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Urban Environmental Quality Improvement in Developing Countries: Socio-Economic Possibilities and Limits

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URBAN ENVIRONMENTAL QUALITY IMPROVEMENT
IN DEVELOPING COUNTRIES:
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Executive Summary

This report focuses attention on the increasing gap between the need for economic progress and urban quality of life in Third World cities. Its aim is to identify critical success factors for urban sustainable development, based on empirical illustrations from East and South-east Asian countries.

After a background sketch of growth and environmental issues in Third World cities, the notion of local sustainable development (LSD) is introduced as a policy strategy. It is argued that urban sustainability indicators ought to be developed in order to have guidelines for effective policy-making. Several experiences from both the developed and the developing world are reported. Particular attention is given to the triangular relationship efficiency, equity and sustainability. A wealth of empirical data is also given.

A main part of the report is devoted to the assessment of urban sustainability in Third World countries by using a pentagon prism with critical success factors, comprising in particular: hardware, socioware, orgware, ecoware and finware.

The feasibility of various sustainability policies is judged by investigating four important fields:

- urban resources and waste management
- urban quality of life
- urban transport
- financing urban sustainability policies

Each of these fields is analyzed and illustrated from the perspective of the above pentagon prism.

In the concluding section the need for effective (private and public) sustainability issues is stressed, with a particular view on urban quality in developing countries. Decentralised policy initiatives are advocated as the most plausible success strategies for LSD in Third World countries.
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PART A. CONCEPTS AND BACKGROUNDS

1. An Urban World and a Threatened Environment

Despite wars and natural disasters the population on our planet is steadily increasing. In the past 200 years an average five-fold increase has taken place and in the foreseeable future there is no clear end to this megatrend. Some regions show even much higher growth rates. For example, on Java (Indonesia) the population size has risen in the past century from 5 to some 95 million people, thus causing an unprecedented stress on land use, resources and amenities.

It goes without saying that the growth rates of world population put a formidable stress on the environment and on the earth's natural resources. However, besides the sheer quantitative trends regarding population and environmental decay, two qualitative trends reflecting structural and/or systemic changes influencing environmental quality have to be mentioned here.

First, one may take for granted that the gradually rising welfare levels in many developing countries will cause an environmental decay and/or threat which far exceeds a linear growth of environmental stress as a fixed proportion of population members. Since industrial products in a modern society are far more environmentally harmful than commodities in a rural society, a non-linear exponentially growing environmental stress curve is plausible. The resulting environmental threats are without any doubt at odds with the notion of a sustainable development in both the developing and the developed world.

Another qualitative megatrend concerns the spatial dispersion of population and economic activities. Apart from some local and temporary exceptions, we are observing a strict and continuing urbanisation trend in almost all countries, with even a fast urbanisation in many developing countries. Around the turn of the century more than one half of world population will be living in cities. Developing countries are rapidly following the pace set by industrialized countries. There is of course a threat that - without effective environmental policies - the urban life style of our world will cause even more environmental disturbance in terms of noise, congestion, pollution and waste, mainly as a result of density and poverty (see also Lea and Courtney 1985).

Many developing countries will likely even become the forerunners in this global megatrend towards massive urbanisation. Some numerical information on this trend towards 'third-world megalopolisation' can be found inter alia in Fuchs et al. (1987), Linn (1983) and Lo (1992). An example can be found in Figure 1.

If one takes for granted that some 1.5 billion people from developing countries are living nowadays already in urban areas, one begins to realize the massive scale of this phenomenon. A few additional figures may illustrate the above point: at the beginning of this century there were only 11 cities with over one million inhabitants, whereas at the turn of the century there will be approximately 400 such cities! It is expected that in approximately 30 years time there will already be some 500 one million cities in developing countries!
Welfare increases - in terms of Gross National Product (GNP) per capita - play a major role in the ongoing urbanisation trend (see Figure 2); clearly, rising GNP levels per capita induce a trend towards an urban way of living which is often leading to a conflict with sustainable environmental quality conditions (as it witnessed by cities like Mexico, Djakarta, Bombay and many other metropolises).

