When Cities Take Bicycles Seriously

By making room for bikes—and putting their own employees on them—city officials are finding a simple, cheap, and effective remedy for the urban car disease.

by Gary Gardner

In late November 1997, President Jiang Zemin of China ducked into an art gallery in Vancouver, where he had come for a meeting of the Asia-Pacific Economic Cooperation forum. The gallery visit was unannounced, but Jiang was soon recognized and a crowd quickly gathered. Worried about the president's safety—Jiang had been the target of various protests at previous stops—Vancouver police called in their Quick Response Team to ensure his protection. Forty-five members of the elite unit arrived swiftly, in spite of congested traffic, and instantly established a metal and rubber barrier between the crowd and the gallery. The president finished his tour, climbed into his limousine, and left without incident.

The police outside the gallery made up the department's bicycle squad, which had been designated the first line of defense to protect the 18 heads of state that attended the conference. Recognizing the bicycle as a superior form of urban transport and an effective policing tool, city officials gave it a central role in police protection for the international meeting.

Vancouver's policy exemplifies the growing recognition that bicycles have a natural place in cities—indeed, in many instances they outperform other forms of urban transport. Bicycles are inexpensive, clean, fast by urban standards, require cheaper infrastructure than cars do, and contribute to the health of the rider. Moreover, they can help calm a city and add a sense of community to it—less tangible but no less valuable improvements in the quality of urban life.

While bicycles are just one species in the "ecology" of urban transportation, their multiple advantages make them especially attractive for short commutes, deliveries, and even some hauling chores. Where cities have understood this, especially in northern Europe, the bicycle has assumed an important presence in the urban transportation network. Indeed, due to years of support from citizens and local officials, bicycles now account for 20 to 30 percent of all trips in major cities in the Netherlands, Denmark, and Germany. In many Asian cities the bicycle's share of trips is even higher, accounting for more than half of all trips in some Chinese cities, for example.

On the other hand, city hall sometimes wields its clout against bicycles. Guangzhou, Shanghai, Ho Chi Minh City, Jakarta, and Dhaka have all restricted bicycle use this decade in response to the gridlock created by a surge in motorbikes and autos. In Jakarta, for example, some 20,000 bicycle rickshaws were tossed into Jakarta Bay in the 1980s, and another 30,000 were confiscated, in an official effort to rid the city of this "backward" technology. In Viet Nam, the combined effect of municipal policies and increased prosperity has proven lethal for bikes: their share of trips dropped by a third between the mid-1970s and the mid-1990s. The trend mimics the practice of cities in some industrialized countries, where urban development long ago relegated the two-wheeler to a distant third as a mode of transportation, behind cars and mass transit. Indeed, bicycles are used for less than 1 percent of all trips in Canada and the United States today.

ILLUSTRATIONS BY PATRICK GNAN

Because local authorities have jurisdiction over areas where most "bikeable" trips are made, they wield considerable influence over the fate of cycling in their cities. But a number of factors may influence the decisions of city hall. Often bicycles have not gained a cultural acceptance, or they are perceived as a poor person's means of transit. In other instances, pro-bicycle policies are paved over by interests such as the construction and auto industries. On the other hand, citizen activism is often an important grassroots impetus for pro-bike city action. And national and provincial governments also have their say: the 1998 U.S. transportation bill, for example, commits at least $1.5 billion for bicycle and pedestrian funding, a shot in the arm to budget-strapped state and local governments.

Even so, local support is a key "limiting factor" in a city's transportation system, akin to levels of sunlight or precipitation in a natural ecosystem—elements that determine which species prosper and which fail. Whether a city succumbs to the pressures of auto-centric growth, or whether it becomes "bike friendly"—the choice is often made by local government. And municipal workers, such as bike police, can showcase—or not—the bicycle's versatility and destigmatize its use. Following such efforts, cities in Germany, for example, have seen a 50 percent average increase in cycling since 1972 (see table, page 19). But without the active backing of city hall, bicycles are typically marginalized by more powerful transportation interests. City hall, it seems, is the key to unlocking the bicycle's potential.

An Urban Invasive Species

Many of the ills that plague cities today are linked to transportation systems that give undue privilege to automobiles. Like an invasive species, cars now dominate many urban "ecosystems," reducing transportation diversity and creating a host of problems throughout the larger urban environment. In the United States, auto dominance is extreme: the car's share of trips rose from 67 percent in 1960 to 87 percent in 1990, while all other modes of transportation saw their shares decline. Other countries, especially in Asia, are also witnessing a rise in the car's influence. But an increase in cars means an increase in car trouble.

