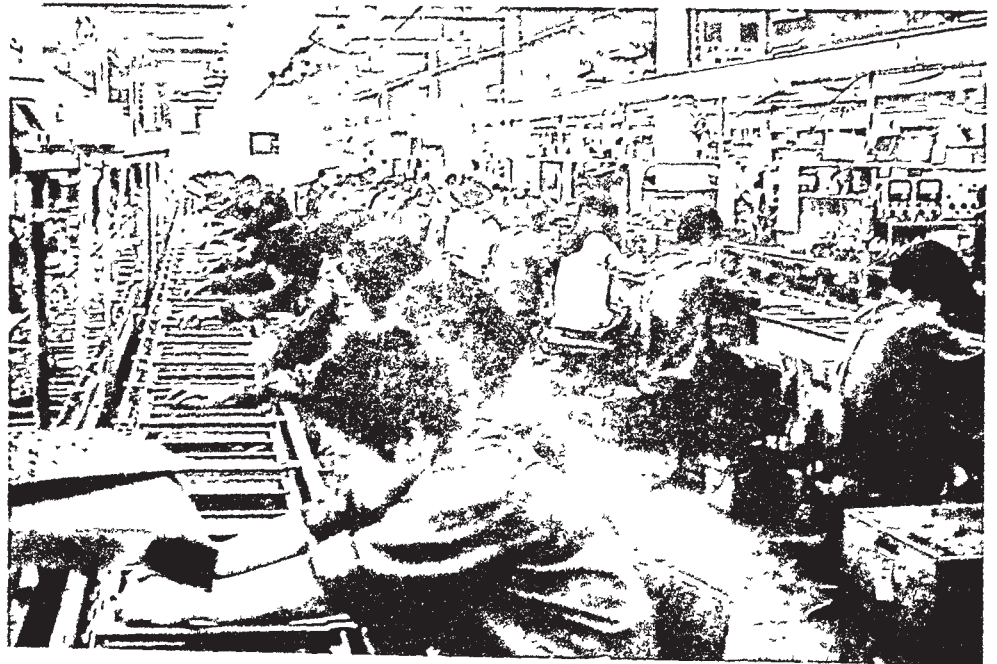
Labor Supply: Labor availability and costs are a factor in choosing an industrial location, but they are seldom the decisive factor. Most affected are *labor-intensive industries*, for which labor costs form a large part of total production costs. Examples are industries depending on highly skilled workers producing small objects of high value, such as transistors, cameras, and watches.

Manufacturers consider several characteristics of labor in deciding where to locate factories: availability of workers, average wages, necessary skills, and worker productivity. Traditionally, workers with certain skills tended to live and work in a small number of places, partly as a result of the need for person-to-person training in handing down such skills. Consequently, manufacturers often sought locations where these skilled workers lived.

In recent decades, the increasing mobility of labor throughout the Western world has lessened the locational influence of labor. Migration of labor has accelerated since World War II, especially in Europe and the United States. Large numbers of workers in Europe have migrated from south to north, leaving homes in Spain, southern Italy, Greece, and Yugoslavia to find employment in the main European manufacturing belt.

Factory "migration" itself is an increasingly powerful force on the labor market. For those industries dependent on largely unskilled labor, or labor that can be trained quickly and cheaply, relocation to economically depressed rural areas can result in higher profits. The main at-

Some industries depend on a supply of skilled workers. One example is this transistor factory near Tokyo. The women in the assembly line are working on printed circuits. What kinds of skilled workers are common in your community?



traction of such areas is the large supply of cheap labor, a contrast to the high wages typical in established industrial districts. Much industry has been attracted to the American South for this reason. However, in the United States, the wage disparities between existing industrial districts and rural or small-town areas are gradually decreasing due to the imposition of uniform regional or national wage scales, thus eliminating the availability of cheap labor.