The size, density, complexity and poverty levels in many cities appear to cause a massive environmental decay at a world-wide scale, especially in Third World countries. Hence megacity (or metropolis) management will become a very difficult planning mission of many large cities, especially if one realizes the volumes of material resources consumed and of waste generated in densely populated urban areas (relative to rural areas).

It should be noted however, that megacity development is certainly not the only important pattern of structural change. Especially in developing countries we also observe an extremely rapid growth in the number of medium-sized cities (see for details Figure 3). The quality conditions in such cities are by no means significantly better than those in megacities. Apparently, lack of resources, urban poverty, insufficient public interest and failure of environmental management in cities lead altogether to worsening urban environmental quality conditions in the Third World.

Consequently, in many countries it is not absolute population figures which count; parallel to urban population size we observe further industrialization and thus more environmental pollution. Bangkok, Taipeh or Djakarta offer glaring examples of the above phenomenon, with high congestion causing the industry and the population to move to the fringe of the city ('urban sprawl') thus leading to a further spillover of the social costs of massive urbanisation. The lack of effective abatement measures (e.g., sewage treatment plants, prohibition of toxic materials, filters in chimneys, catalytic converters in cars etc.) reinforce the above problem situations. In a recent article Lo (1992) concludes: "..., megacities in developing countries are aggravated by the pressures of mounting
population and cumulative economic activities. The need for service and infrastructure to accommodate these growing mega-cities far exceeds the financial means and capabilities of their urban administrations, often resulting in chaotic situations. The lack of basic urban services has contributed to inadequate housing for low-income residents, unemployment among the urban poor, traffic congestion, irregular land-use patterns, and environmental deterioration (p.193). It is certainly not an overstatement to claim that sustainable development meets its most difficult challenges in urban policies in developing countries.

Nevertheless, one point has to be made here. A massive concentration of people in a large agglomeration does not necessarily create an environmental problem, as is witnessed by Singapore. Even a high population density is not by definition disastrous to the urban environment: there is often not an overall shortage of space. The main problem is however, that a large share of the population is living in an extremely small part of the urban territory. For example, in Metro Manila the poorest 45 percent of the population lives in squatter settlements which occupy less than 6 percent of the land area (see Hardoy et al. 1992). This means that the problem of sustainability in urban areas is a complex analytical and policy issue. Hence some general reflections on the issue of urban sustainability are warranted.

2. The Spatial Scene of Sustainable Development

This section aims to link general sustainability objectives to urban development, with particular emphasis on a coherent methodological framework. In subsequent sections more practical matters will be dealt with, with a more specific reference to Third World cities.

The modern city is embedded in a complex force field of economic survival, 'creative destruction' (à la Schumpeter) and the 'home of man' (Ward 1976). Expansion, restructuring and maintenance of quality often form competing forces that place the city at a very dynamic - and often vulnerable - edge.

Cities in our world tend to become increasingly centrifugal and centripetal nodes in a national - and also more and more international - network society. In connection with the urgent need to solve problems of poverty, housing and unemployment, they are also facing the need to generate competitive advantages in order to be sustainable and to survive in a fierce national/international competition (see Nijkamp 1990; Porter 1990). Against the background of international competition and gains/losses of trade (of goods and services) the idea of sustainable development is increasingly coming to the fore.

The notion of 'sustainable development' (SD) has been discussed extensively at many forums in recent years (see Archibugi and Nijkamp 1989; Carley and Christie 1992; IIASA 1992; WCED 1987). However, these discussions were often taking place on a global scale, and to a large extent they focused on conceptual issues. Consequently, it is not surprising that the lack of empirical applicability has been a major source of criticism. A more operational treatment of this - appealing but still abstract - concept of SD seems the only way for it to survive
in the current debate on our common future. Thus the practical applicability of this concept has to be emphasized, a need which was strongly emphasized at the United Nations Conference on Environment and Development, held in Rio de Janeiro (June 1992).

To begin our brief presentation of SD definitions and concepts, we quote the (anthropocentric) definition of the WCED (1987): "Sustainable development is a pattern of development that meets the needs of present generations without jeopardizing the ability of future generations to meet their own needs". However, SD has not only an intergenerational dimension, but also contains other aspects, notably spatial allocative and quality of life aspects. Such spatial dimensions range from global to local scales.

