Division 44
Environment and Infrastructure
Sector project: “Transport Policy Advice”

Introductory module
Sourcebook Overview, and Cross-cutting Issues of Urban Transport

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

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Overview of the sourcebook

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 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; avenues GTZ is pursuing.

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, colour layout.
- Non-technical language (to the extent possible), with technical terms explained.
- Updates via the Internet.

How do I get a copy?

Please visit www.sutp-asia.org or 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.

Comments or feedback?

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

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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, ITDP; Karl Fjellstrom, GTZ)
3b. *Bus Rapid Transit* (Lloyd Wright, ITDP)
3c. *Bus Regulation & Planning* (Richard Meakin)
3d. *Preserving and Expanding the Role of Non-motorised Transport* (Walter Hook, ITDP)

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)

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)

Further modules and resources

Further modules are anticipated in the areas of *Driver Training*; *Financing Urban Transport*; *Benchmarking*; and *Participatory Planning*. Additional resources are being developed, and an Urban Transport Photo CD (GTZ 2002) is now available.

Introductory module
Sourcebook Overview, and Cross-cutting Issues of Urban Transport

About GTZ

The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH is a government-owned corporation for international cooperation with worldwide operations.

In more than 130 partner countries, GTZ is supporting and implementing around 2,700 development projects and programs, chiefly under commissions from the German Federal Government, although also on a consultancy basis.

GTZ's aim is to improve the living conditions and outlook for people in developing and transition countries.

GTZ's main experience lies in providing advisory services in complex urban environments and more specifically in issues of sustainable urban transport.

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1. Overview of the Sourcebook

1.1 Rationale

Traffic jams; polluted air; dangerous roads; funding crises; absence of parks, walkways and public spaces; spiralling car and motorcycle use; ever-greater burdens on the poor; and less liveable cities: these are all increasingly familiar to people living in developing cities. Moreover, transport problems are getting worse, rather than better, with economic development.

"Many developing cities are at a cross-roads"

Policy-makers in developing cities often seem to approach transport with car-oriented paradigms poorly matched to the needs of the large majority of urban dwellers. Transit is dominated by discussion of rail-oriented mega-projects rather than more reasonably priced bus rapid transit, walking and cycling is neglected, uptake of cleaner fuels and technologies is slow, and scarce road space is given free of charge to a car-owning minority even while cities face severe funding shortages.

Many developing cities are at a cross-roads. Policy decisions taken now, while car use is still relatively low and cities retain a relatively transit-friendly, compact urban form, will affect how people will live in their cities for many decades into the future.

Parts of the answer to reversing the deteriorating situation are provided by cities such as Bogotá, which is forming a new paradigm of urban transport; a city for people rather than for cars. A multitude of successful policy tools are available, yet policy-makers and regulators often simply lack access to information about these tools. While an increasing quantity of excellent reference material for developing cities is becoming available on vehicle fuel and technology issues (including through important initiatives of The World Bank and the Asian Development Bank), other aspects of a sustainable urban transport agenda have often been neglected.

Helping address this lack of access to information in developing cities is a major objective of the *Sourcebook*.

1.2 Objective

Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities aims to provide a 'toolkit' for transport policy-makers and regulators in developing cities. It addresses the key policy areas which collectively can provide an integrated and modern transport policy framework for a developing city. Through the *Sourcebook*, policy-makers and their advisors can gain access to information about modern approaches and best practices, and to planning and regulatory resources that would otherwise be unavailable to them, or which would require expensive external consultant resources.

GTZ's main experience lies in providing advisory services in complex urban environments and more specifically in issues of sustainable urban transport.

The *Sourcebook* contains 20 printed modules in the form of booklets around 20 to 40 pages long. Each module draws upon the experience of GTZ and others in developing cities, and is a collaborative exercise, with generous contributions from contributors who are leading experts in their fields.

1.3 The target audience

The *Sourcebook* is for policy-makers and their advisors, and those involved with transport planning and regulation in developing cities. This audience is reflected in the content. The language is not overly technical and links to further resources, mainly via the internet, are provided. Photos, tables and charts are used throughout, and the entire set is printed and bound in an easy-to-read, full-colour format.

Mayors and leading policy-makers in developing cities will not have time to read through long and complicated technical manuals, and for that reason every effort has been made to keep the *Sourcebook* modules down to a manageable length, while still providing the level of detail needed to support regulators and policy-makers. Some modules will be of more relevance to policy-makers than others, depending on their local situation. Most of the modules will, however, be relevant to policy-makers in all developing cities.

As well as capacity development for policy-makers and regulators, the *Sourcebook* can form the basis of a sustainable transport training curriculum in a developing city, and will be a valuable resource to educators, civil society groups and other stakeholders.

1.4 Putting the Sourcebook to use

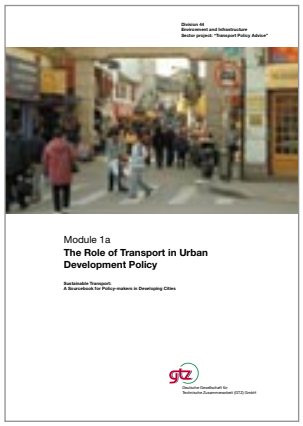
The *Sourcebook* can be used in many ways, ranging from detailed technical manual to a convenient general overview. The modules will be made available to policy-makers and regulators, and to other urban stakeholders.

GTZ is committed to actively disseminating the *Sourcebook* through various approaches and over an extended period of time. Presentations, workshops, brochures, websites, meetings, word of mouth, provision of materials, audio-visual materials, newsletters, media interviews: all are viable methods of helping ensure that the *Sourcebook* objective of assisting developing city governments is attained.

Inevitably, different cities will focus initially on different modules of the *Sourcebook*. To assist in deciding which policy-makers, regulators and advisors should focus on which modules, each module is briefly outlined in the following section.

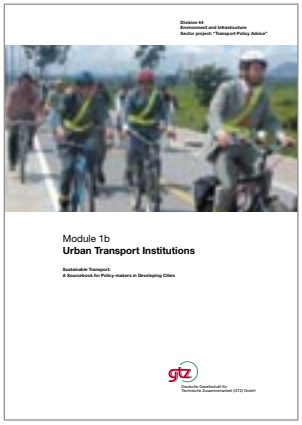
Institutional and policy orientation

1a. The Role of Transport in Urban Development Policy (Enrique Peñalosa)



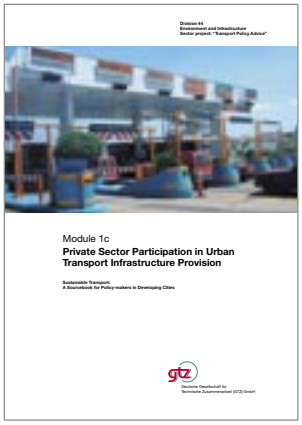
This module sets out a 'new vision' of urban transport for developing cities. Written by former mayor Enrique Penalosa, it draws from the recent experience of Bogotá, Colombia and shows how basic problems of urban transport are political rather than technical. Dr. Axel Friedrich (Umwelbudesamt) contributes to the module, explaining practical working mechanisms to help a city work from conceptual stages through to implementation.

1b. Urban Transport Institutions (Richard Meakin)



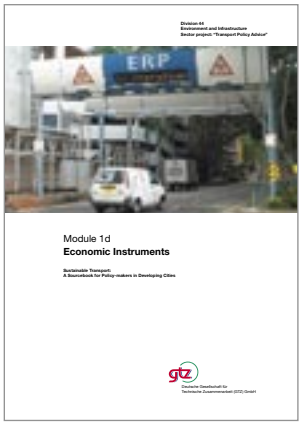
This module develops an analysis of urban transport institutional successes and failures in developing cities. It considers several in-depth case studies in a range of countries, explaining how institutional shortcomings have arisen and are manifested. The module draws conclusions from the case studies in the form of recommended policy approaches required for effective urban transport institutions.

1c. Private Sector Participation in Urban Transport Infrastructure Provision (Chris Zegras, MIT)



This module describes benefits and pitfalls of private sector participation (PSP). It provides detailed case studies of PSP in a range of developing countries and concludes with carefully considered policy recommendations for developing cities. The module emphasises that PSP in urban transport infrastructure provision should take part in the context of achieving wider mobility and access objectives, not as an end in itself.

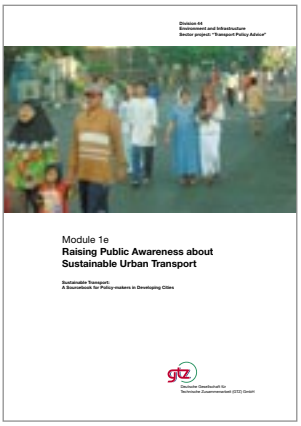
1d. Economic Instruments (Manfred Breithaupt, GTZ)



One of the best ways to influence travel behaviour is through economic instruments. This module surveys successful experiences with fuel and vehicle taxes, road pricing and

other instruments, showing that a range of often under-utilised policy options exists for developing cities. The module shows how economic instruments can work toward multiple goals, generating revenues and reducing congestion while improving air quality.