Nonetheless, this pattern is now being repeated on an international scale, and a new global division of labor seems to be in the works. Behind these changes in the international labor market lies the strategic thinking by directors of the global corporations. According to a recent Department of Commerce study, for instance, 298 American-based global corporations employ 25 percent of their workers outside the United States. A typical example is General Electric, which ships component parts to Singapore. There they are assembled into products to be exported back to the United States by workers who are paid 30 cents an hour. If the same products were assembled in GE's Ashland, Massachusetts, plant, the cost would be \$3.40 an hour. Between 1959 and 1969, GE constructed no less than sixty-one plants abroad. Other major corporations, like Fairchild Camera, Bulova, RCA, and Zenith, are moving their plants to Hong Kong, Taiwan, and other Asian cheap-labor areas, where the labor pool includes children as well as adults who work up to seven days a week.

Such factories, despite relocation costs, quickly drive up corporate profit margins. In addition, the ability of these corporations to plan on such an international scale and to shift the production of a given product thousands of miles away is having a strong effect on the organized labor movements inside the United States.

Markets. A market is the area in which a product may be sold in a volume and at a price profitable to the manufacturer. The size and distribution of markets are generally the most important factors in determining the spatial distribution of industries. Many experts who have studied industrial location consider the market attraction so great that they regard locating an industry near its market as the norm.

Certain industries, in an economic sense, *must* locate at the market. That is, some manufacturers must situate their factories among their consumers if they are to minimize costs and maximize profits. Such industries include those manufacturing a *weight-gaining* finished product, such as bottled beverages, or a *bulk-gaining* finished product, such as metal containers or bottles. In other words, if weight or bulk is added to the raw materials in the manufacturing process, location near the market is economically desirable due to the transport cost factor. Similarly, if the finished product is more perishable than the raw materials, which is the case with bakery goods and local newspapers, a location near market is also required. In addition, if the product is more fragile than the raw materials that go into its manufacture, as in the making of glass, the industry will be attracted to its market. In each of these cases—gain in weight, bulk, perishability, or fragility—transportation costs on the finished product are much higher than on the raw materials.

Obviously, the degree of importance of market as an attractive force increases with the degree of clustering of population. If population is

HOW THE TRUCK CHANGED INDUSTRIAL LOCATION

Transportation innovations have played a major role in the development of the industrial revolution. The following passage from Sam Bass Warner, Jr.'s *The Urban Wilderness* discusses how the truck changed industrial geography.

"The change in the costs of short-haul transportation was probably the single most important factor to influence the dispersal of job locations within the modern metropolis. Intracity freight movement had formerly been dependent on men and boys who carried parcels in handcarts or on horse-drawn wagons, and its slow pace and high costs had restricted business users of freight service to rail locations in the manufacturing sectors or near the central terminals of the inner city. Small firms were crowded around a downtown post office or inner-city freight yard, more

expensive firms with a steady traffic in whole carloads of material could and did settle on spur tracks in the outer rail sectors.

"Slowly the truck and automobile loosened and broke these constraints.

"Trucks of all sizes could move up to a third of the load of a standard railroad car quickly and cheaply to any destination within a hundred and fifty miles. Overnight trucking service could serve points from two hundred and fifty to three hundred miles apart, and since the perfecting of diesel trucks in the fifties the ranges for both daytime and overnight hauls has been lengthening. Thus a location on any major highway became an excellent departure or terminal point for any except the heaviest freight users, such as lumber mills, foundries, and sugar refineries. At the same time, the widespread private ownership of

automobiles released all but the lowest-paid third of the work force from dependence on the streetcar and rapid-transit lines, which were still running radially from suburbs to downtown. The result since World War II has been a steady and substantial outmigration of firms and, even more significant, the placing of new enterprises wholly outside the bounds of the central core of each metropolis."

What roles, do you think, have the car, the subway, and the airplane played in changing the course of industrial development? Or have they played any roles at all? Can you imagine what effect commercial interplanetary rockets might have in the future?