Air pollution, much of it from auto exhaust, is a chronic health hazard in scores of cities in developing countries. Even in the United States, despite several decades of improved air quality, one-third of Americans in 1995 lived in counties that failed to meet federal clean air standards. Traffic is responsible for 15 to 20 percent of emissions of carbon dioxide, the gas that is the main cause of climate change.

In many areas, the car also underlies a vicious circle of urban sprawl: popular acceptance of the car as the means of commuting encourages suburban development at substantial distances from the urban core. The development increases traffic congestion, thereby creating demand for more roads. And the roads, in turn, allow for even more far-flung development. Between 1983 and 1990, for example, the average U.S. commute grew by more than 30 percent, to 17.6 kilometers.

What's bad for commuters is also bad for the land. Traffic congestion—and the resulting demand for asphalt—can put intense pressure on farms and green spaces. Between 1989 and 1994, for example, in the six Asian countries where data are available, the increase in cars would have required more than 1.4 million hectares of new roads to prevent an increase in congestion. Pent-up demand on that scale can be very difficult to ignore.

And just as bikes tend to pull communities together, cars tend to take them apart. Cars are often blamed for social isolation and a loss of community, both because of their high degree of privacy and because they put great distances between residences and community centers.

Given these ills, it is unlikely that the automobile will ever become the world's principal mode of transportation. A world of 10 billion people, with as many

cars per person as in the United States, would be overrun with 5 billion cars—ten times more than today's already problematic stock. Despite the folly of stuffing cities with cars, the automobile continues to receive special treatment that helps it maintain its dominant position in many countries. Subsidies for gasoline, roads, and parking make cars artificially cheap to operate. Low-density zoning policies conspire with the car's extended range to stretch cities over great distances, which in turn make cars ever more necessary. And the planning bias that favors more and bigger roads over creative management of transportation demand ensures that options like cycling are not given a fair hearing. Take that U.S. transportation bill that included $1.5 billion for bikes and pedestrians: it appropriated 116 times that amount—$174 billion—for highway development.

These systemic concerns are crucial in reassessing the bicycle's role. Because bicycles are just one species of transport in a diverse city landscape, the health of cycling is determined not in isolation, but in relationship to other modes of travel. Cities that have successfully promoted cycling attribute their success to a system-wide focus, which has allowed them to sort out the proper niche for bicycles, buses and subways, taxis, private cars, trucks, and human feet.

Clearly, bicycles are not always appropriate for every person or every trip. The elderly or parents with small children, for example, are unlikely to find cycling viable for many of their needs. Likewise, hilly cities or cities with particularly rainy or humid weather may not provide ideal biking conditions. But in most cities, bicycles can play a valuable role in a growing variety of trips.

Cities: A Bicycle's Natural Habitat

Bicycles are as natural to urban transport as wildebeest are to the East African savannah or as salmon are to North America's Columbia River. The close and frequent interactions that characterize urban life carve out a natural niche for the bicycle. Much of urban travel, for example, is "bike-sized": half of all trips in Britain, and 40 percent of those in the United States, are 2 miles (3.2 kilometers) or shorter. Despite the sprawling, low-density development found in the United States, more than a quarter of all trips are under a mile, according to the U.S. Department of Transportation. And citizens regard these distances as "bikeable." For example, most Americans surveyed identify 2-mile trips as bikeworthy, while the Dutch attest to this every day: in the Netherlands, bicycles are used for a third of all trips in the 1.5- to 3-mile range.

Urban travel is also characterized by low average speeds and scarce parking space; both of these factors favor the bicycle. Cycling speeds vary from city to city, but bicycles tend to be competitive with cars for urban trips of about 2 kilometers, and often over longer distances. Indeed, when speed counts over short distances—as with messenger services or pizza delivery—many companies prefer bicycles over cars. And compared to public transportation, bicycles hold their own over much longer trips. In Beijing, for example, bicycles are faster than the bus or subway for trips of up to 6 kilometers and remain competitive with public transportation for journeys of up to 10 kilometers.