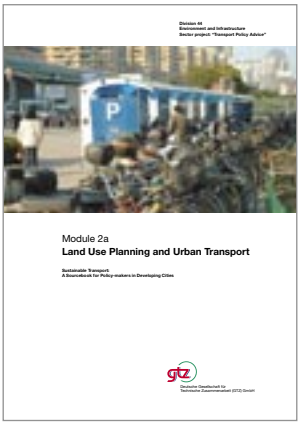
1e. Raising Public Awareness about Sustainable Urban Transport (Karl Fjellstrom, GTZ)



Public awareness, support and information campaigns are crucial to the formulation and implementation of any sustainable transport policy in developing cities. Key components of carrying out a cost-effective initiative to raise public awareness about sustainable transport include determining a target audience, developing a strategic approach, and establishing an effective "Working Group" (with a case study on Bicycle User Groups). This module provides practical advice on all of these matters as well as a section on Car Free Days contributed by Eric Britton of Ecoplan.

Land use planning and demand management

2a. Land Use Planning and Urban Transport (Rudolf Petersen, Wuppertal Institute)



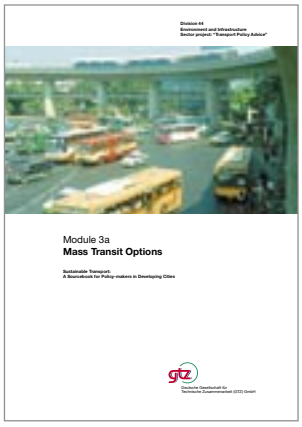
Around the world, which cities have succeeded in establishing land use patterns which support the more environmentally-friendly and efficient modes of transit, walking and cycling? What are the benefits of better land use planning for developing cities? What are the key components of a successful land use and transport planning program in a developing city? How should urban transport and land use be organised? What can developing cities do to address increasing problems of urban sprawl and automobile dependency? This module addresses all of these questions and provides policy recommendations, with several case studies from developing cities.

2b. Mobility Management (Todd Litman, VTPI)

Mobility management, otherwise known as *transport demand management*, aims to make the best use of existing infrastructure by managing the demand for transport. The starting point for mobility management is that a city's transport system should focus on moving people and goods, rather than vehicles. This differs from the approach currently being taken in many developing cities, which is supply-oriented and involves ever-more road building. This module provides a wide range of policy tools in mobility management for developing cities, ranging from Smart Growth to parking to sustainable tourism and commuter reduction programs.

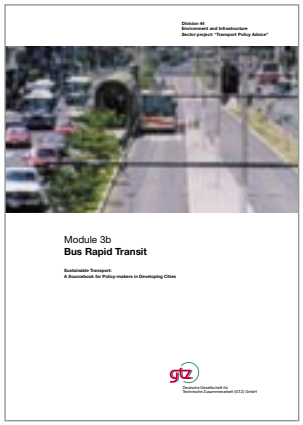
Transit, walking and cycling

3a. Mass Transit Options (Lloyd Wright, ITDP; Karl Fjellstrom, GTZ)



Choices about a mass rapid transit system are choices about a city's future. This module surveys mass transit systems around the world, and compares the different systems according to key parameters such as cost, construction time, environmental impacts, poverty impacts, speed, passenger capacity and so on. It concludes that although there is no single mass transit solution, for most developing cities bus rapid transit may be the best option.

3b. Bus Rapid Transit (Lloyd Wright, ITDP)



Bus rapid transit is a remarkable new phenomenon in the world of transit. This module provides practical guidance on how a developing city can plan, finance, design and implement a world class bus rapid transit system. As a planning template for developing cities, this module can drastically reduce planning and consultancy costs which a developing city would otherwise incur in developing a BRT system.

3c. Bus Regulation & Planning (Richard Meakin)

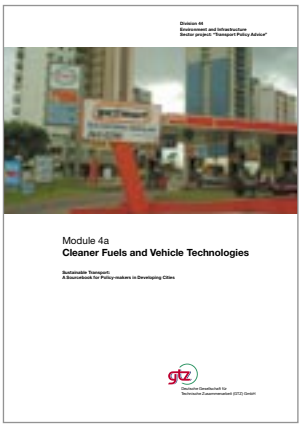
This module provides direction to developing cities on how to break out of a low quality, high-risk, low profit, low investment spiral in which so many urban bus systems in the developing world are now caught. It introduces and outlines the concept of an annual planning cycle, and shows how developing cities can improve bus systems from the viewpoints of operators, drivers, regulators, and passengers.

3d. Preserving and Expanding the Role of Non-motorised Transport (Walter Hook, ITDP)

This module starts by outlining the benefits of non-motorised transport (NMT). It considers the different forms of regulation to which NMT is subjected, and describes the non-motorised planning process and the steps involved, drawing from an example pilot study conducted in Surabaya. Successful measures in cities such as Bogotá, and in European cities, is described with a view to application in developing cities.

Vehicles and fuels

4a. Cleaner Fuels and Vehicle Technologies (Michael Walsh; Reinhard Kolke, Umweltbundesamt)



Cleaner fuels and vehicle technologies are one of the key components of any sustainable urban transport system. This module, from two leading experts on the subject, provides a detailed evaluation of cleaner fuels and technologies which can be applied in developing cities. Fuel options are evaluated based on cost and practicality. The role of fuel quality standards is also described.

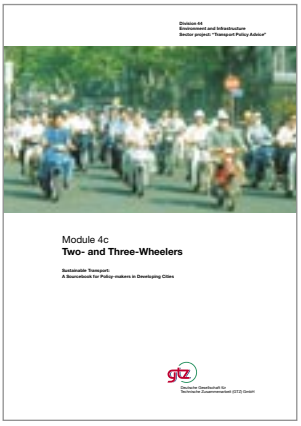
4b. Inspection & Maintenance and Roadworthiness (Reinhard Kolke, UBA)

Another key component of a sustainable transport system is an in-use vehicle testing system. This is essential to ensure that vehicles are properly maintained, from both an environmental (emissions) and safety (roadworthiness) perspective. This module provides advice on the form of inspection and maintenance system appropriate for a developing country, and how developing cities can develop and implement an effective system.

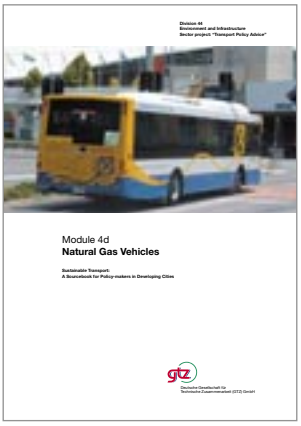
4c. Two- and Three-Wheelers (Jitendra Shah, World Bank; N.V. Iyer, Bajaj Auto)

Motorcycles are the dominant form of transport in many cities, especially throughout Asia. This module firstly describes how the traffic system implications of such a reliance may be

unsustainable. The bulk of the module then considers the problem of emissions from two-stroke two- and three-wheelers in developing cities, emphasising the experience in Asia. It provides policy advice on how to address this problem, considering several case studies.



4d. Natural Gas Vehicles (MVV InnoTec)



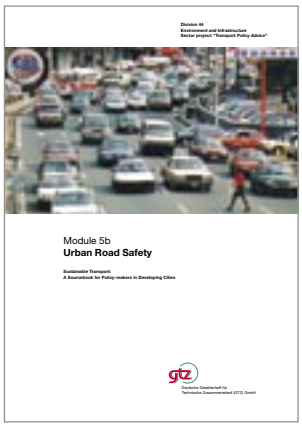
Written primarily from a European perspective, this decision-maker's guide to natural gas vehicles is nevertheless relevant to developing cities which are considering use of CNG. It provides a solid grounding in all the basic concepts of natural gas vehicles, including their operation, economic aspects, environmental aspects, refuelling infrastructure, and so on. Case studies from developing cities, including a detailed consideration of experience in Delhi (provided by CSE India), are provided.

Environmental and health impacts

5a. Air Quality Management (Dietrich Schwela, World Health Organisation)

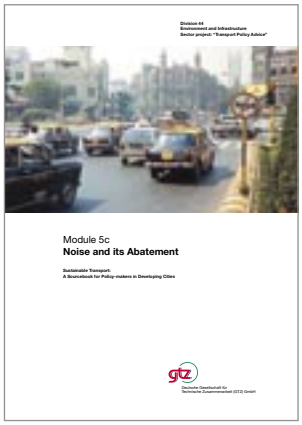
This module serves to assist policy-makers and their advisers in developing countries to determine the best measures to abate air pollution with limited information. It provides advice on developing legally enforceable air quality standards and simplified clean air implementation plans. The module explains basic concepts of air pollution, sources and types of pollution, major pollutants, WHO and other standards, air quality monitoring, air quality management plans, and emissions inventories. It also briefly introduces topics such as air quality modelling and economic valuation of the health impacts of air pollution.