Abridged and adapted from Sam Bass Warner, Jr., Urban Wilderness, pp 117-118 Copyright © 1972 by Sam Bass Warner, Jr. By permission of Harper & Row, Publishers, Inc

relatively evenly distributed across a country, no single location can be said to be nearest to the market. But the clustering in cities so typical of modern industrial societies pulls manufacturers to the urban centers.

Similarly, the type of market being served can affect the location of industries. Some manufacturers supply highly clustered urban markets, while others, such as the makers of farm machinery, cater to a more dispersed body of consumers. Industries selling goods to dispersed markets have greater freedom in their choice of location.

As a rule, though, we can say that in Western industrial cultures, the greatest market potential exists where the largest numbers of people are found. This is the result of what is sometimes called the *multiplier effect*. Once an industry locates in a particular place, it provides additional jobs, attracting laborers into the area. This additional population in turn enlarges the local market, thereby attracting other industries. In the same way, the industries arriving later attract still more people and still more industries. This is how industrial districts develop, through a snowballing increase in people and industries. It is a process that is very difficult to control in free-enterprise systems, and if it is allowed to run its course, the multiplier effect will produce serious overcrowding and excessively clustered population. This intense concentration of industries and population is characteristic of most industrialized nations. Con-

sequently, most such countries suffer from associated problems such as congestion, inadequate housing and recreational facilities, and extreme local pollution of the environment.

Global Corporations. It must be kept in mind that, increasingly, we can no longer think of decisions on market location, labor supply, or other aspects of industrial planning within the framework of a single plant controlled by a single owner. Instead, we are dealing with a highly complex international corporate structure that plans on a gargantuan scale. As George Ball, former government official and now partner in an international investment banking firm, commented: "Working through great corporations that straddle the earth, men are able for the first time to utilize world resources with an efficiency dictated by the objective logic of profit."

Today, the size of corporate conglomeration is breathtaking. The total sales of global corporations is greater than the gross national product of every country except the United States and Russia. In 1971, for instance, General Motors' gross annual sales of \$28 billion was greater than Switzerland's gross national product of \$26 billion. Some of these giant firms have more power to plan where people will live and work than many governments have. On a world scale, the effect of corporate planning is to internationalize production. This is not surprising. In 1970, the top 298 United States-based corporations earned approximately one-third of their net profits abroad.

These corporate giants based in the United States, Europe, and Japan have such sweeping control over international communications networks, the latest advances in modern technology, and large amounts of investment capital that they have effectively penetrated and often control the economic structures of underdeveloped nations. To suggest the extent of this penetration, two scholars, Richard Barnett and Ronald Miller, quote the following figures: "In Mexico, as of 1970, sixty-seven per cent of the metal-products industry, eighty-four per cent of the tobacco industry, and a hundred per cent of the rubber, electrical-machinery, and automobile industries were under foreign control. In Argentina, global corporations control more than fifty per cent of each company in the top fifty." Since the decision-making mechanisms of these locally based companies are geared toward the profit structure of the parent corporation and not toward the local economies in which they exist, their decisions, some scholars have argued, may well result in the further impoverishment of already poor countries. Certainly, the global corporation has done little to reverse the widening gap between rich and poor nations.

