

Sustainable Transport:
A Sourcebook for Policy-makers in Developing Cities
Module 1a

The Role of Transport in Urban Development Policy

– revised July 2005 –



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Sustainable Transport: A Sourcebook for Policy-Makers in Developing Cities

What is the Sourcebook?

This *Sourcebook* on Sustainable Urban Transport addresses the key areas of a sustainable transport policy framework for a developing city. The *Sourcebook* consists of more than 20 modules.

Who is it for?

The *Sourcebook* is intended for policy-makers in developing cities, and their advisors. This target audience is reflected in the content, which provides policy tools appropriate for application in a range of developing cities.

How is it supposed to be used?

The *Sourcebook* can be used in a number of ways. It should be kept in one location, and the different modules provided to officials involved in urban transport. The *Sourcebook* can be easily adapted to fit a formal short course training event, or can serve as a guide for developing a curriculum or other training program in the area of urban transport. GTZ is elaborating training packages for selected modules, being available since October 2004.

What are some of the key features?

The key features of the *Sourcebook* include:

- A practical orientation, focusing on best practices in planning and regulation and, where possible, successful experience in developing cities.
- Contributors are leading experts in their fields.
- An attractive and easy-to-read, color layout.
- Non-technical language (to the extent possible), with technical terms explained.
- Updates via the Internet.

How do I get a copy?

Please visit <http://www.sutp.org> or <http://www.gtz.de/transport> for details on how to order a copy. The *Sourcebook* is not sold for profit. Any charges imposed are only to cover the cost of printing and distribution. You may also order via transport@gtz.de.

Comments or feedback?

We would welcome any of your comments or suggestions, on any aspect of the *Sourcebook*, by e-mail to transport@gtz.de, or by surface mail to:

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Further modules and resources

Further modules are anticipated in the areas of *Financing Urban Transport*; *Benchmarking*; and *Car Free Development*. Additional resources are being developed, and an Urban Transport Photo CD-ROM is available.

Modules and contributors

Sourcebook Overview and Cross-cutting Issues of Urban Transport (GTZ)

Institutional and policy orientation

- 1a. *The Role of Transport in Urban Development Policy* (Enrique Peñalosa)
- 1b. *Urban Transport Institutions* (Richard Meakin)
- 1c. *Private Sector Participation in Transport Infrastructure Provision* (Christopher Zegras, MIT)
- 1d. *Economic Instruments* (Manfred Breithaupt, GTZ)
- 1e. *Raising Public Awareness about Sustainable Urban Transport* (Karl Fjellstrom, GTZ)

Land use planning and demand management

- 2a. *Land Use Planning and Urban Transport* (Rudolf Petersen, Wuppertal Institute)
- 2b. *Mobility Management* (Todd Litman, VTPI)

Transit, walking and cycling

- 3a. *Mass Transit Options* (Lloyd Wright, University College London; Karl Fjellstrom, GTZ)
- 3b. *Bus Rapid Transit* (Lloyd Wright, University College London)
- 3c. *Bus Regulation & Planning* (Richard Meakin)
- 3d. *Preserving and Expanding the Role of Non-motorised Transport* (Walter Hook, ITDP)
- 3e. *Car-Free Development* (Lloyd Wright, University College London)

Vehicles and fuels

- 4a. *Cleaner Fuels and Vehicle Technologies* (Michael Walsh; Reinhard Kolke, Umweltbundesamt – UBA)
- 4b. *Inspection & Maintenance and Roadworthiness* (Reinhard Kolke, UBA)
- 4c. *Two- and Three-Wheelers* (Jitendra Shah, World Bank; N.V. Iyer, Bajaj Auto)
- 4d. *Natural Gas Vehicles* (MVV InnoTec)
- 4e. *Intelligent Transport Systems* (Phil Sayeg, TRA; Phil Charles, University of Queensland)
- 4f. *EcoDriving* (VTL; Manfred Breithaupt, Oliver Eberz, GTZ)

Environmental and health impacts

- 5a. *Air Quality Management* (Dietrich Schwela, World Health Organisation)
- 5b. *Urban Road Safety* (Jacqueline Lacroix, DVR; David Silcock, GRSP)
- 5c. *Noise and its Abatement* (Civic Exchange Hong Kong; GTZ; UBA)

Resources

6. *Resources for Policy-makers* (GTZ)

The Role of Transport in Urban Development Policy

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About the author

Enrique Peñalosa is an accomplished public official, who has demonstrated the success of his innovative ideas and management abilities; he completed his term as Mayor of Bogotá, Colombia on January 1, 2001. Soon after Mr. Peñalosa ended his term as Mayor, he became a visiting scholar at New York University, where for three and a half years he was doing research and writing a book on a new urban-development model for Developing Country Cities. During the same period he served as a consultant on urban development issues in Asia, Africa, Australia, Latin America, Europe and the USA. Mr. Peñalosa is currently the President of the Por el Pais que Queremos (PPQ) foundation in Bogotá and a candidate for the Presidency of Colombia. Mr. Peñalosa holds a BA in Economics and History from Duke University, masters in Management at the Institut International D'Administration Publique and a DESS in Public Administration at the University of Paris II in Paris.

As Mayor of the capital of Colombia, Enrique Peñalosa was the political and administrative head of a city of 6.5 million inhabitants. During his tenure (1998-2001) Mr. Peñalosa was responsible for many accomplishments related to the promotion of a more sustainable development.

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A street scene in Shanghai, China, January 2002

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1. Urban transport and urban development: a different model

Most public policy discussions and decisions such as those having to do with macroeconomics are quite removed from people's daily lives in developing cities. Even if it sounds a bit sacrilegious, it is irrelevant to the way people live today that most countries' revolutions or wars of independence would have occurred a hundred years before or after they actually occurred, or in many cases that they would have occurred at all. Rather, the way cities are built affects to a large degree how people will live for hundreds of years to come.

“The way cities are built affects to a large degree how people will live for hundreds of years to come.”

The task for everyone involved in creating environments where many generations will live is not simply to create a city that functions efficiently. It is to create an environment where the majority of people will be as happy as possible. Happiness is difficult to define and impossible to measure; but it should not be forgotten that it is what our efforts, collective or individual, are about. Over the last 40 years the environment became an issue of deep concern to all societies. So much that today any 8 year old is worried about tropical forests and the survival of mountain gorillas. Curiously, a similar interest in the human environment has not yet arisen. There is much more clarity in our time as to what the ideal environment is for a happy gorilla or a happy whale, than what the ideal environment is for a happy child. We are far from having a shared vision of an ideal human environment; much less of the transportation system for it.