5b. Urban Road Safety (Jacqueline Lacroix, DVR; David Silcock, GRSP)



Road traffic crashes result in around 800,000 deaths annually. A disproportionate amount are in developing countries, with the victims often pedestrians and cyclists. This module describes how road safety is organised at a city government level, how it is assessed (including the use of tools such as road crash diagrams), how safer road environments can be created, and the importance of public awareness, enforcement, safer vehicles, and sound financing.

5c. Noise and its Abatement (Civic Exchange Hong Kong; GTZ; UBA)



Noise is emerging as an insidious problem in developing cities, even though it is not currently perceived as a major problem. A major source of noise in cities is urban raod transport. This module introduces basic concepts of measuring noise, describes the health effects of noise, provides recommended noise level standards, and outlines six key policy areas where governments can take action to reduce noise from transport.

Resources

6. Resources for Policy-makers (Compiled by GTZ)

This module provides up-to-date, annotated links to internet resources in all the module topic areas, as well as several additional sub-topics.

1.5 Future directions for the Sourcebook

Dissemination

GTZ recognises the importance of devoting resources to the active dissemination of the *Sourcebook*, to try to ensure that the modules are actually used and applied in developing cities. This active dissemination consists of several activities, one of which is the Sustainable Urban Transport Project in Asia.

SUTP-Asia

The Sustainable Urban Transport Project in Asia, called SUTP-Asia, is one of the partnerships and initiatives which can be used as a platform for the active dissemination and ongoing development of the *Sourcebook*. This project commenced in early 2003 with initial German Technical Cooperation funding.

SUTP-Asia (sutp-asia.org) is based in Southeast Asia and cooperates with a number of existing and potential partners, including the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), CITYNET, the Clean Air Initiative for Asian Cities, the Asian Development Bank and the Partnership for Clean Air in Manila, and the Institute for Transportation & Development Policy.

Training materials

Subject to available resources, GTZ in cooperation with key partners such as UNESCAP, intends to further develop the *Sourcebook* into a set of training materials on sustainable urban transport. These training materials will consist of various components according to an internationally standardised methodology of high quality training material provision. Components will include, for example:

- instructors' notes
- participants' notes
- overheads / slides / projector material
- facts sheets & briefings
- training exercises and review questions
- support audio-visual and multimedia materials
- advice on how to plan for and implement an effective training program based on the *Sourcebook*.

> ***"www.sutp.org is the companion website to the Sourcebook, as well as an information source on sustainable urban transport"***

Future directions for the *Sourcebook* and SUTP-Asia include updates to the modules (incorporating feedback from users), additional modules – for example on driver training, urban transport financing, and participatory planning – and the development of training materials based on the modules.

The Sourcebook companion website

The SUTP-Asia website, www.sutp.org, is the companion website to the *Sourcebook* as well as an information source on sustainable urban transport. It will contain news of training events, workshops and other events, news items, related GTZ initiatives, and other information. Additional resource materials such as transport photo CDs will also be available, with details provided on the website.

2. Cross-cutting issues of urban transport

2.1 Sustainable transport: The ideas and principles*

* This section is drawn from an unpublished mission report by Dr. Axel Friedrich, Umweltbundesamt, for GTZ SUTP, January 2000

Mobility of people and of goods is an essential part of all social and economic activities. In most countries of the world, even developing countries, passenger cars and trucks have become the most important transport modes. In many developing cities high growth of the vehicle fleet has taken place in recent years. Non-motorised transport, which in earlier times was the common way of linking together places of activities, has to a large extent been substituted by the car in daily mobility, and by trucks, for freight movement. The result of this process has also been a significant change in land use patterns.

This process began during the 1920s and 1930s in the United States and spread in the wealthier countries initially, but subsequently all over the world, including to developing cities. The shift towards motorised private road transport reduced the share of other modes. The growth of road traffic overwhelmed the development of the city structures and the supply of sufficient infrastructure. Therefore in developing cities more than in developed countries the transport system is inefficient, unsafe, causes environmental problems, and disadvantages healthy city development.

The common problems of the transport sector in big conurbations are congestion, fatalities and injuries due to traffic accidents. Furthermore, an increasing demand for mineral oil fuels, severe air pollution, increasing noise levels, and a loss of urban livability and green spaces due to transport activities adversely affects city development. In particular the high growth of the transport related CO_2 emissions – compared to other economic sectors (see Section 2.4 below) – are causing concerns and demand further action. These developments discourage the attractiveness of cities and their economic well-being. From the social point of view the trend towards individual motorisation causes unequal mobility chances and disparities in burdens and advantages, for example burdens for those who cannot drive or cannot afford ownership of a private car. The transport system demands large investments and thus imposes economic burdens on public

Sustainable development – its origins and meaning

In 1972 the United Nations convened a conference in Stockholm, Sweden to give developed and developing countries a better understanding of how to care for our planet. The United Nations Environment Programme (UNEP) arose out of the Stockholm Conference.

In 1983 the United Nations General Assembly created the World Commission on Environment and Development (WCED) and appointed Dr. Gro Harlem Brundtland its Chairwoman. The WCED was given the task of developing a "global agenda for change." Five years later, in 1987, the WCED published *Our Common Future*, which agreed a definition of sustainable development which is now generally recognised around the world. According to this definition, sustainable development ***meets the needs of the present without compromising the ability of future generations to meet their own needs***.

The concepts developed in *Our Common Future* and further elaborated in Rio in 1992 and in Johannesburg a decade later serve as the basis for much of today's understanding of the link between environment and development. The 'genius' of sustainable development is that it attempts to reconcile economy and environment, and the access to resources of both present and future generations. (Future generations should have the same right to a healthy environment as we enjoy.) In particular, it is now widely agreed that sustainable development means more than merely conservation, and that environmental and economic goals, especially poverty alleviation, are not contradictory but are fundamentally intertwined.

A healthy economy, and especially improving the standard of living of people in the world's developing countries, is just as essential in satisfying our material and non-material needs as preserving the natural foundations of life. And only a society that is able to develop forms of governance that promote and help attain goals about how people want to live, and is able to distribute its goods and opportunities fairly, will be able to preserve that society's values and effectively organise the use of resources in a socially sustainable way. Sustainable development therefore relates equally to the three domains of economy, environment and society.

Sustainable transport at the international level

Particularly important initiatives in the transport sector include:

- Initially sustainable transportation was discussed at the 1994 OECD conference "Towards clean Transport: Fuel efficient and Clean Motor vehicles" in Mexico
- The Sustainable Transportation Principles, as discussed and developed by the March 1996 OECD Conference "Towards Sustainable Transportation" held in Vancouver, Canada; published in the Sustainable Development in Canada Monograph Series: "Sustainable Transportation", Monograph No. 2, Ottawa 1997
- The Vienna Declaration of the 1997 UNECE Regional Conference on Transport and the Environment
- Recent work of the OECD developing the concept of environmentally sustainable transport.

budgets, which are difficult to afford for developing countries. This leads to the conclusion: high per-capita transport activities in terms of passenger kilometres and ton kilometres, done mainly by passenger cars and trucks, not only indicate economic progress and welfare but also cause severe problems.

The 1992 Earth Conference in Rio adopted *Agenda 21*, underlining the principle of sustainable development. The June 1997 Special Session of the General Assembly of the United Nations recalled the need for sustainable development, further reinforced in the Johannesburg Summit of 2002, and promoted the need for changing the current patterns of transportation in order to avoid unfavourable environmental and health effects. The threats and damages to human health and to the natural environment make current transport structures unacceptable in the light of the ideas of sustainability. In this context different international approaches following the Rio Earth Conference started to transfer the principle of sustainable development to the transport sector (see margin note). In very simple terms we can differentiate between the environmental, social and economic goals that have to be satisfied by a sustainable transport system:

- ***Environmental***: rate of use of non-renewable resources should not exceed the rate at which renewable substitutes are developed; the rate of pollution emission should not exceed the assimilative capacity of the environment; biodiversity should be protected.
- ***Social***: access to all activities necessary to participate in social life has to be guaranteed as far as possible; air quality and noise should not exceed the health standards suggested by the WHO (World Health Organization); accident risks should be minimised
- ***Economic***: mobility of persons and of goods necessary to achieve prosperous economic development has to be provided, avoiding congesting, and without over-burdening the financial limitations of the public and private budgets.