**Global examples** are: sea level rise of the oceans caused mainly by global warming or climatic changes; depletion of the ozone layer; deforestation; desertification; and extinction of species.

**Local examples** are: pollution in areas that face strong urban expansion; local hazards from chemical, nuclear, and radioactive toxic industries; extinction of specific species through uncontrolled hunting; road construction; and local catastrophes.

A common attribute of these examples is that they threaten human and environmental survival and hence are 'negative' (or undesirable) changes in social welfare that we should try to avoid or to cope with. 'Positive' changes (regeneration of natural environmental stocks, advances in environmental technology regarding optimal resource allocation and exploitation, etc) are by definition 'welcome'. Clearly, intensified scientific action is needed to support and enhance such 'positive' changes.

The previous discussion can also be illustrated by making a reference to current attempts at correcting Gross Domestic Product (GDP) for various material and environmental depreciations. Such depreciations may relate to man-made capital (DMC) and natural resources (DNR). Such an ecological domestic product (EDP) is thus equal to:

$$\text{EDP} = \text{GDP} - \text{DMC} - \text{DNR}$$

This definition does not only hold for national accounts, but also for regional and local accounts. The previous definition has also relevance for sustainability analysis at a local or regional level, but has as yet not found many applications, because the openness of a spatial system often precludes an operational application of this otherwise sound economic framework. This means that environmental policies in cities are usually more based on systems of standards, prohibitions or quota than on market-oriented instruments such as charges (although a combined use of such instruments does also occur, for instance, in traffic policy in Singapore).

In general, one may expect that an SD analysis should offer operational guidelines for the contents and the steps to be taken in order to meet the objective of SD. They range from the adoption of market principles to technology design/implementation or prohibitions/regulations (see also for an interest-
ing review Young 1992). Such strategies would not only have a global meaning, but would offer many possibilities for effective local or regional sustainability strategies. The inherent logic of a local sustainable development (LSD) analysis stems from the belief that this analysis may make functional interdependencies at the local level more manageable in view of a given desired development of cities and regions. Clearly, from a management and policy point of view, a local scale is more suitable for policy control and transformation than the global scale (see for a review of urban sustainability policies in Europe, Nijkamp and Perrels 1993). And hence it is evident that the objective of SD may be achieved more easily, if the processes of socio-economic development and environmental change at a local scale are clearly understood and properly managed (see Kairiukstis 1989). Clearly, local development planning may vary from analytical-theoretical to descriptive-empirical or prescriptive guidelines. An unidimensional SD objective may be operationalised by means of conventional optimisation strategies, whereas with a multidimensional policy analysis a 'satisficing' strategy may be more appropriate (see Simon 1967).

In the framework of LSD an integrated economic and environmental approach to policy-making is needed to minimise conflicts between resource-using activities, to enhance socioeconomic opportunities (like optimising employment opportunities), and to bequeath an environmental estate for the benefit of future generations (Cloke and Park 1985). Quite often an LSD oriented strategy is carried out by evaluating the implications of environmental standards or by putting constraints on industrial land use, housing or transport developments. A particular project (proposed or implemented) should aim to increase welfare levels of society at different points in time and space, recognizing that there are distributive implications for income, employment, and environmental amenities over space and time. In light of these observations, it seems meaningful, from a welfare viewpoint, to define LSD as a development which ensures that the local population can attain an acceptable level of welfare - both at present and in the future - and that this local development is compatible with ecological circumstances in the long run while at the same time it tries to accomplish a supra-local (and preferably global) sustainable development (Van den Bergh 1991; Nijkamp et al. 1992). Consequently, LSD has to fulfil two goals: (1) it should ensure for the local population an acceptable level of welfare, which can be sustained in the future; and (2) it should not be in conflict with SD at a supra-local level.