Transport differs from other problems developing societies face, because it gets worse rather than better with economic development. While sanitation, education, and other challenges improve with economic growth, transport gets worse. Transport is also at the core of a different, more appropriate model that could and should be implemented by Third World, developing cities. More than a socio-political model, the model

which will be described is a model for a different way of living in cities; but it has profound social and economic implications. A true commitment to social justice, environmental sustainability and economic growth needs to espouse a city model different from the one the world has pursued over the last century and up to now.

At the core of the new model is a severe restriction of automobile use, with total restriction of cars and commercial vehicles during 5 or 6 peak hours every day. During those 2.5 or 3 hours every morning and afternoon, all citizens will move exclusively using public transport, bicycles, or walking. It sounds simplistic, but the environmental implications in terms of noise, air pollution, energy consumption, and land use are significant. Socially, it would free immense resources currently devoted to care for roads mainly for the upper income citizens that could be used to invest in the needs of the poor; it would get all citizens together as equals regardless of income or social standing in public spaces, public transport or bicycles. And most importantly, it would allow cities to become a place primarily for people, a change from the last 80 years a time during which cities were built much more for motor vehicles' mobility than for children's happiness.



Fig. 1
A congested road in Cairo, and the terminus of Cairo's last remaining tram line. Transport problems in developing cities tend to get worse rather than better with economic development.

Karl Fjellstrom, Mar. 2002



Cairo, Egypt

Mar. 2002

Hostile environments

Adults in developing cities can fondly recall when they used to walk or ride bicycles to school. They could play in the street and feel quite safe.



Surabaya, Indonesia

Jan. 2000

Today's children in developing cities face a very different reality. Their ability to travel, explore and play outside the home is severely restricted by hostile traffic conditions. The street is now a dangerous environment for them. Dense traffic, lack of pedestrian and cycling facilities, air pollution and noise make getting around not only difficult for children, but extremely dangerous for every one.



Muenster, Germany

Aug. 2001 (Photos Karl Fjellstrom)

2. A city for people

The other structuring element of the new city model is abundant high quality pedestrian public space. There should be at least as much public pedestrian space as road space. Physically protected bicycle paths, large, exclusively pedestrian avenues and greenways should crisscross the city in all directions. No child should grow farther than 3 blocks from a park. Large tracts of land around cities should become parks; cross country pedestrian and bicycle paths through the adjacent countryside should readily permit all citizens a contact with nature; all waterfronts should have public access and have the basic infrastructure for it.

We were made walking animals: pedestrians. As a fish needs to swim, a bird to fly, a deer to run, humans need to walk, not in order to survive but to be happy. A bird can survive inside a small cage and even bear descendants. But one suspects the bird would be happier inside an enormous cage the size of an auditorium and even more flying free. While a person could survive inside an apartment all of his life, he would be much happier if he could walk and run about, as freely as possible.

The importance of pedestrian public spaces cannot be measured. It cannot be proven mathematically that wider sidewalks, pedestrian streets, and more or better parks make people happier; much less measure how much happier. However if we reflect, most things that are important in life cannot be measured either: Friendship, beauty, love, and loyalty are examples. Parks and other pedestrian places are essential to a happy urban life. There is a curious difference between parks and other public investments. If people lack transport, running water, or other traditional public services, they will feel very unsatisfied. But if they do have those services, they do not get much satisfaction out of it. On the contrary, if they lack parks or other pedestrian spaces, they will not be particularly dissatisfied. But if they do have them, they will derive out of it ceaseless satisfaction. It is so, because most government services are means to a better life; while pedestrian spaces are an end in themselves; they practically ARE a better life in themselves.

An impressive recent documentary described herons in a Brazilian wetland. As child herons were learning to fly, some would fall into the water, where crocodiles promptly devoured them. Before feeling sympathetic towards the herons, it should be realised that children in cities faced a similar predicament. As they leave their homes, they risk being run over by a car. This is not theory. Thousands of children the world over are killed by cars every year. City children grow in fear of cars, as children from the Middle Age feared wolves. One of the main reasons for moving to the suburbs is finding environments for children free from the threat of cars. Another reason is to have a closer contact with nature and green spaces. The higher income groups always have access to nature, at beach houses, lake cabins, mountain chalets, on vacations to Alaska or Africa, or in more urban settings at golf courses or gardens. Parks allow the rest of society to have that contact as well.

“A city is more civilised not when it has highways, but when a child in a tricycle is able to move about everywhere with ease and safety.”

At first it may seem that in developing cities with so many unmet needs, high quality pedestrian spaces would be a frivolity. On the contrary, in places where citizens lack so much in terms of amenities and consumption, it is quicker and more effective to distribute quality of life through public goods such as parks, plazas, and sidewalks, than to increase the personal incomes of the poor. It is impossible to provide citizens certain individual consumer goods and services such as cars, computers, or trips to Paris. It is however possible to provide them with excellent schools, libraries, sidewalks, and parks. Low-income privations are not as evident during work time. It is during leisure time that the difference with upper income groups is most felt. While upper income people—increasingly turning to large, enclave-style gated communities and housing estates with freeway access near the edges of large developing cities—have cars, go to clubs, country houses, theaters, restaurants and on vacations, for the poor public space is the only leisure alternative to television and



Fig. 2
Nanpu Bridge, Shanghai, China. Grand roads are still seen as symbols of progress and modernity in developing cities. Some wealthy cities—such as San Diego—have on the contrary torn down inner city elevated roads, and halted road expansion.

Unknown

walking around in shopping malls. Parks, plazas, pedestrian streets and sidewalks are essential for social justice. High quality sidewalks are the most basic element of a democratic city. It is frequent that images of high-rises and highways are used to portray a city's advance (Figure 2).

In fact, in urban terms a city is more civilized not when it has highways, but when a child in a tricycle is able to move about everywhere with ease and safety.

Parks and public space are also important to a democratic society, because they are the only places where people meet as equals. In our highly hierarchical societies, we meet separated by our socio-economic differences. The Chief Executive Officer perhaps meets the janitor, but from his position of power. In walkways and parks everyone meets as equals.

For all of these reasons I concentrated an enormous effort during my term as Mayor of Bogotá in the creation of public pedestrian spaces: Hundreds of thousands of square metres of tree-lined walkways, more than 200 km of bicycle paths, a 45 km greenway connecting rich and poor neighborhoods, more than 300 small parks proposed and built by poor communities themselves, a total of 1123 new or reconstructed parks. Two blocks away from the Presidential Palace, in the city core, more than 600 houses

Mayors making a difference*

Jaime Lerner of Curitiba

* Adapted from Robert Cervero, *The Transit Metropolis*, Island Press, Washington, 1998, pp. 270–271

A notable precursor to the visionary former mayor of Bogotá Enrique Peñalosa and indeed the current Bogotá mayor Antanas Mockus, was mayor Jaime Lerner of Curitiba.