In some cities, the role of the bicycle is being expanded to include certain types of hauling. Bicycles will never displace trucks for carrying heavy freight, but the small loads and frequent stops required of some urban deliveries often favor use of a bike. This was the experience of the largest industrial bakery in Bogotá, which replaced 200 delivery trucks with 800 tricycles a few years ago—a move that substantially lowered the cost of deliveries to its 22,000 daily customers. Similarly, a Pepsi distributor in San Salvador found that a bicycle and trailer could deliver 900 cases of soda per month—as many as the previous delivery vehicle, a 5-ton truck, but at a fraction of the expense. The bicycle proved well-suited to deliver quickly to the numerous and closely spaced delivery points (small shops and homes that stock a few items for sale to neighbors). In industrial nations, bicycle-powered courier services are already operating in many cities. It is easy to imagine groceries and other short-haul deliveries being made by bicycle, especially as more consumers turn to shopping by phone or from the Internet.

If cities are a natural environment for bicycles, bikes in turn are good for the urban landscape. Bike traffic is pollution free. Every trip made by a bike instead of a car reduces the environmental burden of low-level ozone, nitrous oxides, carbon dioxide, soot—and noise. Neither electric cars nor high-mileage gas-powered cars can match that achievement. And because bicycles are used for short trips—during which car engines are typically cold and inefficient—increased cycling tends to eliminate the dirtiest trips of all. A study for the state of California, for example, estimated that 90 percent of emissions in a 7-mile (11.2-kilometer) auto trip are generated in the first mile. Similarly, transportation analyst Todd Litman of the Victoria Transport Policy Institute in British Columbia estimates that for every 1 percent of auto trips replaced by cycling, air pollution from cars drops by 2 to 4 percent.

Litman has also compared the costs imposed by cars and bikes on an urban landscape. Using a variety of economic tools to tally the full range of automobile and bicycle costs—from the cost of purchasing and maintaining the vehicles, to the social costs of increased congestion, air pollution, noise, parking, road maintenance, and other impacts—Litman found that a shift from cars to bicycles in North America would save $1.59 per 4-kilometer trip during non-rush hours, and $3.68 per trip during rush hours. Because Americans drive cars and taxis more than 1.5 trillion miles each year, the potential social savings from even a small shift to bikes is gargantuan. If just 5 percent of those miles were shifted to bicycles during non-rush hours, the savings would top $100 billion. Add to this the health and aesthetic benefits of increased cycling (such as a calmer urban core), and the city-bicycle fit is hard to deny. It's as if cities are a kind of natural habitat for bikes.

Increase in Share of Trips Made by Bike, Selected German Cities

City	Mid-1970s	Early 1990s
	(percent)	
Munich	6	15
Nuremberg	4	10
Cologne	6	11
Freiburg	12	19
Essen	3	5
Bremen	16	22
Muenster	29	32
Average for all urban areas in western Germany	8	12

SOURCE: John Pucher, "Bicycling Boom in Germany: A Revival Engineered by Public Policy," *Transportation Quarterly,* Fall 1997.

Restoring Bicycles to Their Habitat

While bicycles have a "natural" place in an urban environment, obstacles to their use are making them an endangered species in many cities. Much as dams on the Columbia River have reduced salmon populations by 90 percent, poorly planned freeways and other car-centered infrastructure have spoiled the bicycle's urban niche, consigning many bicycles to basements or garages. Evidence of the dormant cycling potential in the United States is found in the U.S. Department of Transportation's National Bicycling and Walking Study (NBWS), which reported in 1994 that only 5 percent of Americans rely on cycling or walking as their main form of transportation, but 13 percent would *prefer* to cycle or walk.

What will it take to tap in to this latent interest, and restore the bike's urban niche? Topping the list of cycling obstacles cited in the study are "concerns about safety" and "excessive trip length or duration." Such concerns appear to be responsible for suppressed levels of cycling in other countries as well. Both types of objections can be at least partly answered on a local level. Cities can address safety concerns by making room for bicycles on city streets or by building bikeways. Distance issues can be handled by zoning for compact development and by effectively linking bicycles with mass transit—providing ample, secure parking for bikes at subway and train stations, for example, or even allowing bikes to be taken aboard.