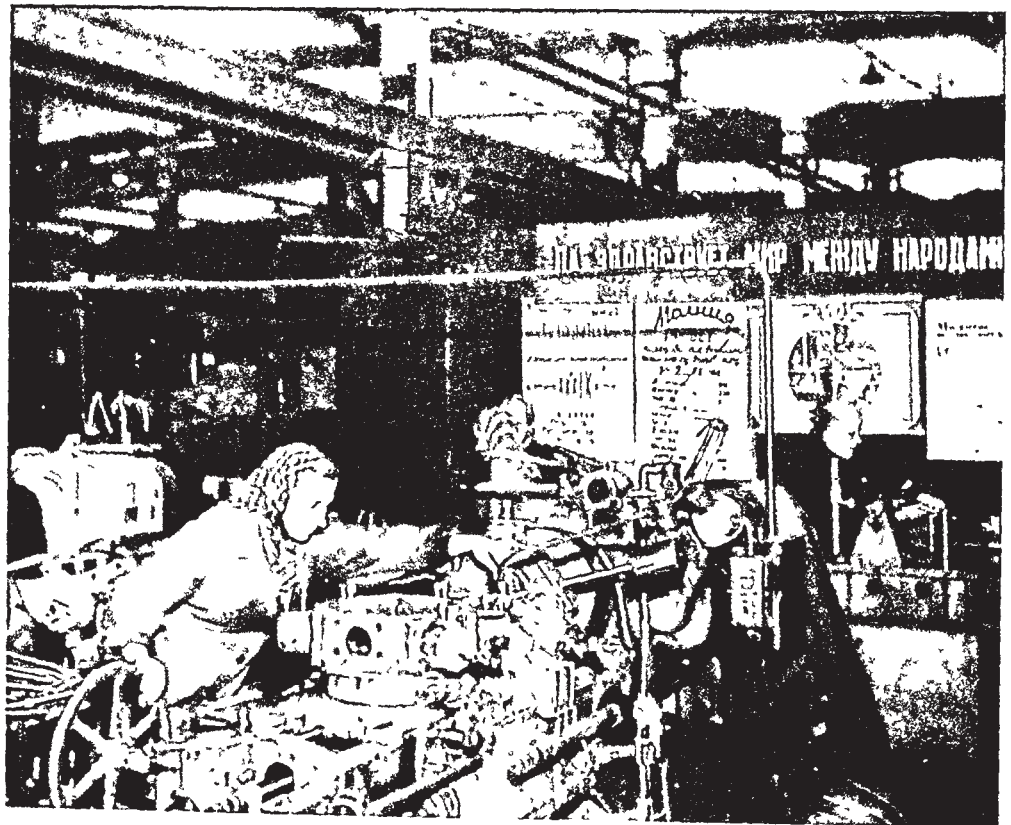
The Political Element in Industrial Location

Political influence on the spatial distribution of industrialization is common. Governments often intervene directly in decisions concerning industrial location. Such intervention typically results from a desire to establish strategic, militarily important industries that would otherwise not develop; to decrease vulnerability to attack by artificially scattering industry to many parts of the country; to create national self-sufficiency

by diversifying industries, to bring industrial development and a higher standard of living to poverty-stricken provinces, to place vital strategic industries in remote locations, far removed from possible war zones, or to halt the multiplier effect in existing industrial areas. Such governmental influence is most pronounced in highly planned economic systems, particularly in Communist or socialist countries such as the Soviet Union and China, but it can be seen to some extent in almost every industrial nation.

The existence of armaments factories in the Republic of South Africa, a country that fears a possible United Nations arms embargo, is a good example of the artificial development of government-encouraged strategic industries. The scattering of industry in the Soviet Union, motivated partly by a desire to lessen the catastrophic effect of a military attack, is another. The development of a major industrial complex in the Soviet Ural Mountains, deep in the interior of the country, was partially in response to the German military advance in 1941. For similar strategic reasons, the United States government during World War II encouraged the development of an iron and steel industry in Utah, an economically "inefficient" location that would not have attracted such industry without government intervention. The American aircraft industry was similarly dispersed as a result of government policy. The peacetime Italian government has deliberately caused industries to be established in the impoverished southern part of the country in an effort to improve the

In the Soviet Union the government has supervised the location of industry. These women work in a machinery plant near Moscow. What role does the American government play in the location of industry?



standard of living there. Similarly, the American government has encouraged new industrial development in economically depressed Appalachia. The United Kingdom, with some limited success, has attempted to retard further industrial development in existing population centers, causing many new factories to be situated in rural or small-town areas.