Curitiba, the capital of the largely agricultural Parana province in southern Brazil with a population of 2.3 million people, is one of the world's great urban success stories. Its transport system in particular has been studied and emulated (with varying degrees of success) in cities ranging from Ottawa and Los Angeles to Bogotá and Jakarta. Curitiba's present-day success can to a large extent be attributed to the visionary and daring urban planning implemented after Lerner was elected mayor in 1971. His strong and decisive leadership saw Curitiba's transit-oriented master plan through to implementation at a time of military dictatorship when other Brazilian cities were concentrating on building more and larger highways to accommodate motor vehicles.

Lerner's philosophy was to gain momentum by doing things simply and quickly; at low cost. A key component of the plan quickly implemented was the conversion of downtown streets to pedestrian ways. As Lerner later put it:

On a cold, icy night in the Winter of 1972, from Friday to Saturday, an army of strange-looking silhouettes surrounded the accesses to the main street in downtown Curitiba. The first ones to arrive were armed with wooden horses bearing the inscriptions, "Traffic Not Allowed," and signs indicating alternative routes. Those who came next ... started to methodically destroy the asphalt pavement of the main street with picks, electric power-drills and mechanical shovels.

This 'surprise-attack' to transform Curitiba's main avenue into a pedestrian street had been carefully planned for more than a year. Shop-owners initially protested but soon noticed increases in sales. Seeing this, shop-keepers in other areas began to demand pedestrianisation. Some car supporters planned to 'invade' and reclaim the streets, but when the cars arrived they were met with passive resistance from thousands of children painting an immense ecological mural. From these beginnings, Curitiba's pedestrian street system has now expanded to 49 downtown blocks (see photos in right column).



Transit-oriented development in Curitiba

Karl Fjellstrom, Feb. 2002

were demolished in a severely degraded area that had become perhaps the world's largest crime centre and a 20 hectare park is being built there. It should become a magnet for residential development. One of downtown's main streets was converted into a pedestrian street. A 17 km long pedestrian street lined with trees, lamps, and benches was built, through some of the poorest neighbourhoods in Latin America, where most motor vehicle streets are not yet paved. The political battles were not easy. I was almost impeached for getting cars off the sidewalks (Figure 3).

In the end Bogotá changed from being a city intensely resented and rejected by its inhabitants, to one loved by its now proud citizens.

3. Consequences of unrestrained car use

We cannot talk about urban transport until we know what type of a city we want. And to talk about the city we want is to talk about the way we want to live. Do we want to create a city for the poor, the children, and the elderly, and therefore for every other human being, or a city for automobiles? The important questions are not about engineering, but about ways to live. A premise of the new city is that we want society to be as egalitarian as possible. For this purpose, quality of life distribution is more important than income distribution. The equality that really matters is that relevant to a child: Access to adequate nutrition, recreation, education, sports facilities, green spaces, and a living environment as free from motor vehicles as possible. The city should have abundant cultural offerings; public spaces with people; low levels of noise and air pollution; and short travel times.

Urban transport is a political rather than a technical issue. The technical aspects are relatively simple. The difficult decisions relate to who is going to benefit from the models adopted. Do we dare to create a transport model different from that in the so-called advanced world cities? Do we dare create a transport system giving priority to the needs of the poor majority rather than the automobile owning minority? Are we trying to find the most efficient, economical way to move a city's population, as cleanly and as comfortably as possible? Or are we just trying to minimise the upper class's traffic jams?

The new city should have a high population density, in any case more than 120 inhabitants per hectare (12,000 per square kilometre). High population density is desirable for several reasons:

- low cost, high-frequency transit systems will be viable;
- shorter travel times are achieved;
- mobility for non-drivers—the vast majority in developing cities—is enhanced, including mobility of the poor, children, and the elderly;
- an abundance of people will fill public pedestrian spaces;
- rich cultural offerings are provided (Figure 4);
- more efficient land use and infrastructure provision is achieved;



Fig. 3
*“Before” and “after”:
parking and public
space improvements in
Bogotá.*

Enrique Penalosa 2001, presentation to the Surabaya City Council



- lower expenditures on road construction and maintenance will result. (If Bogotá had Atlanta’s density, it would occupy an area almost 20 times as large as it occupies today, with a road network that much longer).

For these reasons and more, urban experts around the world concur on the desirability of density. However, unrestricted car use inevitably breeds suburban development and lower densities. First it brings about traffic jams. Traffic jams in turn create enormous pressure to invest in more and bigger road infrastructure, which in turn stimulates suburban development.

“Unrestricted car use inevitably breeds suburban development.”

This process will occur regardless of availability of mass transit. Paris is the best example of growing car use and suburbanisation despite a beautiful central city and top quality public transport. It is important to understand what features draw people to suburbs, so that these features can be provided in central areas.

Ironically, it seems that one of the main attractions of suburbia is a relatively car-free environment, for children to play and ride bicycles safely. Greenery and green spaces also pull people to the suburbs. The new city model outlined in this module can provide ample exclusive pedestrian streets and green spaces which cater to these forces driving suburbanisation. And contrary to what is often supposed, a high density city needs not have very high buildings: Five-story buildings can easily yield high population densities.

The unsustainable nature of car-based transport is illustrated by the fact that the problem gets worse as societies grow richer. Unless car use is severely restricted, as in Singapore, or in cities such as Tokyo and Hong Kong which provide a very low level of Central Business District parking spaces, society will be worse instead of better off with economic progress due to the following:

- more traffic jams;
- more noise;
- more air pollution;
- more health problems;
- more low density city expansion and suburban development;

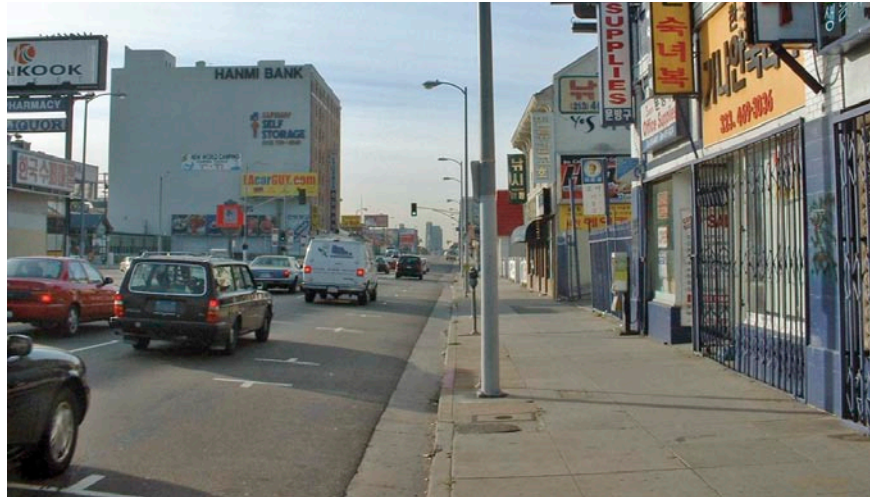


Fig. 4
Themes of cultural emptiness in a car-oriented US-style city (above) contrast with the cultural richness of a pedestrian and cyclist-oriented setting (left and below).