The NBWS asserts that dedicated cycling space increases the perception of cycling safety, and may be an important incentive for increasing bicycle use. The survey found a strong correlation between the size of

a bikeway network and the amount of bicycle commuting. More impressive is the experience of the Netherlands, where officials doubled the total length of the national bike path network between 1978 and 1992, and found that fatalities dropped by 30 percent and injuries by 25 percent—even as the number of kilometers cycled increased by 30 percent. Its cycling infrastructure is one reason the Netherlands has among the highest rates of bike use in the world: nearly 30 percent of all trips are made by bicycle, with some cities reporting cycling rates of over 40 percent.

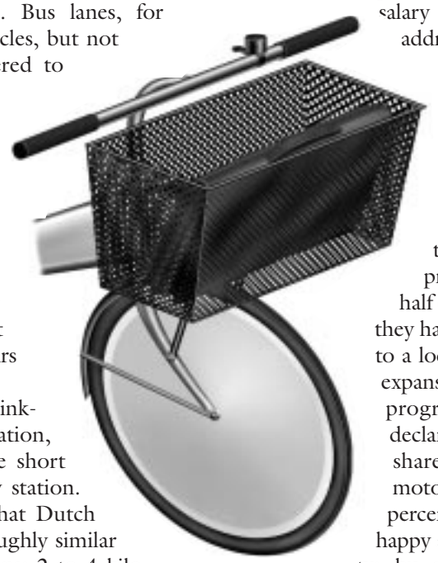
Often, simpler changes—even as simple as changing street signs—can be used by cities to facilitate cycling. Urban planning professor John Pucher of Rutgers University has documented the inexpensive but effective changes that Muenster, Germany uses to complement its bikeway network. Bus lanes, for example, may now be used by bicycles, but not by cars. Traffic lights are engineered to give priority to bikes. Some streets are designated one-way for cars but two-way for bikes. "Traffic calming" measures on residential streets limit cars to speeds of 30 kilometers per hour. And special lanes near intersections feed cyclists to a stop area ahead of cars, while an advance green light for cyclists ensures that they get through the intersection before cars behind them begin to move.

Some cities facilitate cycling by linking bicycles and public transportation, which helps bicycles "capture" the short trips to or from a train or subway station. Interestingly, the NBWS reports that Dutch and American commuters travel roughly similar distances to reach commuter stations: 2 to 4 kilometers. But the Dutch tap the cycling potential of these trips far more readily than Americans do. For every car that delivers a passenger to a Dutch railway station, three bicycles arrive. In U.S. cities, bicycles typically account for a negligible share of these feeder trips.

One key to establishing the "bike and ride" link is adequate bicycle parking. Extensive bicycle parking facilities—often with thousands of spaces—are now standard at Dutch, Japanese, Danish, and German train stations. In Japan, local governments have been key in providing these facilities. Until 1978, most rail station bicycle parking facilities in that country were privately owned and in very short supply. By the early 1990s, cities and towns owned three-quarters of the parking supply at rail stations, the result of a major program to expand capacity (with subsidies from prefectural and national governments). The number of train station spaces rose from some 600,000 in 1977 to nearly 2.4 million in 1987, an increase that is credited with maintaining the continued high levels of railway use in Japan, despite rising levels of car ownership.

And of course, it is much cheaper to provide bike parking than car parking. Construction of covered and locked bike racks costs from $50 to $500 per space—a fraction of the $12,000 to $18,000 it costs to build garage space for each car. The savings in land are similarly huge: bike parking facilities provide one or two spaces for each square meter of land used; in car lots, the ratio typically works out to one space for every 30 square meters of land.

In some places, the greatest obstacle to cycling is also the simplest: lack of a bicycle. In many developing countries, bikes may be absent from the urban landscape because they can cost a month's salary or more. Lima, Peru has addressed this issue by setting up a micro-credit program to facilitate bike purchases, with 12-month loans of $100 available to low-income citizens. The city is capitalizing on Limeños' desire to bike: two-thirds of men in the project area and more than half of the women would cycle if they had access to a bike, according to a local survey. Together with an expansion of bikeways, the loan program is part of the city's declared effort to increase the share of trips made by non-motorized transport from 2 to 10 percent. The program also has the happy advantage of fighting poverty: by eliminating dependence on public transportation, which runs about $25 per month, workers making $200 per month would see their income effectively rise by 8 percent during the repayment period, and by more than 12 percent once the loan is paid off.