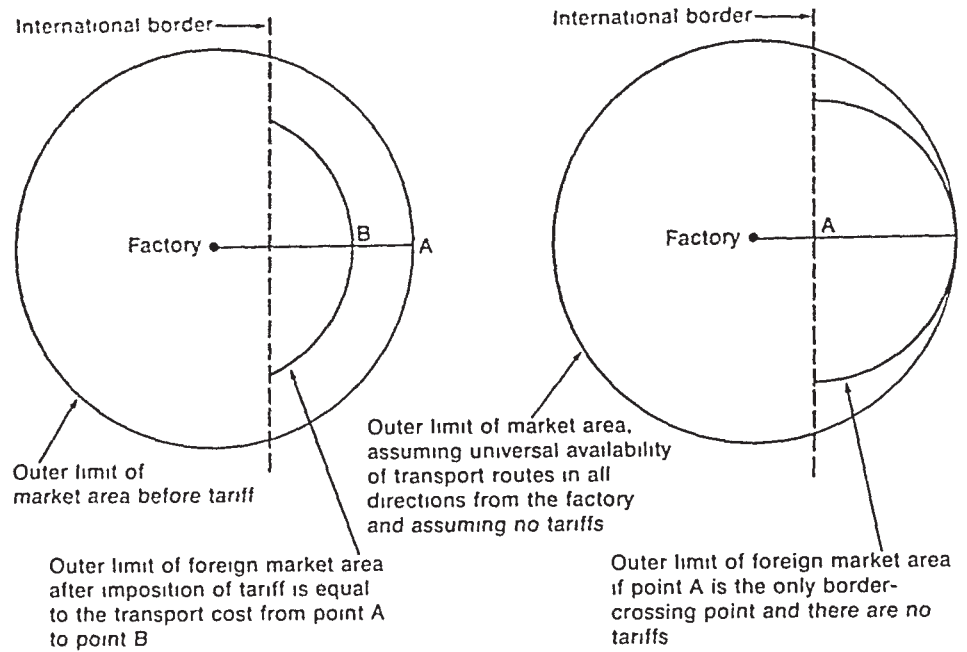
A problem common to attempted industrialization of poverty regions is *multiplier leakage*. Capital is invested in the economically depressed areas, but most of the profits tend to flow back to the dominant industrial areas, with the result that the "prosperity gap" between the two areas actually increases rather than decreases.

Local and state governments are often directly involved in efforts to influence industrial locations. Action by such governments sometimes takes the form of tax concessions, such as those granted by a number of states, counties, and cities in the United States. These concessions commonly last for a specified period of time, frequently ten years or less, and are designed to persuade industries to locate in areas under their jurisdiction. Conversely, governments can act to prevent the establishment of industries viewed as undesirable. A beer brewery, for example, could be kept out of an area where influential local church leaders had prohibitionist views and brought their influence to bear on government officials. Oil refineries and "superport" facilities for large tankers are presently being blocked from New England by state action, and some American municipalities have refused to allow development of particularly pollution-prone industries such as copper smelters and paper mills.

Another type of government influence comes in the form of tariffs, import-export quotas, political obstacles to the free movement of labor and capital, and various types of hindrance to transportation across borders. Tariffs, in effect, reduce the size of a market area proportional to the amount of tariff imposed (see Figure 12-10). A similar effect is produced when the number of border crossing points is restricted. In some parts of the world, especially Europe, the impact of tariffs and borders on industrial location has been greatly reduced by the establishment of free-trade blocs, groups of nations that have banded together economically and abolished most tariffs. Of these associations, the European Common Market is perhaps the most famous. Composed of nine nations of non-Communist Europe, the Common Market has succeeded in abolishing most tariffs within its area.

Industrialization as an Agent of Cultural Change

In all of these ways, then, different aspects of culture influence industrial location. But equally pronounced are the effects of industry on culture. Indeed, industrialization is the most potent and effective agent of cultural change ever to operate. Entire cultures have been reshaped as a consequence of the industrial revolution. Traditions thousands of years old have been discarded almost overnight. Much of the replacement of folk culture by popular culture can be attributed at least indirectly to the industrial revolution. With spreading industrialization went the most concentrated burst of invention in history. From the steamship and the simple tack to the revolver and the ballistic missile, from the typewriter



and the rotary printing press to the computer and the atom bomb, the list of innovations is almost endless.