Los Angeles, Jan. 2002 (above);
 Suzhou, China, Jan. 2002 (below);
 (Karl Fjellstrom); Bogotá, Colombia
 (left) (Enrique Penalosa)

Induced travel

Many transport models used to evaluate and justify transport infrastructure projects mistakenly assume no elasticity of road capacity (supply) with road traffic (demand). Studies have shown, however, that increasing transport supply—e.g., by road widening—itself generates increased vehicle travel, or ‘induces’ traffic.

Such inducement effects are felt in the *short term* such as through longer and more trips, mode switching to cars, or different trip routes. Perhaps more insidious are the *long term* impacts, such as higher car ownership and lower densities, as activities become more spread out.

For more information see <http://www.vtpi.org>.



Fig. 5

As well as a causing visual blight and pollution, this elevated road in Shanghai results in poor conditions for the more sustainable modes: buses, walking, and cycling. Buses can be seen caught in congestion below the elevated road; also an unpleasant area for pedestrians.

Karl Fjellstrom, Jan. 2002

- more regressive public expenditure on road building and maintenance that benefits primarily car-owning upper middle classes.

In a city where the poor do not use cars, road building, and road improvement in order to relieve congestion is very regressive. It takes up very scarce government resources leaving the needs of the poor unattended.

Car use in developing cities is very regressive: It absorbs massive public investments for road infrastructure building and maintenance, taking resources away from the more urgent and important needs of the poor; creates traffic jams that hinder the mobility of the bus-riding majorities; pollutes the air; makes noise; leads to accidents; creates obstacles to lower income pedestrians; and leads to a progressive invasion of scarce pedestrian spaces by parked vehicles. There clearly are contradictory interests between motor vehicles and human beings: The more a city is made to accommodate motor vehicles, the less respectful of human dignity it becomes, and the more acute the differences in quality of life between upper income and lower income groups. The poor and vulnerable—again, a large majority of the population in developing cities—are particularly alienated by increasing motorisation and the processes that come with it. Women are often particularly disadvantaged, as their trip-making pattern in developing cities

Shanghai's elevated road program

Since 1994 Shanghai has constructed 63km of elevated highways. While often lauded as symbols of progress (see Figure 2), more commonly these roads simply blight the landscape, channel more traffic into the city centre, and generate more noise and air pollution (Figure 5).

Citing concerns over air and noise pollution and their impact on quality of life and hence ability to attract investment to the city, officials in April 2002 announced that the elevated road program had been suspended (<http://www.smarturbantransport.com>; May 2002), although there are a large number of elevated road projects in the city which are currently under construction, and presumably these will continue through to completion.

is often characterised by shorter, more frequent trips that rely on non-motorised modes.

International experience has made it clear that trying to solve traffic problems by building more, bigger roads is like trying to put out a fire with gasoline. In the United States time lost in traffic increases every year, despite enormous highways. A new highway stimulates new development around it and particularly at its extremes and thus generates its own traffic (see margin note “Induced travel”).

Consider the case of a new 10-lane highway from the centre of a city to any location in its outskirts. Immediately after it is completed, or even before, new housing projects, shopping malls, and factories are built around the new road and in the countryside near its extreme. The new road stimulates urban expansion, lower densities and longer trips. In addition, new roads have been shown to generate new traffic. Ten years after the road is built, traffic jams are worse than ever. But now average trips are longer. For traffic considerations, doubling the number of vehicles is the same as having the same amount of vehicles travel twice the distance. For all these reasons, building new road infrastructure in order to solve traffic problems is not only regressive and dehumanizes a city, but it is also useless. Los Angeles, perhaps the archetypal experiment in building a car-oriented city and seemingly the role-model for some developing cities such as Bangkok, has





Fig. 6
The Los Angeles county of Santa Monica is implementing pedestrian, cycling, and bus improvements, including replacing car with bicycle parking (above).
 Karl Fjellstrom, Feb. 2002

found that road-building cannot solve congestion problems. The city now focuses on transit-oriented investments including Bus Rapid Transit, light and heavy rail, and car-sharing (Figure 6).

Yet despite overwhelming evidence that the road-building approach is regressive, inappropriate, and unsustainable for dense developing cities, it is an approach which continues to be followed throughout the world (see, for example, the text box on Shanghai’s elevated road program).

4. Restricting automobile use

The only sustainable solution is to have people move by public transport rather than by individual automobile. Some propose high user charges in order to restrict automobile use: Tolls, vehicle registration fees, gasoline taxes, or varying road charges according to type of road and hour of the day. Such schemes however have deficiencies: Charges never adequately cover the immense costs society pays in terms of road space real estate value; noise and air pollution; road accidents; road construction and maintenance; policing; roads as obstacles to pedestrian life and sources of danger for children. Road user charges may create a situation where a few upper income drivers have the street network all to themselves.

While industrialised cities have higher levels of motor vehicle ownership, developing cities have much lower levels of car ownership. Figure 7 illustrates a general differentiation between North American & Australian cities, with the highest rates of motor vehicle ownership (often more than 650 per 1000 people), followed by European cities (generally less than 550 motor vehicles per 1000 people), and Asian cities with the lowest levels of motor vehicle ownership. Yet motor vehicle ownership and use in dense developing cities is growing rapidly—sometimes more than 10% per year.

Unchecked, the combined effects of population growth and motorisation will create ever more severe problems of quality of life and equity in developing cities. If we believe in democracy and participation, people should have a clear understanding of the consequences of unchecked motorisation. And they should be able to vote on it, for example mandating a ban on car use during rush hours. Is there any doubt that the majority of the population that does not drive a car would only gain from such a restriction? It would result in shorter travel times as traffic from cars does not slow buses down; cleaner air; less noise; a more egalitarian relationship with car-owners; more public resources available for priority investments; a more humane, less dangerous environment for children to grow in; and less high velocity arteries destroying neighbourhoods. The fact

Fig. 7

Motor vehicle ownership per 1000 people in various cities, 1990.