Sometimes the lack of a bicycle is a temporary situation, as with the commuter who leaves his bike at the train station in the morning but needs it to make a cross-town trip at lunchtime. Some cities have found solutions for this problem as well. Copenhagen's City Bike program, for example, makes 2,300 bicycles available for public use at 120 racks around the city. Users pay 20 krona (about $3) to check out a two-wheeler, but the fee is refunded when the bike is returned (often in a different part of the city). The bikes are popular among tourists, but are meant for use by the average Dane as well: the basket, for example, was designed to hold a briefcase, and business people commonly hop on them. After three years, the program is considered a major success. Support is so strong that the fleet has more than doubled in size. And the bikes are intensively used: a Danish newspaper reported that the City Bike it tracked for 12 hours spent only 8 minutes at bike stands waiting for new patrons. In addition, bicycle thefts—a major problem in Copenhagen before the program began—fell by 18 percent in the first year of operation, and 26 percent in 1996. City Bikes are covered with advertising, on both their frames and wheels, so they're too conspicuous to steal. And their availability has apparently made a good deal of private bike theft unnecessary.

Copenhagen's program is a public-private partnership. Businesses purchase the specially-made bicycles, in return for that advertising space. For its part, the city converted car parking spaces to bike racks, contributed some of the $600,000 in start-up funding for the racks and routes, and maintains the bicycles to keep the fleet in good working order. Supporters view the city's active backing as essential for the program's success.

Municipal Workers: Planting the Seeds

No matter how good the infrastructure or how convenient the cycling, bicycles will not be used if the local culture does not welcome them, as is the case in many societies. The U.S. transportation department's study reported that Americans, for example, view cycling for transport or work as "uncool", a "children's activity", or "socially inappropriate for those who can afford a car". And some African cultures regard cycling as inappropriate for women, despite the bicycle's potential usefulness to women in their role as the principal transporters of many goods. City government can make a difference here too—by using bicycles in its own work to lend legitimacy to cycling.

Bicycles are largely untapped as a form of official transport, but their potential applications are broad. City inspectors, health workers, meter readers, parks and recreation officials, paramedics, and a host of other employees could use bikes for at least some of their work. Indeed, there are already isolated instances of such uses in various cities around the world. And in several countries, it is the city police departments, such as the one in Vancouver, that have shown the greatest interest in bikes' advantages. A relatively recent phenomenon, bicycle use by police departments has mushroomed in the past decade. The International Police Mountain Bike Association (IPMBA), formed in 1992 to provide information and training to police bicycle patrols, estimates that more than 2,000 police departments in the United States, Canada, Australia, Iceland, and Russia have bicycle units, with some 10,000 officers on bikes. Most of these patrols have been added in the 1990s, with IPMBA membership growing more than ninefold since 1992.

Because official use of bicycles is so new, there is little hard evidence that police cycling leads to increased bicycle use by the general public. But bicycle companies are betting that such a demonstration effect exists. An industry newspaper reports that three dozen bicycle and accessory companies paid for booth space at the 1998 IPMBA conference to peddle their wares to police departments, in part because, as one sales rep explained, a cycling officer is "advertising you can't pay for." Another noted that officers work eight hours a day "promoting cycling and reaching a broader market." And cycling officers confirmed the industry view: "The public sees us riding Treks and they ask us how we like our bikes. The next thing you know, they are riding Treks." If such anecdotal evidence is close to the mark, the evangelizing effect of general bike use by city governments could be very substantial indeed.

Although the full extent of the demonstration effect remains to be measured, other compelling reasons for city use of bikes can be cited, such as major increases in productivity. More than half of police departments surveyed by IPMBA, for example, saw a jump in arrest rates—by an average of 24 percent—when bicycles were introduced into patrol areas. Arrests then fell, and crime stabilized, reportedly due to the bicycle's deterrent value. The secret to this effectiveness is stealth: a bike cop sees more, and is seen less, than a colleague in a car. In Fort Lauderdale, this nimbleness has produced a 30 percent increase in "self-initiated calls"—those that are not assigned by a central dispatcher.

Similarly, parking enforcement employees in downtown Vancouver have proven more productive on bikes. Cycling officers easily navigate congested downtown areas and do not lose time searching for parking spaces. These officers make rounds four or five times per shift, in contrast to the two or three times typical of car-bound workers. As a result, one officer estimates that the increased access has boosted his revenue collections by two-thirds. Such increases in productivity could be boosted further with the adoption of electric bicycles, which achieve speeds of up to 24 kilometers per hour without pedaling, and even faster with pedaling. The added power extends a bike's range and allows it to tackle hilly terrain, which expands its usefulness for city workers—and commuters.