Some of the more important and far-reaching changes brought by industrialization include increased interregional trade and intercultural contact, basic alterations in employment patterns, a shift from rural to urban residence for vast numbers of people, the release of women from the home, the ultimate disappearance of child labor, an initial increase in the rate of population growth followed by a drop to unprecedented low birth rates, greatly increased individual mobility and mass migrations of people, a decline in the role of organized religion, the decline of the multigeneration family, greatly increased educational opportunities for the nonwealthy, and an increase of government influence and functions.

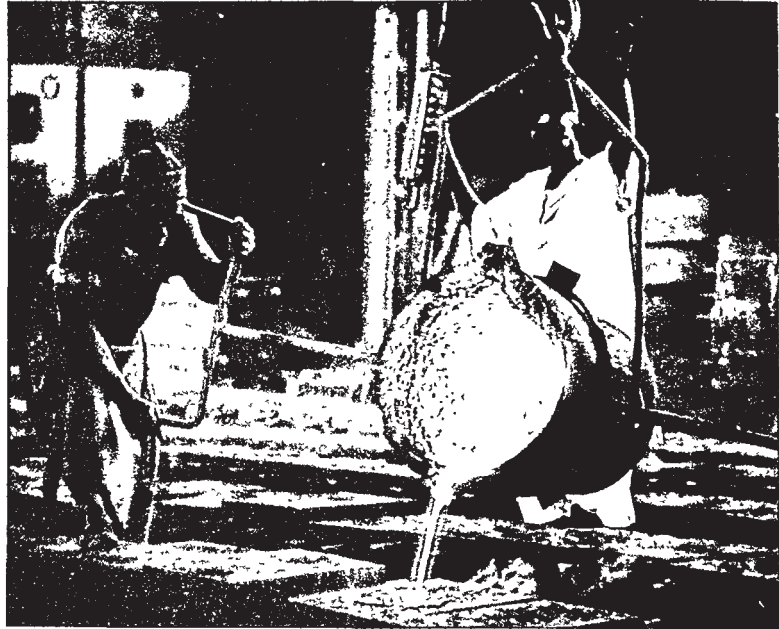
Perhaps the most basic change, however, is in the way people make their living. Industrial development in a region typically produces a restructuring of employment. A marked increase occurs in the proportion of the labor force employed in secondary and tertiary activities, as well as in such primary activities as lumbering and mining. There is a resultant decline in agricultural employment. Worker productivity increases greatly, both in industry and agriculture, mainly due to the adoption of machinery in the production process. This increased productivity allows the number of children and elderly persons in the labor force to decline substantially, but the number of women working outside the home increases.

The large-scale expansion of interregional trade is largely due to industrialization, for no industrial region is self-sufficient. Each must rely on other regions for raw materials, foodstuffs, laborers, and markets. Such trade contacts, often between peoples with very different cultural

FIGURE 12-10

The impact of political borders on market area is illustrated in this diagram. The presence of a political border reduces the market area of a factory if a tariff is imposed or if the number of border-crossing points is restricted. As a result, factories tend not to be located in border zones (After Herbert Giersch, "Economic Union Between Nations and the Location of Industries," Review of Economic Studies, 17 (1949-50), 87-97.)

Industrialization brings culture change. Today we see men in Senegal, Africa, pouring molten metal in a factory, but their clothes remind us that only a few years ago their lives and occupations were very different. How is new industrial technology changing your community?



heritages and social patterns, naturally accelerate the processes of cultural diffusion. While intercultural contacts can serve to reduce prejudice and suspicion, too great a dependence upon an unfamiliar people for basic necessities can result in feelings of hostility if one or both trading partners feel taken advantage of. The rise of anti-Arab sentiment in the United States in the 1970s is in part the result of greatly increased oil prices.

Before the industrial revolution, education was a luxury available only to the wealthy. In an industrial society, however, worker productivity is closely related to the educational level of the labor force. This recognition has led all industrial countries to devote large portions of their financial resources to the support of education. This has been facilitated by release of children from the labor force.