Paul Barter, *An International Comparative Perspective on Urban Transport and Urban Form in Pacific Asia: the challenge of rapid motorisation in dense cities*, PhD thesis, 1999, pg. 132

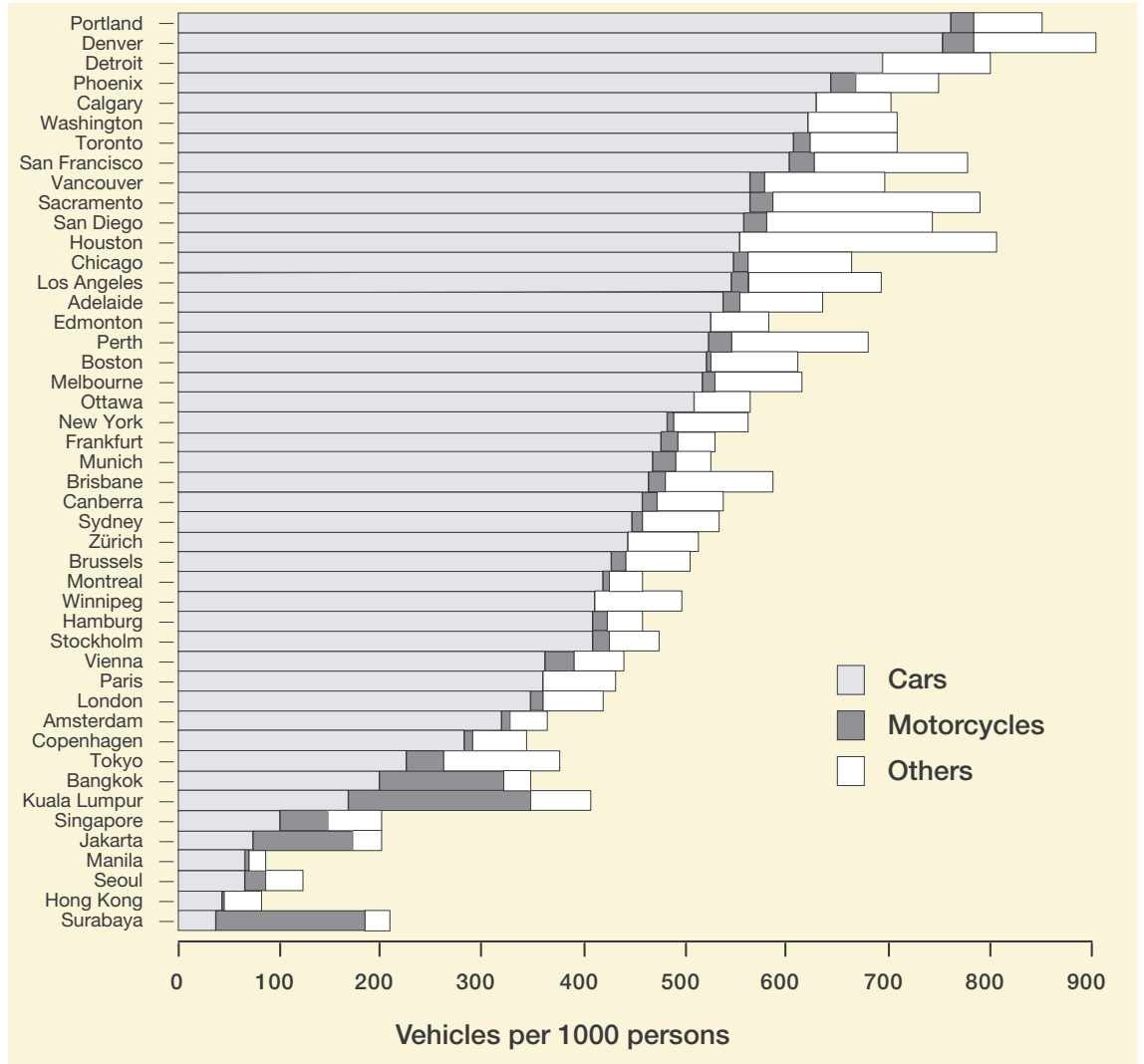


Fig. 8

Regular evening road closures are implemented in this area of Kowloon, Hong Kong

Karl Fjellstrom, Jun. 2001



that such a measure is not adopted is yet more evidence that the priorities of the political and economic systems are not to solve the needs of the poor, or even to benefit the majority of the population, but rather to favour the ruling upper income groups.

In October 2000, the majority of the voters of Bogotá approved a referendum asking them whether they wanted all cars off the streets every weekday between 6:00am and 9:00am and 4:30pm and 7:30pm from January 2015 onwards. Constitutional interpretations later demanded a higher voter turnout for the referendum to become a legal mandate. Nevertheless it proved that it is possible for people to conceive different, perhaps better for them, ways of organising city life and city transport. Beyond the environmental advantages of a city that moves basically without cars, the economic implications are significant.

The private savings in garages, vehicle depreciation, and fuel, can be spent on other goods.

“Such a city would become extremely attractive to highly qualified professionals and investors.”

A city may follow a more timid approach and simply structure an excellent bus-based transit system on exclusive lanes and not restrict automobile use. But why should the rest of society tolerate the car-using minority that imposes so many noise, air pollution, accidents, and other costs on society?

The public savings in road construction and maintenance, traffic police, and hospital costs of people hurt in vehicle accidents or suffering from air pollution, can be used not only to provide excellent public transport, but also for schools, libraries, and parks, to mention only a few. Of course people could always own cars and use them during off-peak hours, or travel to the countryside on weekends. Or they could simply rent them when required. Freed from the pressure to find ever more room for cars, authorities can concentrate on more civilising endeavors, such as creating more public pedestrian space.

A city such as that proposed in this module would become a world example of sustainability, quality of life, social justice, and social integration. And it would become extremely attractive to highly qualified professionals and investors. If in the past capital investments were attracted with subsidies of different sorts, in the new knowledge economy perhaps the most crucial competitive factor is urban quality of life.

Imagine that 1000 wealthy individuals in a large city decide to use private helicopters for their daily transport. Helicopters are very loud. Why would the rest of society forego its silence, if that natural resource belongs to all? Why should the majority suffer great noise for the benefit of a few? Yet the car-using minority generates much more costs for the majority than helicopters would. Cars destroy the common silence; pollute the air; and require extremely costly road space and infrastructure that absorbs scarce public funds. The most important

point illustrated by the helicopters example is that it is possible for a few hundred people to use helicopters for their transport; but it would be impossible for everyone in a city to do so. The same happens with private cars. While only an upper middle class minority uses cars, despite enormous costs and injustice, the system works. But it would not be possible for every citizen to use a private car for his or her mobility; otherwise jams would be massive and high velocity roads would destroy the human qualities and structure of the city. Many developing cities are moving in this direction. Bangkok, Manila, Cairo, Kuala Lumpur and other cities are already notorious for severe traffic congestion, despite relatively low levels of motorisation.