Some productivity increases are less measurable, but no less valuable. City after city reports that eliminating the physical and psychological barrier of a patrol car has made police more approachable and improved community relations. In the words of one officer, citizens "don't have the same attitude of hostility that we're out there to do something to them. They can see that we're professionals out there to do

something *for* them." Indeed, cops on bikes seem to capture the best of two eras: the community relations edge of the old beat-walking policeman, and the mobility of the modern officer.

These police patrols also create a model for the economic and environmental benefits of biking. Bicycles are much cheaper to purchase and maintain than cars, although the two can be difficult to compare on a one-to-one basis (cars often carry two officers, and cars work all shifts, while 15 percent of police bike patrols are idle at night). Nevertheless, IPMBA estimates that 10 to 15 bike officers can be fully outfitted for the cost of one patrol car. One patrol car costs about $23,000 and requires $3,000 to $4,000 each year in maintenance costs. On the other hand, one police bicycle costs about $1,000 and requires $100 each year in maintenance. Vancouver police have eliminated one car for every eight officers on bikes, while the Dayton, Ohio police department equipped its 25-member bicycle staff for just over the cost of one patrol car.

Police departments also demonstrate how bikes offer major savings on operational expenses. The average car costs 12 cents per mile to run, according to transportation analyst Todd Litman. But bicycles operate for about a penny per mile. This cost gap is conservative, however, because bicycles eliminate the shortest, most inefficient auto trips. For these short hauls, Litman estimates that bikes are up to 24 times cheaper to operate than cars.

Bicycles will never entirely replace a city's municipal auto fleet, but they can complement it. Bike police, for example, may make more arrests, but they require colleagues in cars to transport suspects back to headquarters. Still, police departments are showing how effectively cycling can complement other forms of transport. Such efforts are beginning to restore bicycles to their urban niche.

Nurturing A Bicycle Niche

While many cities now have a smattering of probiking policies, these are usually insufficient to reestablish a cycling presence. A piecemeal approach will not restore bicycles to cities any more than peppering the Columbia River with fish food will bring back salmon. Thus, many cities build bike paths, or promote bike-and-ride commuting, or put police on bikes. But few take all of these initiatives, and fewer still coordinate these with other urban policies that affect cycling. Only when transportation is planned comprehensively—with attention to all options for managing transportation demand—will the natural place of the bicycle become evident, and the obstacles to biking be removed.

Some of the policy initiatives that help to reestablish a cycling niche are only indirectly related to cycling. Charging drivers for parking—or providing the cash equivalent of parking subsidies to those who do not drive—could tip transportation choices away from cars, and possibly to bikes. Encouraging high-density development would result in more bike-sized trip distances. Surveying riders periodically about problem areas for cyclists would ensure that a cycling perspective is included in all traffic planning. And adopting "traffic calming" measures in residential areas by building traffic circles or reducing speed limits would make streets more bicycle-friendly. In combination with policies that promote cycling directly, these measures are powerful tools for establishing and maintaining the bicycle's niche.

By 2025, the share of people living in cities is expected to reach 5 billion. As cities cope with this growth, the need to move away from auto-centered transport will be increasingly apparent. Many cities in Asia continue to be successful models of urban bicycling, despite growing pressures to shift to auto-centered transportation systems. And cities in northern Europe have begun to experience a cycling renaissance, as more and more people discover the benefits of bicycling. There is no reason why cities in the rest of the world cannot raise cycling levels substantially above their current anemic levels. To the extent that they do so, and to the extent that Asian and European cities preserve their cycling, the bicycle will make the urban habitat, now home to nearly half of humanity, a far more livable space.

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Further Reading

Anton G. Welleman, Cees J. Louisse and Dirk M. Ligtermoet, "Theme Paper 5: Bicycles in the Cities" in Stephen Stares and Liu Zhi, eds., *China's Urban Transport Development Strategy: Proceedings of a Symposium in Beijing*, November 8–10, 1995, World Bank Discussion Paper no. 352 (Washington, DC: World Bank, 1996).

John Pucher, "Bicycling Boom in Germany: A Revival Engineered by Public Policy," *Transportation Quarterly*, Fall 1997.

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