As a practical consequence of these (and similar other) criteria for sustainable transportation, the transport sector needs structural changes that can be described as follows:

- Decrease the demand or at least mitigate the increase of demand for motorised transport of people and goods, for example by establishing transport avoiding spatial structures, by applying fiscal incentives and other policy instruments to promote short distance access.
- Shift transport demand from unfavourable transport modes (in terms of environmental, social and economic impact) to those with less negative impact on people and nature.
- Ensure the use of best available technology (BAT) both for the transport vehicles and for the management and communication tools in transport.
- Promote responsible behaviour of individuals and responsible decisions by enterprises.
- Integrate environmental and social considerations into transport policy.

Fig. 1

Global concepts of sustainability underlie the concept of sustainable transport. Raising the standard of living in developing countries is a major goal of sustainability.

Earth by night. Image by Craig Mayhew and Robert Simmon, NASA GSFC. Based on data from the Defense Meteorological Satellite Program, 9 Nov. 2000.

2.2 Poverty

A multidimensional problem

Poverty is hunger. Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not being able to go to school and not knowing how to read. Poverty is not having a job, is fear for the future, living one day at a time. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation and freedom. (www.worldbank.org/poverty/mission/up1.htm)

Poverty has many faces and aspects, involves in general terms lack of access to the resources needed to participate in the everyday life of society. The multidimensional nature of poverty can be conceptualised in various aspects relating to urban transport, access, and exclusion:

The "income poor" make less trips, and more of their trips are undertaken on foot. For most purposes they are restricted to whatever services (usually poor) can be accessed within walking distance, making them "accessibility poor". The journey to work may be relatively long. Even if it is not, it will use slow modes and may be very time consuming, so they are also "time-poor." For poor people, and particularly for women, children and the elderly, trip making is often discouraged by their vulnerability as pedestrians both to traffic accidents and to personal violence, making them "safety poor." Finally there is evidence that long walking distances and times also creates a tiredness and boredom ... adding an "energy-poverty" dimension to their deprivation (World Bank 2002).

When developing transport policy measures to alleviate poverty it is important to consider the multidimensional nature of poverty, and not simply to focus on economic indictors such as the proportion of income spent on transport or the time spent travelling. In Bogotá, for example, one of the most effective measures for helping the urban poor was the dramatic improvements to public spaces in the city. Since 1998, public space improvements in Bogotá have included:

- 285,500 square metres in walkways, green space, road dividers, sidewalks
- 3,149 neigbourhood parks
- 323 pocket parks
- 11 metropolitan parks.

As former mayor Enrique Peñalosa argues (see Module 1a: *The Role of Transport in Urban Development Policy*) pedestrian streets and ample sidewalks make a more humane city. They also make a city more democratic, as public spaces such as sidewalks and parks help integrate rich and poor neighbourhoods, and provide one of few avenues of recreation for the urban poor.

Although poverty is multidimensional, we can still consider in broad terms absolute indicators such as the number of people living on less than $1 per day, as set out in UNDP's *Human Development Report 2002,* to give an appreciation of the extent of poverty in developing countries. Table 1 shows that more than one-fifth of the world's people live on less than $1 per day.

In order to alleviate poverty, it is essential to develop an understanding of the dimensions of

Table 1: Number of people living on less than $1 per day, 1990 – 1999

UNDP 2002

Worldwide, the number of people living on less than $1 a day barely changed in the 1990s

	Share (percent)		Number (millions)	
Region	1990	1999	1990	1999
Sub-Saharan Africa	47.7	46.7	242	300
East Asia and the Pacific	27.6	14.2	452	260
Excluding China	18.5	7.9	92	46
South Asia	44.0	36.9	495	490
Latin America and the Caribbean	16.8	15.1	74	77
Eastern Europe and Central Asia	1.6	3.6	7	17
Middle East and North Africa	2.4	2.3	6	7
Total	**29.0**	**22.7**	**1,276**	**1,151**
Excluding China	28.1	24.5	916	936

Note: $1 a day is $1.08 in 1993 purchasing power parity (PPP) prices.
Source: World Bank 2002c.

povery and impoverishment, and through this understanding to develop strategic ways of approaching and addressing poverty alleviation. It is now accepted that it is not sufficient to merely focus on indirect – so-called 'trickle down' – benefits for the poor. This consensus is reflected in approaches of multilateral institutions such as the World Bank. Strategy documents such as the *Urban Transport Strategy Review* now acknowledge that urban transport improvements directed at 'improving the efficiency of the transport system as a whole', are not sufficient. In addition to sytem-wide increases in efficiency, targeted interventions to achieve poverty alleviation are required. Multilateral and bilateral aid and development agencies are developing increasingly sophisticated tools to understand – and alleviate – poverty. These include, for example, toolkits, websites, guidelines and manuals in the "References" section of this module.

Focusing on the modes used by the poor

The transport needs of the poor differ from the non-poor. The poor typically make 20 – 30% less trips, and rely much more on non-motorised and public transport (Figure 2). The poor have a more limited range of destinations, being much more focused on core destinations such as work places, schools, markets, places of worship and health clinics.

In developing cities land values often reflect accessibility of an area to key destinations. The poor are faced with a complex trade-off between residential security, travel time, and travel mode. A survey of pavement dwellers in Madras, for example, showed that 59% walked to work at zero cost. At the other extreme, those opting for a degree of residential security on the outskirts of cities pay a high price in terms of access costs. The urban poor in Lima and Rio de Janeiro for example are driven out to cheap dwelling space in remote locations, 30 or 40 kilometres out of the employment centre; average commuting time per day for the poorest group in Rio de Janeiro exceeding three hours (World Bank 2002).

> ***"Eradicating poverty is the greatest global challenge facing the world today and an indispensable requirement for sustainable development, particularly for developing countries"***
>
> United Nations, *Report of the World Summit on Sustainable Development, Johannesburg*, 2002

Much attention in the form of international events, seminars, conferences, training materials and so on, is devoted to issues of vehicle and fuel technologies. While this high level of attention to technology is understandable and helpful in addressing tailpipe emissions, it often does not address the most direct transport needs of the urban poor in developing countries. We often hear of seminars and workshops elaborating the results of the latest comparison of CNG versus clean diesel, or even trials of fuel cells or electric vehicles. But seldom do we hear of a high profile international seminar focusing on walkway design, or non-motorised transport in developing countries. This is despite the fact that in many developing cities, car-owners are still a small minority of the population. Public transport users, pedestrians and cyclists represent a large majority in many developing cities, ranging from Belgrade to Metro Manila to Bogotá to Shanghai. Private motor vehicle ownership is beyond the reach of the urban poor, with the possible exception of motorcycles in cities such as Denpasar and Ho Chi Minh in which public transport provides less than 5% of trips.

Fig. 2

In Agra as in other developing cities, urban poor are more reliant on non-motorised modes of transport.

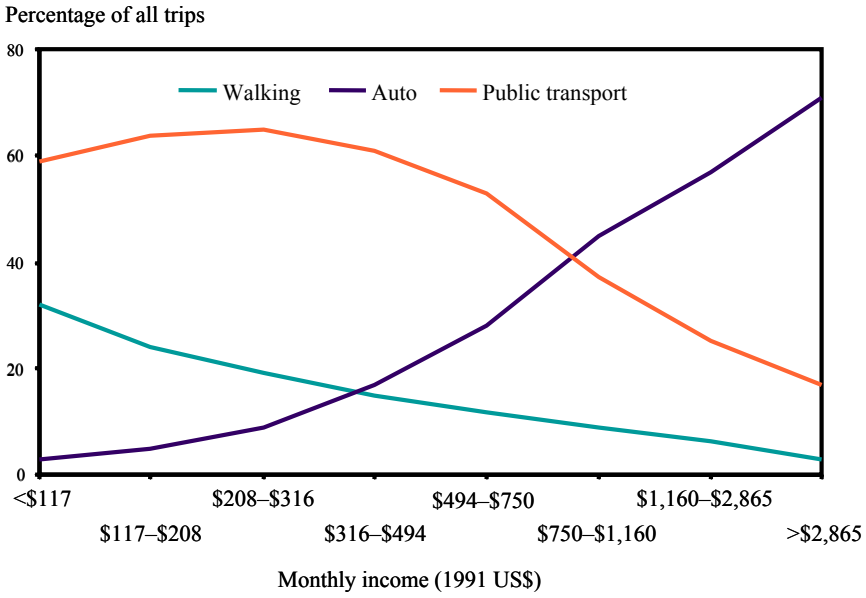
Lloyd Wright, GTZ Urban Transport Photo CD 2002

The poor in developing cities cannot afford cars. They rely primarily on walking, cycling and public transport for gaining access to jobs, services and social events. Figure 3 presents data for Santiago, Chile. Figures for other cities will vary, though the trend it illustrates is typical of almost all developing cities. It shows that the poor rely on walking, cycling and public transport much moreso than the non-poor.