Bogotá in recent years implemented several schemes to reduce car use. Through a tag number system, 40% of all cars have to be off the streets during peak hours every day. Each car has this restriction two days every week. This reduced daily travel times by about 48 minutes and lowered pollution levels. Fuel consumption went down 10.3%.

Since 1974 Bogotá has had a tradition of *Ciclovia* (Figure 9), the closing of main arteries to motor vehicle traffic for 7 hours every Sunday. The city recently doubled the kilometers closed to traffic: Now 120 kilometres of main city arteries are closed to motor vehicles so that people can use them for bicycling, jogging,

Festive season tradition in Bangkok

As in Bogotá, a new “tradition” in Bangkok in the days leading up to Christmas and New Year has been established, with many main roads closed off each evening to traffic. Tens of thousands of people through the pedestrianised areas late into the night.

Similarly many other Asian cities have recently launched successful pedestrianisation initiatives, completely closing off roads to motor vehicle traffic, or implementing evening or weekend closures. These include Kuala Lumpur, Singapore, Guangzhou, Shanghai, Hong Kong and others. In most cases these improvements are part of schemes to increase the appeal of inner city areas.

Fig. 9

Ciclovia, Bogotá

Enrique Peñalosa (above), TransMilenio SA (top)





Fig. 10
More than 300 km of protected bicycle paths were built in Bogotá, at an average cost of around US\$500 per metre. See further Module 1d: Preserving and Expanding the Role of NMT.

Oscar Diaz & Enrique Penalosa (above); Juan Amarillo Greenway; left: Parque Terce Milenio)

and getting together. More than 1.5 million people come out there every week end in a marvelous community building celebration. A new tradition was initiated, closing the same 120 kilometres each night close to Christmas, for citizens to come out and see the Christmas lights. Almost half the city's population, nearly 3 million people of all ages and social standings, come out. The exercise builds a sense of belonging and of community.

“Bicycle paths are a symbol of respect for human dignity and of a more egalitarian city, as are high quality walkways. Both show that a city is for its people, and not for the motor vehicles of its upper classes as is so often the case.”

Another collective adventure launched in Bogotá was a car-free day. On a Thursday in February 2000, the city's nearly 7 million inhabitants went to work leaving all cars at home. It worked well. 98% of people went to school and work as usual, by bus, bicycle or taxi. People enjoyed the adventure. Afterwards in the referendum of October 2000, nearly 64% of voters approved establishing a car free day on the first Thursday of February every year. Polls taken the day after the 2002 Car Free Day found that 83% of the population supported it. The importance of the exercise, going beyond transport or environment, has to do with social integration. People of all socio-economic conditions meet as equals on their bicycles or in public transport. More than 200 km of protected bicycle paths were built (Figure 10). There has been a remarkable increase in cycling in the city in a short period. Cyclists have gone from 0.5% of all trips in 1998, to 5% a few years later. Moreover, bicycle paths are a symbol of respect for human dignity and of a more egalitarian city, as are high quality walkways. Both show that a city is for its people, and not for the motor vehicles of its upper classes as is so often the case. Bicycles can also be very efficient feeder systems to mass transit.

5. TransMilenio

The single project implemented in Bogotá that most contributed to improving quality of life and giving citizens confidence in a better future was a bus-based transit system called TransMilenio (Figures 11 and 12; Module 3b: *Bus Rapid Transit*). Starting from zero, inspired by the Curitiba system, the city was able to design and build the infrastructure, create the private partners that would operate it, remove the thousands of buses that previously operated there, and put the system into operation in just three years.

Today the incipient system accounts for more than 630,000 daily trips [Ed: by July, 2005 900,000] and the main line is carrying more than 40,000 passengers per hour [Ed: Monday peak hour ridership on the system in Sept. 2002 was 71,851]; more than many rail systems. TransMilenio users are saving on average 223 hours annually. 9% of them used to go to work by car. TransMilenio should be moving more than 80% of the city's population by 2015.

Although the system is bus-based, its operation is similar to a rail-based system. Articulated buses operate on exclusive busways, using one or two lanes in each direction. Passengers board and alight only at stations. They buy a ticket when they enter the station, or in stores outside. In this way, when the bus arrives and opens its three doors simultaneously with the station doors, dozens of passengers can board and alight in seconds. The bus floor is at the same level as the station, making entering and exiting the bus a rapid and safe operation, as well as making the buses fully accessible to the handicapped. The drivers, devoid of any incentive to pick up passengers outside the stations, do not do so. But it would be difficult to do it even if they tried, with doors around one metre off the ground.

TransMilenio uses articulated, 165-passenger buses with clean diesel engines that comply with Euro II emission standards. Contractual arrangements guarantee that buses are extremely clean, well-lighted, and are changed before they are in less than perfect shape. Drivers wear uniforms and are required to attend approved training programs. While some



buses stop at all stations, others operate express routes stopping at only a few. Passengers can change from a local to an express bus with the same ticket; as they can also change from a bus on one route to another on a different route at no extra cost. Feeder buses sharing streets with the rest of traffic give people in marginal neighbourhoods access to the system. TransMilenio buses run in the middle of avenues and not on the sides, so that vehicles entering and exiting driveways, or delivery vehicles, do not become obstacles. Also, in this way one station is required in each place, instead of one in each direction. Although TransMilenio is the fastest means today to move about Bogotá, it could be made even faster by building underpasses for the buses at busy intersections. This can easily be done at any time in the future. There is nothing technically complex about TransMilenio. The issue is whether a city is ready to get cars off several lanes in its main arteries, in order to assign them exclusively to articulated buses. If



Fig. 11
TransMilenio's bus fleet is operated by 10 profitable private operators under contract to the state-owned but autonomous and professional regulator, TransMilenio S.A.

Karl Fjellstrom, Feb. 2002

Fig. 12
TransMilenio has the look and feel of a rail system, but with the operational costs and other advantages of buses. Bus stations and bus doors are elevated, allowing quick boarding and alighting.

Karl Fjellstrom, Feb. 2002

the common good is to prevail over the private interest, it is very clear that it must be done.