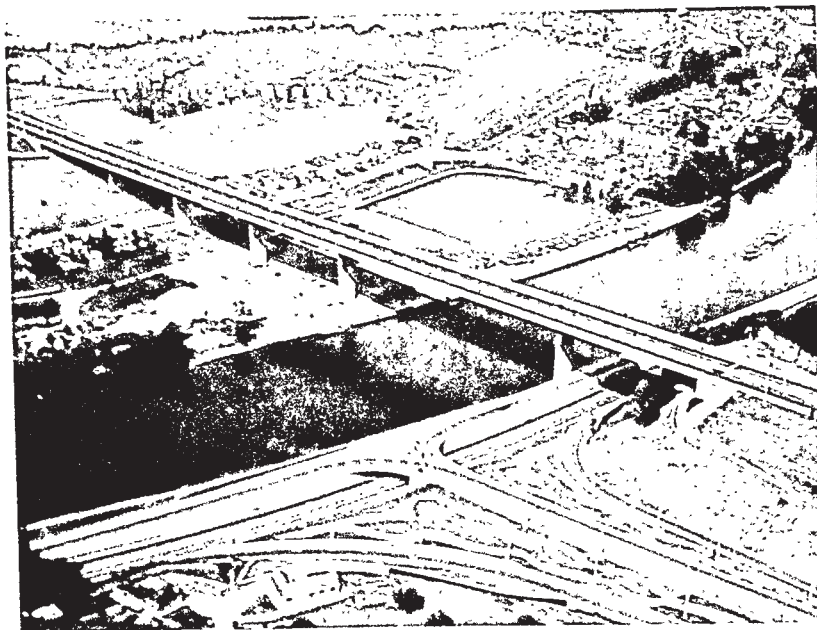
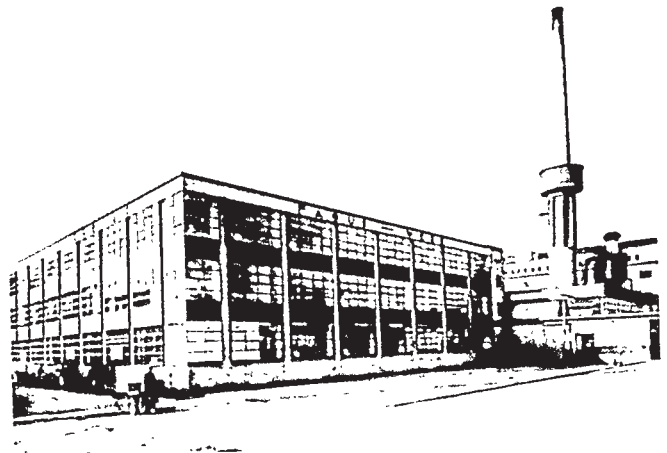
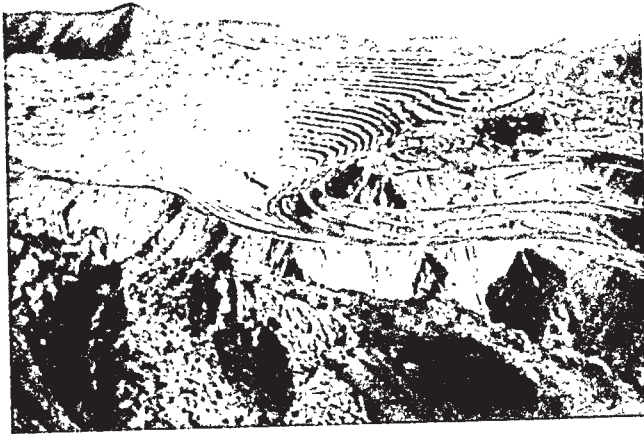
As a rule, people strongly resist substantial changes in their basic cultural patterns unless some immediate and great personal benefit is perceived. It is some measure of the appeal and promise of the industrial revolution that so many people in such a great variety of cultures have been willing to discard tradition in order to adopt this new way of life.