> ***"Low income people [in the Surabaya study area] are forced to use motorised travel even for extremely short trips"***
>
> GTZ SUTP/ITDP, 2000

Although the transport patterns and needs of the poor will vary in different developing cities, it is one of the foundations of this *Sourcebook* and of GTZ's approach to urban transport that improved public transport and better conditions for walking and cycling will provide improved access to the urban poor, and will in this way contribute to poverty alleviation. Many other interventions can contribute to povery alleviation. Module 2a: *Land Use Planning and Urban Transport*, sets out a diverse agenda of policy reforms which can promote transit, pedestrian and non-motorised transport friendly development. More effective transport and land use planning is an urgent requirement in many developing cities experiencing rapidly growing urban sprawl and car-dependency. Similarly, the mobility management measures described in Module 2b: *Mobility Management*, lead to less automobile-oriented urban development patterns.

Improving public transport is a key component of any pro-poor urban transport agenda in a developing city. In many cities, policy-makers have strictly regulated fares under a misguided conception that this alone would guarantee public transport access for the urban poor. Rather, the outcome of poor regulation and misguided fare controls have almost everywhere been a declining level of service of public transport, and a 'vicious cycle' of declining investment and market share, as described in Module 3c: *Bus Regulation and Planning*. The *Sourcebook* modules on *Transit, Walking and Cycling* show



Note: Santiago does not add to 100%; not all modal shares included.

Fig. 3
The relationship between transport mode choice and income in Santiago.
WBCSD 2002

how effective public transport regulation means that low-cost mass transit and non-motorised transport solutions need not correspond to a low level of service. Cities such as Bogotá have provided a world class mass transit sytsem accessible to the urban poor, as described in Module 3a: *Mass Transit Options*, and Module 3b: *Bus Rapid Transit*.

It is also important to avoid the misconception and stigma that non-motorised transport (such as walking and cycling) and public transport is for the poor. Module 3d: *Preserving and Expanding the Role of Non-motorised Transport*, shows that poverty alleviation is only one of the many benefits of improving conditions for non-motorised transport. Benefits of improving non-motorised transport for the urban poor are, nevertheless, potentially large. GTZ and ITDP showed in a pilot project in Surabaya that even in poor neighbourhoods, some 60% of trips between 1 and 3 km were undertaken by motorised means, due mainly to the very poor conditions for walking, cycling and pedicabs in Surabaya. Perhaps even more surprisingly, 20% of trips less than 1 km in length were made by motorised means, despite the fact that both areas of the pilot projects were low income neighbourhoods. One conclusion of the study was that:

Even low income people are forced to use motorised travel even for extremely short trips, leading to conditions where the working poor spend an

estimated 20% of their household income on transport. Improved conditions for non-motorised travel in the study area would yield $250,000 in benefits to these low income families each year. (GTZ SUTP/ITDP 2000)

Public finances, and equity considerations

Opportunity costs of transport investments

Urban transport policy has major implications for city government finances. City government spending in turn carries major opportunity costs. Scarce development funds spent on expensive rail-based mass transit systems, for example, could be spent on more cost effective approaches such as bus rapid transit, with the resulting savings invested in health, public space and educational facilities to benefit the urban poor. Possibly even worse than ill-advised mass transit system investments, spending on new road infrastructure, as well as being regressive in that it benefits primarily the richest (car-owning) portion of the population, may actually worsen urban transport conditions through induced traffic and sprawl.

Private sector participation in urban transport infrastructure provision can be an effective method for developing city governments to provide infrastructure and services. Advice is provided on this topic in Module 1c: *Private Sector Participation in Urban Transport Infrastucture Provision*.

The city of Bogotá, Colombia provides a recent example of the effective use of public finances to benefit the urban poor, to improve social integration, to enhance air quality, to improve the productivity of the city, and to enhance the quality of life of all citizens. The example of Bogotá – and the policy underpinning it – is elaborated by the man who inspired it, former mayor Enrique Peñalosa, in Module 1a: *The Role of Transport in Urban Development Policy*.

Bogotá is also an example of a city which has leveraged the potential of economic instruments as a way of achieving multiple transport objectives including provision of funds, reduced congestion, progressive taxation, and environmental improvements. Advice on the use of economic instruments including road pricing, fuel taxation, parking, vehicle taxation, environmental trust funds and other measures is provided in Module 1d: *Economic Instruments*.

Equity and transport in developing cities

Equity considerations dictate that transport planners in developing cities should favour modes of walking, cycling, and public transport. In wealthier cities the urban poor are often a minority. Although equity considerations are important in all cities (see text box "Evaluating transportation equity"), in wealthy cities equity considerations are often focused on politically justifying urban transport subsidies of public transport systems used by only a minority of the population. In many developing cities, on the other hand, the urban poor represent the majority of the population. This is reflected

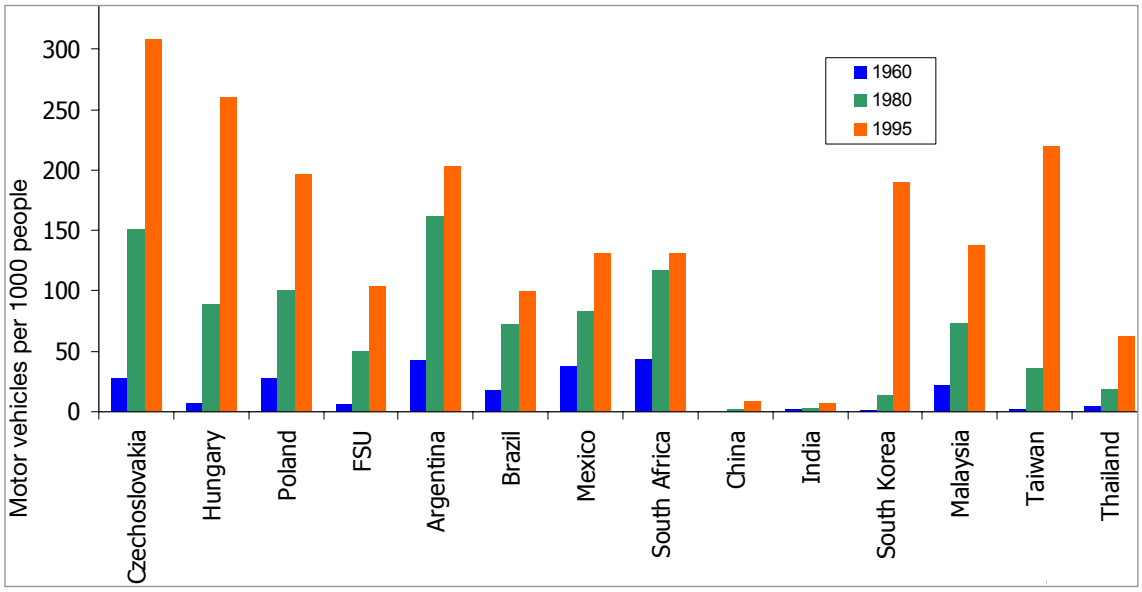


Fig. 4
Vehicle ownership rates in selected countries of the developing world.
Thorvik, WBSCD 2002

Evaluating transportation equity

Equity refers to the distribution of resources and opportunities. Transportation decisions can have significant equity impacts. Transport represents a major portion of consumer, business and government expenditures. It consumes a significant portion of taxes and public land. Transport activities have external impacts (noise and air pollution, crash risk and barrier effects) that affect the quality of community and natural environments, and personal safety. Transport determines where people can live, shop, work, go to school and recreate, and their opportunities in life. The quality of transport affects people's ability to obtain education, employment, medical service and other critical goods.

Equity impacts can be difficult to evaluate, in part because the word "equity" has several meaning, each with different implications. There are three major types of equity related to transportation:

1. ***Horizontal equity*** (also called "fairness"). This concept is concerned with whether each individual or group receives a fair share of common resources. It suggests that people with equal incomes and needs should receive a comparable share of government benefits and bear comparable tax burdens.
2. ***Vertical equity with regard to income***. This considers the allocation of costs between different income classes, assuming that public policies should favour people who are economically disadvantaged. Policies that provide a proportionally greater benefit to lower-income groups are called "progressive," while those that make lower-income people relatively worse off are called "regressive."
3. ***Vertical equity with regard to mobility need and ability.*** This considers whether a transport system provides adequate service to people who have special transport needs (i.e., they are "transportation disadvantaged"). It suggests that public subsidies can be justified if needed to provide basic mobility to people who are transportation disadvantaged.

Due to these different definitions it is important to specify which perspective is being used when evaluating transport equity. For example, it may be unclear to simply say that a particular transport policy or project increases or decreases equity, without indicating which type of equity. For more information please see www.vtpi.org.

Todd Litman, 2003

for example in vehicle ownership data. Figure 4 shows that in low income developing countries car ownership rates are typically less than 100 cars per 1000 people, and even in higher income developing cities car ownership is generally less than 200 per 1000 people. This compares to car ownership rates of around 400 per 1000 people in Europe, and more than 500 per 1000 people in many cities in North America and Australia.