The main advantage of TransMilenio over rail systems is its low cost. Public investments in Bogotá were US\$5 million per kilometre. Even this cost is high, because it was chosen not only to build a transit artery, but to improve dramatically the public pedestrian space around it, with sidewalks, plazas, trees, and the like, in order to improve the city quality of life and to attract more users to the system. Operating costs are low. While almost all rail systems in the world require ongoing operational subsidies, at a fare of US\$0.40 per passenger, TransMilenio private operators do not only cover costs but also make a profit. With problems of malnutrition and lack of clean water, sewerage, schools, parks, and paved roads, developing country cities cannot afford costly rail transit systems. They should not in any case, because too many critical investments required by the poor necessarily are left unattended if rail solutions are chosen. Often the political shine of rail projects, or the financial facilities offered by the vendor countries lead local or national governments to acquire sophisticated subway systems. But at \$80 million or more per kilometre, and usually unable to generate revenues to cover even their operating costs, such systems are an enormous financial drain for developing cities. With resources of that magnitude, basic water and sewage infrastructure, schools, housing projects, or ample parks to improve the quality of life of many generations could be created.

Often the upper classes in developing cities insist on rail systems, because they oppose bus-systems' use of space they rather have for their private cars. Generally they prefer subways not, because they would like to use them—which mostly they do not where they exist—but simply, because they imagine that, by putting the poor underground, traffic problems will go away. Whether rail or bus based, surface transport systems are more humane. It is much nicer to travel looking at buildings, people, trees, and stores, than to travel underground like a rodent. When rail systems are chosen in developing cities, limited funds often only permit building a couple of lines that rarely serve more than a few percent of daily trips (see Module 3a: *Mass Transit Options*).

6. From vision to implementation*

* This section is based on material from Axel Friedrich, Head of Division, Transport and the Environment, Federal Environment Agency (UBA), Germany

6.1 A policy vision: how should a city look in 5/10/20 years?

A vision for the transport system of a city has to be developed. This vision has to include goals. The vision and goals must be derived from intensive discussions with all stakeholders.

It is important to clearly separate the vision from the goals. Policy measures must always be checked against the goals, and their cost-effectiveness in meeting the goals must be evaluated. The fact that the transport and environment related database is not very broad in many developing cities makes it more difficult—but not impossible—to define these goals. It may be, however, that after more data becomes available the goals will need to be revised.

“It is important to clearly separate the vision from the goals. Policy measures must always be checked against the goals, and their cost-effectiveness in meeting the goals must be evaluated.”

- a. The ambient air standards of the World Health Organization (WHO) should not be exceeded.
- b. Access to essential goods, services, and locations should be available for everyone, regardless of income level or abilities.
- c. The poor pay more of their income and more of their time for basic mobility than the rich; this gap has to be reduced.
- d. Social activities have to have the same claim to the allocation of space as motorised transport. The city should be designed for people, not for cars.
- e. Transport systems should be designed and operated in a way that would protect the health and safety of all people and enhance the quality of life of people in communities.
- f. People need to be fully engaged in the decision-making process about sustainable transport and empowered to participate.
- g. Transportation systems must make efficient use of land and other natural resources.

b. Taxation and economic policies should work for, and not against, sustainable transport.

Goals toward a sustainable transport vision might consist of something similar to components outlined in the adjacent text box.

6.2 Quantitative economic, environmental, and social targets

Quantitative targets should be set. For public transport, for example, such targets might include achieving a specified modal split between use of private vs. public transport, by a specified date. Specific goals are possible in most areas: for example for reduced road fatalities, conversion of fleet vehicles to cleaner fuels, cleaner fuel specifications, use of bicycles for short trips, reductions in air pollution, motorised trips through the city centre, and so on. All such goals can be set for various time periods.

The potential of the various measures and activities which are developed by the Working Groups (see 6.3 below) for achieving the short, medium, and long term goals should then where possible be measured.

Methods of measuring and quantifying the impacts of policy measures are discussed for example in Module 3d: *Preserving and Expanding the Role of Non-motorised Transport*. Such quantification should be stated in simple and clear terms, such as reduction in pollution emissions, reductions in accidents and fatalities, increase in road capacity, and anticipated modal shifts to walking, cycling, and transit.

6.3 Developing policy measures and actions

Organisation and institutional basis

A range of organisational forms have been successfully—and sometimes less so—applied in developing cities. Of these, the formation of some form of Working Groups is the most basic organisational step required. The operation of these various groups should be considered cyclical, with continuous and ongoing interaction between them.

Working Groups

Creation of some form of Working Groups (however named) in the key policy areas is

Goals toward a vision: an example

Short term goals

In a short term (within the next 3 years) it is proposed to achieve remarkable improvements in the ambient air quality of the whole city. The number of road accidents with injuries and fatalities should fall by 30%. A public awareness campaign should be started, and the public supplied with information about transport and environmental concerns. First steps to improving public transport should be taken, by improving the quality of bus services, and establishment of bus lanes and Bus Rapid Transit routes after tendering. In-street measurement of air pollution should be performed. The first bicycle and pedicab lanes are installed, and cleaner fuels promoted.

Mid term goals

In the mid term (within the next 8 years) WHO standards are, apart from a limited number of days and areas, met. A starting point for tackling the problem of greenhouse gases could be to limit expected growth in emissions to half of what could be expected without a new strategy. The public transport system is renewed, attractive, reliable, affordable and competes with private car use. Successful efforts have been carried out promoting a wider use of cycling and making the city centre area more attractive to pedestrians. Public awareness and participation is aiming at further improving the transport system. Freight transport is managed in a way that no longer hurts the citizens and the livability of the city. The city is demonstrating the use of natural gas being a clean alternative fuel for transportation.

Long term goals

Long term goals should be developed in order to assure a sustainable transport system: concrete values are recommended to be developed after a more in-depth assessment of the problem. Ambient air quality and noise levels do not exceed guideline values, which are set to avoid any harm to human health, greenhouse gas emissions are reduced to the extent necessary to serve the global policy on that problem, and livability of urban areas is improved in order to assure social and economic well-being. The precautionary principle should be the guiding consideration for setting clear principles. The number of road accidents with injuries and fatalities per number of citizens is not higher than in European countries or the USA.

The OECD's "Environmentally Sustainable Transport" approach

A quantitative, target-based approach is one of the hallmarks of the *Environmentally Sustainable Transport* (OECD 2002, see [http://www.oilis.oecd.org/olis/2001doc.nsf/LinkTo/env-epoc-wp-nep-t\(2001\)8-final](http://www.oilis.oecd.org/olis/2001doc.nsf/LinkTo/env-epoc-wp-nep-t(2001)8-final)) approach developed by the OECD. The EST approach stresses developing a vision of a desired future, stating clear goals and milestones required, and working towards this vision. This stands in contrast to the current prevalent approach in most cities, where rather than working toward specified transport goals, policy-makers are fully occupied only with attempting to mitigate the adverse symptoms of current developments.

an essential early step. Working Groups, for example, might be formed for public transport, non-motorised transport, cleaner fuels, air quality management, economic instruments, transport demand management, and raising public awareness.