INDUSTRIAL LANDSCAPES

The industrial landscape is part of our daily life, for industry is a prominent and often disturbing visible feature of our surroundings. It is a landscape not normally designed for beauty, charm, or aesthetic appeal, but rather for utility. Often it is, by almost anyone's standards, ugly. As a rule, industrial landscapes are poor places for humans to have to spend their lives.

Each level of industrial activity produces its own distinctive landscape. Primary industries have perhaps the most drastic impact on the land. The resultant landscapes contain slag heaps, strip-cut commercial forests, massive strip-mining scars, gaping open-pit mines, and "forests" of oil derricks. But primary industrial landscapes can also be pleasing, as in the comfortable fishing villages of New England and Portugal.

The manufacturing landscapes of secondary industry are most notable in the form of factory buildings. Some of these are imaginatively designed and well landscaped, others are less appealing and surrounded by grey seas of parking lots. They range from the futuristic, harsh, solid



Industry shapes the landscape in many ways. The vast copper mine in Arizona is a mark of primary industry. The architects, Walter Gropius and Adolf Meyer, designed the German factory above, part of the landscape of secondary industry. This Belgian landscape includes many elements of tertiary activity: roads, highways, a bridge, and river transportation. How has industry modified the landscape around your home?

geometry of chemical refineries and formless, stark “brick-pile” factories to award-winning structures designed by famous architects.

Manufacturing landscapes first appeared in Britain, since that island was the first area touched by the industrial revolution. It is interesting to observe how British poets and artists of the eighteenth and nineteenth centuries reacted to the emerging manufacturing landscape. Poets and artists are widely acknowledged to be aesthetically sensitive and more perceptive than the average person, so their reactions should interest us. Geographers Gary Peters and Burton Anderson studied the works of such writers and painters. They found that after an early period of optimism about industrialization, some poets and artists quickly sensed that something was amiss in the landscape. Their warnings, in the form of paintings and poems, began appearing in the 1775–1800 period. Typical is the description of an iron foundry written by the poet Robert Burns in his native Scottish dialect:

We cam na here to view your warks,
In hopes to be mair wise,
But only, lest we gang to Hell,
It may be nae surprise.

Some artists of the period left us paintings that convey a sinister, foreboding, unpleasant landscape. By the time ordinary people began to see with the eyes of poets and artists, the manufacturing landscape was seemingly out of control, and much of the British industrial region was already known, appropriately, as the “Black Country.”

The tertiary landscape is quite varied. Its visual content includes elements as diverse as high-rise bank buildings, hamburger stands, and the concrete and steel webs of highways and railroads. Some highway interchanges can only be described as a modern art form. But perhaps the aesthetic high point of the tertiary landscape is found in bridges, often graceful and beautiful structures. There are few sights of the industrial age that can match a well-designed rail or highway bridge.

Industrialization has even changed the way we view the landscape. As the geographer Yi-Fu Tuan has commented, “it was only in the early decades of the twentieth century that vehicles began to displace walking as the prevalent form of locomotion, and street scenes were perceived increasingly from the interior of automobiles moving staccato-fashion through regularly paced traffic lights.” Los Angeles, the ultimate automobile city, is perhaps the best example of the new viewpoints provided by the industrial age. Its freeway system allows individual motorists to observe their surroundings at nonstop speeds up to fifty-five miles per hour. It also allows the driver to look *down* on the world. The pedestrian, on the other hand, is slighted. The view from the street is not encouraged. In some areas of Los Angeles, streets actually have no sidewalks at all, so that the nonautomobile viewpoint is functionally impossible. In other areas, the layout of the main avenues has been planned with the car in mind, and the pedestrian is likely to feel ill at ease amid the nonhuman surroundings—noise, traffic jams, drive-in banks, and parking lots. Often the shopping street is no longer scaled to the pedestrian—Los Angeles’s Ventura Boulevard extends for fifteen miles.