> ***"We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected"***
>
> United Nations Millenium Declaration, Sept. 2000

The road environment

One area requiring further research concerns the exposure of urban poor to transport-related air pollution, road accidents, and noise. The following general observations, however, can be made:

- The urban poor make up a significant proportion of the road-side workers in developing countries, resulting in a likely higher exposure to roadside air pollution (see further Module 5a: *Air Quality Management*).
- The urban poor have less means to protect themselves against pollution, and less means to mitigate the results of pollution. The urban poor are also often forced to accept trade-offs between residential cost and ambient noise levels. The effects of noise on health, and policies for mitigation, are described in Module 5c: *Noise and its Abatement*.
- The urban poor are much greater users of non-motorised transport modes than the non-poor, and users of non-motorised modes (including pedestrians) represent a high proportion of road crash victims in developing cities. The problems of road safety, and policy recommendations in this area, are elaborated in Module 5b: *Urban Road Safety*.

Employment

The urban transport sector is a significant employer in developing cities. Initiatives taken to greatly improve the livelihood of urban bus

drivers in Bogotá are described in Module 3b: *Bus Rapid Transit*, and initiatives to improve the livelihood of pedicab drivers in Indian cities are described in Module 3d: *Preserving and Expanding the Role of Non-motorised Transport*.

Involving the poor

Sustainable urban transport measures will not succeed without the support of the local people. Many of the modules in the *Sourcebook* describe various forms of participatory planning processes.

Information campaigns, as described in Module 1e: *Raising Public Awareness about Sustainable Urban Transport*, are essential. It is necessary to create awareness about the transportation system the people of a city deserve for existing and future generations. This is a way for projects to become "owned" by the community. In this way participation of the local people can be increased, resulting in greater benefits and making projects politically, socially and financially feasible.

2.3 Gender

Gender awareness is seeping into the transport sector. Although there were few studies on the subject as recently as 1998, a growing number of projects are beginning to address gender imbalances in the burden of transport, and endeavour to expand the range of transport choices, and reduce the costs of transport, for women.

Gender analysis is justified in terms of greater efficiency of transport interventions and therefore greater impact on poverty reduction that it enables. Transport facilities can be better matched to the needs of users through an understanding of gender aspects of transport. In Surabaya, Indonesia, for example, a GTZ/ITDP (2000) study showed that a large majority of cyclists are men and a large majority of cycle rickshaw passengers are women. Policy interventions aiming to reduce the transport burden on the urban poor in Surabaya need to take account of these gender-based variations for maximum effectiveness. An increasing number of gender-related tools are becoming available to policy-makers, although so far the major resources have tended to focus on rural areas.

Along with poverty, gender related disadvantage is also endemic in developing cities. The discussion of gender in the *Urban Transport Strategy Review* is worth quoting at length:

Many activities typically undertaken by women (child-care, household management, informal sector employment, etc) require them to make more and shorter trips than men, more trips at off-peak hours and off the main routes, and engage in more complicated multi-leg trips, all of which tend to make their movements relatively expensive to provide for by public transport, and hence highly priced or poorly supplied. Women are very vulnerable to these cost characteristics as they frequently have less capacity to pay than male household members, who also control any bicycles or other vehicles available to the household. Cultural factors may constrain women's ability to use public transport or bicycles. In many countries there is also a problem of the "social safety or security" of public transport for women, especially in the evening hours. This may force them to depend on

Gender aspects of rural road maintenance in Costa Rica

In Costa Rica, GTZ has been co-operating with local governments since 1990 in establishing a practical road maintenance system. Its principles are straightforward:

- ***Everyone has to join in*** – No road repairs are possible without the participation of the local residents and the people's assuming responsibility.
- ***Everyone has to pay*** – Ministries and local governments with money, and local residents with their labour.
- ***The right technology counts*** – Simple but essective solutions are required, above all for road drainage.
- ***Not without the women*** – Women have proven to be especially important in organising local road maintenance committees and in winning over people's support.

"We'll get our husbands to work!"

A Costa Rican road committee member

The results of this approach have been remarkable, including greatly increased access to health and education services, regular bus sevices, a road maintenance fund, growth in the area under cultivation by 7.5% per year, greatly reduced travel times and vehicle maintenance costs, and integration into the long term planning of the local governments.

more expensive alternatives. Peripheral location may be particularly damaging to women's employment potential. But there remains a heavy agenda of necessary gender related research. This includes a need for more ac tivity, as opposed to trip-based, research; better estimates of the economic value of women's time; and direct evaluation of the impacts of some gender related projects.

2.4 GlobaL warming

The scientific basis

The "Greenhouse Effect", which rose to prominence on political and research agendas in the 1990s, refers to the warming which occurs when certain gases allow sunlight to penetrate to the earth but partially trap the planet's radiated infrared heat in the atmosphere. Some such warming is natural and necessary, but increasing concentrations of these 'greenhouse gases' are causing serious climate changes.

Carbon dioxide (CO_2) is by far the most important greenhouse gas. Scientists can study the composition of air in the past by examining air trapped in Antarctic ice. Analysis of these bubbles shows that CO_2 concentrations are now higher than at any time in the past 420,000 years. In fact, it is likely that the concentration today is higher than it has been for 20 million years. The current rate of increase of carbon dioxide is greater than at any time in the past 20,000 years. Atmospheric CO_2 concentrations have been stable at around 280 parts per million (ppm) for the last 1000 years, but rose sharply in the late 20th Century to 380ppm. According to various scenarios outlined in the Intergovernmental Panel on Climate Change (IPCC) reports of 2001, the atmospheric concentration of CO_2 is projected to rise further to between 550ppm and 960ppm by 2100.

The rise in greenhouse gas emissions, and especially in CO_2 emissions, has a direct impact on global temperatures. Figure 5 illustrates both the rise in global temperature since 1860, and the contribution of anthropogenic emissions (primarily CO_2 emissions) to this rise in temperatures.

Effects of global warming*

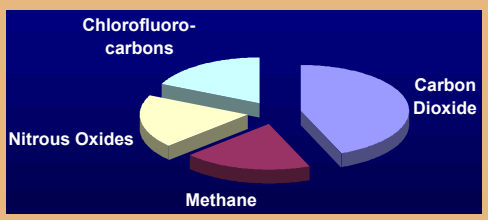
* This section is adapted from IPCC 2001

Projected climate change will have beneficial and adverse effects on both environmental and socio-economic systems, but the larger the changes and rate of change in climate, the more the adverse effects predominate. When considered by region, adverse effects are projected to predominate for much of the world, particularly in the tropics and sub-tropics.

Climate change is projected to increase threats to human health, particularly in lower income populations, predominantly within subtropic and tropical countries. Climate change can affect human health directly (e.g. loss of life in floods and storms) and indirectly through changes in the range of disease vectors (e.g. mosquitoes), water-borne pathogens, water quality, air quality,

Minimising greenhouse gas emissions from mobile sources

The main greenhouse gases (see chart) are carbon dioxide (CO_2) [44%], methane (CH_4) [19%], nitrous oxides (NO_x) [19%], and the chloro-fluoro hydrocarbons (CFCs) [18%].



Carbon dioxide is produced naturally by living organisms and by the burning of fossil fuels including mobile sources. Most of the methane is from coal formations, landfills, livestock and wetland rice cultivation. Methane has around 21 times greater impact on global warming than carbon dioxide. Nitrous oxide is a by-product of fuel burning and fertiliser manufacture. It has 310 times the global warming potential (GWP) of carbon dioxide.

The global community has conducted several international negotiations with the *United Nations Framework Convention on Climate Change* and the associated *Kyoto Protocol* (unfortunately rejected by the United States in 2001, but ratified by many other countries) now setting the pace. Negotiations are aimed at developing protocols for binding greenhouse gas reduction levels.

Major greenhouse gas emission reductions – combined with local, city-level benefits in developing countries – can be achieved through modal shifts from private vehicles, to public transport and non-motorised modes.