The core membership of the Working Groups should be drawn from related government agencies. For non-motorised transport, for example, agencies such as Traffic & Transport, Public Works, the Press Office, City Planning, Parks & Gardens, Health, Police (esp. Traffic), and others, possibly at both City as well as Provincial levels, will be involved.

As well as the main related agencies, membership should be open to civil society stakeholders. For non-motorised transport, for example, this might include the rickshaw drivers' association and vendors' association; Cleaner Fuels might include large taxi fleet owners, operator's associations, and financing organisations (for retrofits). All the Working Groups should try to include interested members of the City Council.

Simply forming the Working Groups, however, will not ensure that the groups make progress. Working Groups will not be successful unless their objectives are understood and are achievable. Meetings should be held regularly (please see Module 1e: *Raising Public Awareness about Sustainable Urban Transport* for advice on formation and operation of Working Groups), with membership based not so much on rank and agency, but on interest and motivation of the individuals concerned. A reporting mechanism should be in place so that individual members report their progress (and obstacles encountered) back to the main group, and the main group in turn reports to the Mayor and to the general public.

Once policies have been developed and agreement reached with the main local stakeholders, the Working Group will continue to play a role during implementation, and subsequently in monitoring the results and making the required modifications.

Steering Committee, Roundtable, and Scientific Board

In addition to the Working Groups, according to the subject area a range of other organisations

will be necessary. Development of an inspection & maintenance and roadworthiness system (see Module 4b: *Inspection & Maintenance and Roadworthiness*), for example, will require both a wider Roundtable forum consisting perhaps of 20 to 30 leading stakeholders, as well as a smaller Core Group of 4 to 5 officials who will work more intensively on preparing the required documentation and regulations.

In general terms, however, some form of Steering Committee to coordinate the activities of the various Working Groups will be useful, along with a Scientific Board to whom particular technical questions can be submitted. Some form of wider Roundtable group of all leading local stakeholders—possibly with 30 to 60 members and meeting only irregularly—is also required in each main policy area.

7. Conclusions

We have been building cities more for the mobility of automobiles than the happiness of its inhabitants. It is time to give more importance to public pedestrian space than to roads for motor vehicles. The advanced cities' car-based suburbanised model is not working well. It is wasteful in physical and human resources, is not environmentally sound and leaves much to be desired in terms of human interaction. Depression—along with obesity associated with sedentary lifestyles—is one of the fastest growing illnesses in the advanced world. On the other hand, developing countries will not likely overtake the advanced countries' level of GDP per capita. If they measure success in terms of GDP per capita they will have to define themselves as losers probably for hundreds of years to come. Their frustrated youth will be afraid to dream, to conceive of things as different, and many of those most capable will migrate abroad. A different, more appropriate model is necessary, as much for equality and environment as for cultural identity and self esteem.

“It is still possible to think and act differently.”

Developing cities can still avoid the failings of advanced cities and create a different city model. It is still possible to think and act differently. The most important difference is that automobile use can be restricted and a much more pedestrian and transit oriented society can be organised, since motorisation is still only a fraction of that in advanced cities and much of the 2050 cities is yet un-built.

A developing city will never have a Notre Dame Cathedral, or other architectural jewels of European cities. Yet precisely, because of its lack of many architectural treasures, it could for example have a 20 kilometre long pedestrian avenue lined with giant tropical trees, something beyond Paris' possibilities. Disadvantage can be turned into advantage, as in Bogotá, where low incomes and its resulting low motorisation and unavailability of highways as well as crime have kept much of the land surrounding Bogotá



free of suburban development. Land values are therefore relatively low. US\$500 million could buy 10,000 hectares of land surrounding Bogotá, an area roughly equivalent to one third of the urbanised area. Can anyone conceive of a better use for \$500 million for the Bogotá of the future than to reserve a 10,000 hectare green park, 34 times the area of New York's Central Park?

A 10,000 hectare park surrounding Bogotá would generate quality of life for the next 100 years; but it would also construct equality, because it would give the 10 million inhabitants

Fig. 13
Bogotá's improvements mean it's citizens are now proud of their city.
 TransMilenio, Carolina Herrera

of the 250 city access to a natural green environment, sports facilities, and bicycle paths regardless of income. Usually the quality of life resource most difficult to provide the poor is green space. Upper classes in most developing cities have access to golf clubs and country villas, but the poor truly live in concrete jungles. Such a park would also favour competitiveness and economic growth, by making the city more attractive to highly qualified individual and corporate investors in the region.

We must keep ever present that our goal is not to generate as much income as possible, but to generate as much happiness as possible. However, to seek quality of life and happiness may turn out to be the best investment in competitiveness and economic growth. A country's competitiveness in the information age will depend largely of the quality of life in its cities. We acknowledge today that as land was the source of wealth and power in agricultural societies, and capital filled the role of land in the industrial stage, today that source of wealth is knowledge, be it that of a movie director or an engineer. The knowledge that creates wealth today is attached to individuals, and it is necessary to create environments to which wealth-creating people are attracted. In other words, city life quality can be the most important competitive factor in the new economy.

It is essential to construct a shared vision of a city. How would that ideal city be? How would its blocks be, its sidewalks, the height of its buildings, its pedestrian spaces, its transport systems? This vision is particularly necessary for developing countries, where cities are in dynamic creation processes. Developing cities cannot continue being second rate imitations of advanced cities, because their reality is different and advanced cities do not provide very successful models anyway. Developing cities have the opportunity of learning from successes and failures of advanced cities in order to create a new, more appropriate and better city model. It does not matter if the shared vision can only be reached in 100 years or more. Middle Age cathedrals took more than 200 years to build, not out of any crisis in the process, but because building was designed to take that long. It is time for us to dream up our cathedrals.

Resource materials

- <http://socrates.berkeley.edu:7001/Events/spring2002/04-08-Penalosa>, University of California, Berkeley, Center for Latin American Studies. The presentation upon which this module is based.
- <http://www.civitas-initiative.org>, Civitas Initiative, Co-financed by the EU, promoting sustainable transport pilot projects in 19 European cities.
- <http://www.itdp.org>, Institute for Transportation and Development Policy. An international NGO, based in New York and active in Latin America, Asia and Africa.
- <http://www.oecd.org/env>, Organisation for Economic Cooperation and Development. The Environment Directorate provides a range of resources, including the Environmentally Sustainable Transport (EST) program.
- <http://www.pps.org>, Project for Public Spaces: Place marking for communities. A website documenting and encouraging "people places".
- <http://www.sustainable.doe.gov>, Smart Communities Network – A US Department of Energy program.
- <http://www.sustainablemobility.org>, World Business Council for Sustainable Development. WBCSD Sustainable Mobility program includes e-bulletins, workshops and consultations, with presentations and reports available for download.



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