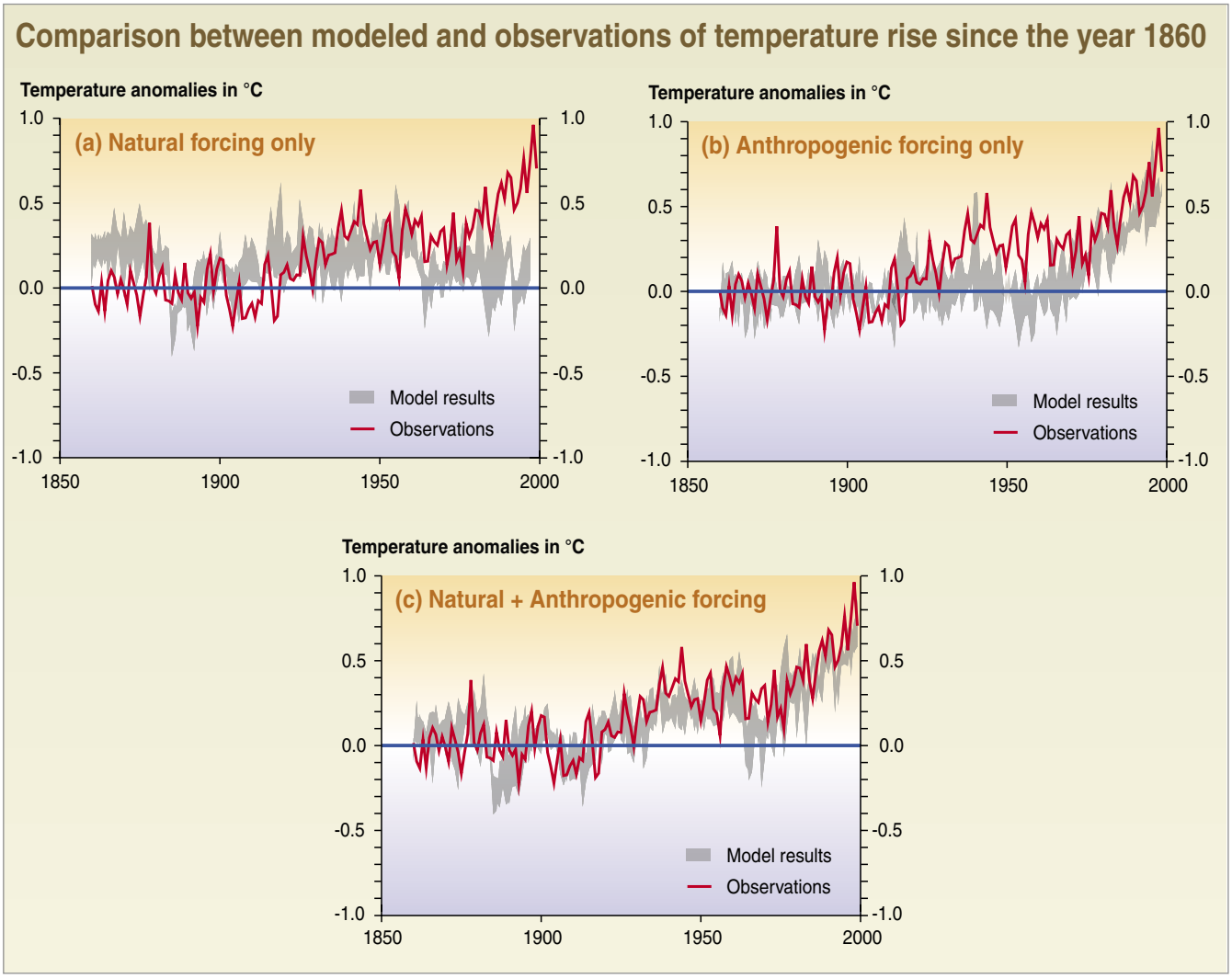


Figure SPM-2: Simulating the Earth's temperature variations (°C) and comparing the results to the measured changes can provide insight to the underlying causes of the major changes. A climate model can be used to simulate the temperature changes that occur from both natural and anthropogenic causes. The simulations represented by the band in (a) were done with only natural forcings: solar variation and volcanic activity. Those encompassed by the band in (b) were done with anthropogenic forcings: greenhouse gases and an estimate of sulfate aerosols. And those encompassed by the band in (c) were done with both natural and anthropogenic forcings included. From (b), it can be seen that the inclusion of anthropogenic forcings provides a plausible explanation for a substantial part of the observed temperature changes over the past century, but the best match with observations is obtained in (c) when both natural and anthropogenic factors are included. These results show that the forcings included are sufficient to explain the observed changes, but do not exclude the possibility that other forcings may also have contributed.

Q2 Figure 2-4

Fig. 5

Comparison between modeled and observations of temperature rise since the year 1960.

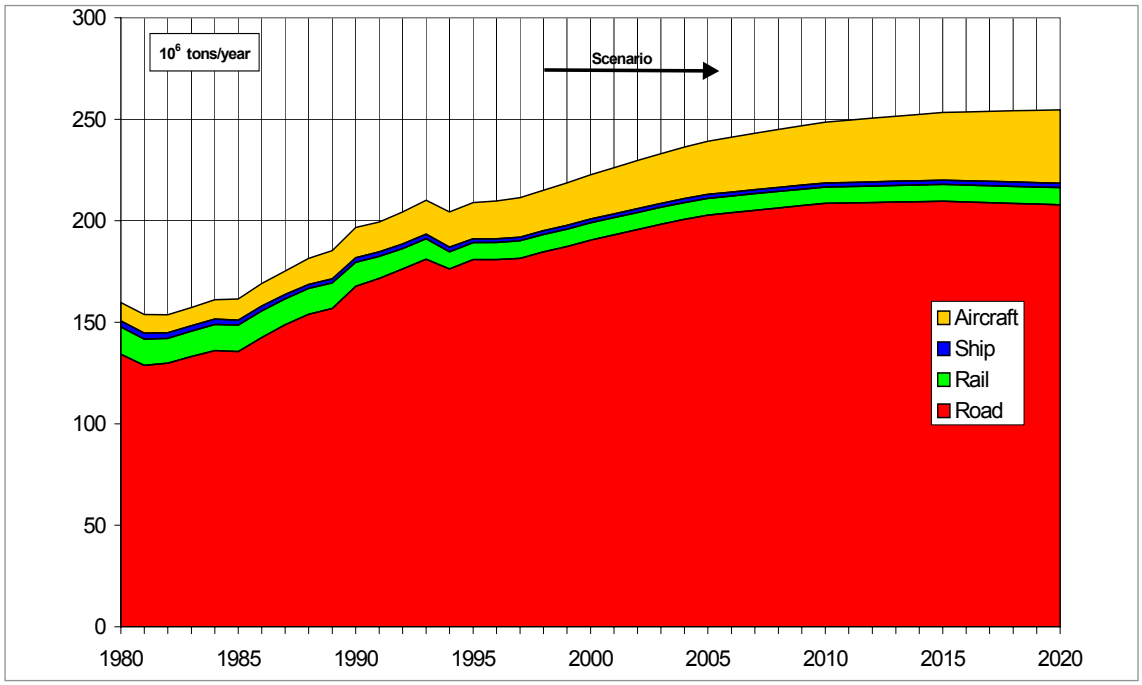
IPCC 2001

and food availability and quality. Impacts will be strongly influenced by local conditions.

Water shortages in existing water-scarce areas, threats to vulnerable ecosystems and low-lying island nations, and reductions in crop outputs are further projected effects of global warming, with most of the adverse impact projected to fall upon poorer nations, and upon the poorer people in all nations.

The transport sector and global warming

The transport sector is responsible for around 25% of global CO_2 emissions from fossil fuel use; a share which is growing. CO_2 emissions in developed countries have been stabilised in most sectors, with the exception of emissions from transportation. Figure 6 shows that CO_2 emissions from the transport sector in Germany, for example, will continue to increase this decade.



Remarks: Total emissions including prechain (energy transport, production and conversion in power plants, refineries); Aircraft: Transport starting from German airports;

Fig. 6
CO_2 emissions from the transport sector in Germany (actual and projected).
TREMOD calculation in Nov. 1999, courtesy of Axel Friedrich, Umweltbundesamt

Developed countries currently represent the major source of CO_2 emissions (Figure 7), although emissions from developing countries are rising rapidly and showing no signs of stabilisation (Figure 8).

Reducing emissions from the transport sector has proved very difficult. The OECD (1998) bemoans that:
Of all energy-using activities, transport is the area where governments find it hardest to find politically feasible policies that can mitigate greenhouse gas emissions.

There is, however, an emerging consensus on how to effectively tackle CO_2 emissions from the transport sector in developing countries, as outlined in the following section.

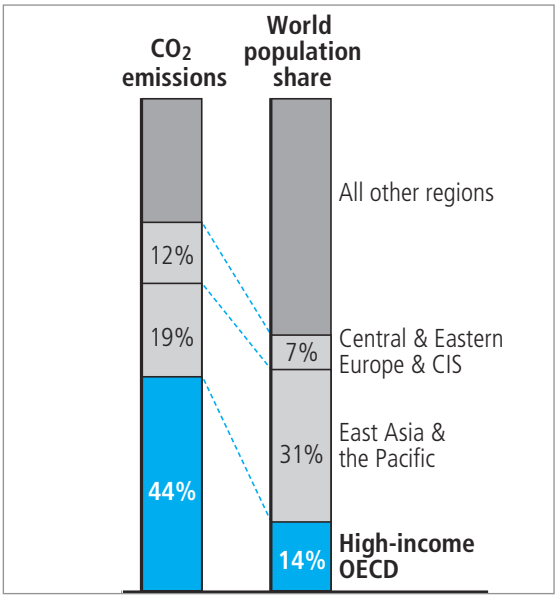


Fig. 7
CO_2 emissions originate disproportionately from high income countries.
UNDP 2002

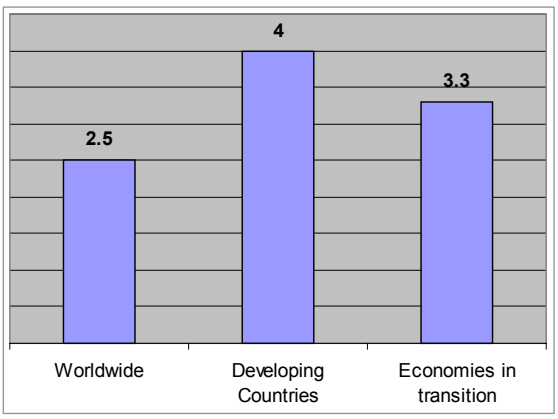


Fig. 8
Projected annual percentage growth rate of CO_2 emissions from the transport sector to 2020.
GTZ, based on data from IEA 2000

> ***"Climate policies can be more effective when consistently embedded within broader strategies designed to make national and regional development paths more sustainable"***
>
> IPCC, *Climate Change Synthesis Report*, 2001

Achieving greenhouse gas emission reductions from transport in developing cities

Carbon dioxide (CO_2) mitigation has a negative connotation in many developing countries, where city governments are faced with many urgent demands. Averting increasing contributions of transport to GHG emissions requires an integrated package of reforms. In all developing cities, the question is how to get such policies implemented. The approach favoured by GTZ and applied in Surabaya (www.sutp.org), and recommended by a range of recent studies, is to focus on short to mid-term measures which are low cost and "win-win," with the highest impact on CO_2 mitigation at the same time leading to local economic, social, and environmental improvements in the form of reduced congestion & local air pollution, and a more liveable, efficient, democratic and prosperous city. As the WB UTSR (2001, draft) argues:

The suggested key … is both to link GHG mitigation to policy initiatives to goals that are perceived to be of immediate relevance and to try to uncouple, or at least "flex" the link between economic growth and GHG emissions from the transport sector.

There is now an established consensus, exemplified by the shift of the Global Environment Facility funding from technology upgrades to projects promoting modal shifts, that the best way to reduce greenhouse gas emissions from urban transport is to strategically focus on urban transport issues which are regarded as being of immediate importance to policy-makers in developing cities (especially congestion, local air pollution, and uncontrolled motorisation) which will give rise to a range of policy initiatives which simultaneously have the effect of drastically reducing greenhouse gas emissions.

Local and global (chiefly in the form of reduced greenhouse gas emissions) benefits are achieved through such policies. In this sense this approach amounts to a sustainable urban transport policy approach focusing on city-level problems and aiming to meet local and global needs.

A recent report from the Washington-based Pew Center on Global Climate Change (Sperling *et al.* 2002) recommends policies which should be pursued in developing countries in order to reduce greenhouse gas emissions from transport.

Which policy approaches are recommended? The report notes that many of the strategies required have substantial local as well as global benefits, and states that:

Key strategies include increasing the relative cost of using ... private cars and enhancing the quality and choices of alternative transportation modes.

The challenge for all concerned with climate change mitigation and reducing emissions from the transport sector, of course, is to help see such policy approaches through to implementation.

This is the challenge taken up by GTZ's *Sustainable Transport Sourcebook for Policy-makers in Developing Cities*.

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- World Bank. 2002. *Cities on the Move: an Urban Transport Strategy Review*, www.worldbank.org/transport
- World Business Council on Sustainable Development (WBCSD). 2001. *Mobility 2001*, www.sustainablemobility.org/publications/publications.asp

Other resources

Sustainable development

- Global Environment Facility, www.gefweb.org. GEF funds defray the added costs of making planned projects environmentally friendly (with a focus on global issues such as climate change, in the transport sector).
- Organization for Economic Cooperation and Development, Sustainable Development section, www.oecd.org/EN/home/0,,EN-home-21-nodirectorate-no-no--21,00.html, and the Environmentally Sustainable Transport section, www.oecd.org/EN/home/0,,EN-home-518-nodirectorate-no-no-no-25,00.html provide numerous resouces on sustainable development
- United Nations Commission on Sustainable Development, www.un.org/esa/sustdev/csd.htm. The UNCSD was established in 1992 following the UN Conference on Environment and Development
- United Nations Development Programme, www.undp.org. UNDP's mission is to help countries achieve sustainable human development by assisting them to build their capacity to design and carry out development programs, giving first priority to poverty eradication
- United Nations Environment Programme, www.unep.ch. UNEP is charged with the implementation of global and regional environment conventions, providing policy responses to existing and emerging environmental concerns and raising awareness about how peoples actions negatively affect the environment. www.unep.ch/conventions/geclist.htm provides links to various multilateral agreements and conventions
- World Bank, www.worldbank.org. The world's largest source of development assistance
- World Business Council for Sustainable Development, www.wbcsd.ch. WBCSD aims to develop closer co-operation between business, government and all other organizations concerned with the environment and sustainable development, and to encourage high standards of environmental management by business.

Transport and poverty

- DFID Transport Resource Centre, www.transport-links.org/rcs. The TRCS is a world-wide consortium of groups and individuals with specialist knowledge in the field of transport research. Site includes the Rural Transport Knowledge Base
- GTZ. 2002. *Urban Transport and Poverty in Developing Countries*, Ralf Kaltheier
- International Conference on Financing for Development, Mexico, 18-20 March 2002, www.un.org/esa/ffd. Documents available for download include the "Monterrey Consensus"
- International Forum for Rural Transport and Development, www.ifrtd.gn.apc.org
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- United Nations Centre on Human Settlements/HABITAT, www.unchs.org. Habitat's activities focus on promoting housing for all, improving urban governance, reducing urban poverty, improving the living environment and managing disaster mitigation and post-conflict rehabilitation
- United Nations Millenium Development Goals, www.developmentgoals.org, UN Millenium Declaration, September 2000
- World Bank PovertyNet, www.worldbank.org/poverty/mission/up1.htm provides many resources on poverty, including a "Literature of Poverty" section.

Transport and gender

- Transport and Society Research, www.geocities.com/transport_research. Deals with the two main topics of social exclusion & transport, and gender & transport
- World Bank Gender and Transport, www.worldbank.org/gender/transport, Includes various studies, tools and resources
- www.geocities.com/transport_and_society/ruralinclusion.html#topics. This website, prepared by Margaret Grieco, Professor of Transport and Society, Napier University, Edinburgh, includes an annotated list of links to a large number of resources on gender and development, including best practice guidelines in various sectors. Includes a paper on *Gender, social inclusion and rural infrastructure services*
- www.ifrtd.gn.apc.org/issues/cc-gen.htm, includes a section on Gender in Rural transport issues, and links to various resources

Transport and global warming

- ARIC, www.doc.mmu.ac.uk/aric/arichome.html. ARIC provides research & education in atmospheric & sustainability issues
- Center for Neighborhood Technology, www.cnt.org. Contains a number of sub-web sites on various transport topics
- Environmental Defense, www.environmentaldefense.org. US non-profit organization representing more than 300,000 members
- Exhaustion: A Guide to Transportation Emissions, www.ec.gc.ca/emission/toce.html. Easy-to-read fact sheets mainly on fuel-related topics, with a Canadian focus
- Global Environment Facility, www.gefweb.org. GEF helps developing countries fund projects that protect the global environment. Site provides a list of projects worldwide, information and application forms.
- GTZ Climate Protection Program, www.gtz.de/climate/english.
- Helio International, www.helio-international.org. HELIO's goals are to assess, monitor and publicise the contribution of energy systems to sustainable development. Links to individual country reports.
- International Council for Local Environmental Initiatives, www.iclei.org. ICLEI is an international association of local governments implementing sustainable development
- International Energy Agency, www.iea.org. Multinational agency dealing with energy issues.

- Intergovernmental Panel on Climate Change (IPCC), www.ipcc.ch. An intergovernmental body that provides scientific, technical and socio-economic advice to the world community
- Organisation for Economic Cooperation and Development, www.oecd.org/env. Environment Directorate resources include the Environmentally Sustainable Transport (EST) program.
- Sierra Club, www.sierraclub.org. Campaigns include sprawl and global warming
- United States Environmental Protection Agency, www.epa.gov. Many resources, particularly strong on AQM. Also advocacy, fuels, TDM, and global warming resources
- Wuppertal Institute, www.wuppertal-institut.de. The work of the Wuppertal Institute is interdisciplinary and oriented to solving problems in the area of applied sustainability research.

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