Of course, LSD runs the danger of transferring the 'global rhetoric' (Pezzy 1989) of sustainability towards a micro or meso level of application. Clearly, a local treatment of sustainable development falls in between a macro (or global) systems level and a micro (or project) level approach, as analysis of LSD is spatially a meso level analysis. However, practical, efficiency or analytical reasons may necessitate a flexible use of different spatial scales. Also, management reasons may lead to a differentiated level of treatment of LSD, both for legislative tasks and for policy control (or executive) tasks. Thus, LSD presupposes a meso level of analysis, mainly based on a flexible spatial scale of a
Consequently, LSD differs from SD in three essential aspects: the openness (or interrelatedness) of a city or region; socio-economic imbalances which are - in contrast to global treatment - not levelled out on a local or regional scale; and the local or regional authority of common goods. These aspects should be considered explicitly to make SD operational on the basis of (supra-)local, regional, or supraregional (but locally or regionally differentiated) policies. These three dimensions justify separate attention for LSD.

Restricting ourselves to economic and ecological coevolutionary development at a local scale (Nijkamp 1990), we regard local development as non-negative changes of local social welfare over time, with social welfare being made up of two correlated components (see also Nijkamp and Soeteman 1990; Van Pelt et al. 1991a; 1991b; Van Pelt 1993), namely the consumption of man-made products and services (the socioeconomic system) and the consumption of environmental amenities (the ecological system). In Figure 4 a schematic simplified representation is given of the above interpretation of social welfare. Both systems (the socio-economic and the environmental system) produce important functions that include quantitative and qualitative components influencing altogether human welfare.

Using Figure 4 as a general frame, we observe that the condition that social welfare function changes should be positive \((dW/dt \geq 0)\) may hold in two different ways: either the change in one welfare constituent is positive and in the other negative (provided the net overall change in \(W\) is still positive) or all changes in both welfare constituents are positive. In the first case we speak of 'weak sustainability', whereas in the second case we have a situation of 'strong sustainability' (Daly 1991; Opschoor and Reijnders 1991). Although these distinctions are conceptually sound, the absence of a 'numéraire' again makes an actual numerical illustration or application very difficult. It is clear that spatial substitution within one of the two subsystems and substitution between welfare components are closely related phenomena. The nature of such substitution phenomena may be brought to light more adequately and in a visually appealing way by using geographic information systems (GIS) (see for interesting local and urban applications Fischer and Nijkamp 1993; Giaoutzi and Nijkamp 1993; see also ESCAP 1992).

After this broad exposition on sustainability issues, the question arises whether such issues have the same relevance for developing countries as for the industrialized world. In this context it is noteworthy that Third World countries have a socio-economic structure which differs in many ways significantly from that in the developing world:
in general, the market system in third-world countries is characterized by serious price distortions
- there is a substantially unequal distribution of income and access to basic infrastructure services (water supply, solid waste collection, public lighting, public transport etc.)
- in general, the informal sector is very well developed
- most Third World countries have pronounced characteristics of a dual economy
- urban housing quality for the poor (slums and squatter settlements) is usually very low
- given the low levels of welfare, the perception of environmental quality is often lower than in developed countries.

The previous observations indicate that sustainability issues have an important meaning for developing countries and hence for cities in developing countries. Various specific problems of urban sustainability will now briefly be discussed in the next section.

3. The Concept of Sustainable Cities

The need to favour and support LSD has provoked the awareness of the idea of sustainable cities as a strategic guideline for urban environmental policy.

In recent years the interest in urban environmental questions has risen to an unprecedented degree. The Commission of the European Communities (EC) launched its Greenbook on the Urban Environment (1990), the Organisation for Economic Cooperation and Development (OECD) published its report on Environmental Policies for Cities in the 1990s (1990), while many other institutions (international, national, regional or local) followed this new wave of interest in urban quality of life by organizing meetings of experts, undertaking urban environmental research projects, preparing urban quality of life programmes and the like. Various new concepts were advocated, such as the 'green city', the 'eco-city' or the 'environmental city'. Apparently there is nowadays a broad concern about the future of our cities.

Sustainable development of cities thus refers to continuity in a changing situation. These changing situations are clearly reflected in the role of the city, for instance, as an industrial centre, as a service centre, as a high-tech centre, etc. In the history of most cities in the past century it is possible to identify shifts in the role that the city plays within the (changing) national systems of cities and within the changing national (and international) economy (see Nijkamp 1991).

Clearly, in some particular cases (for instance, a war situation, a catastrophe, a decline of a dominant employer or a major new policy initiative) external developments may induce a very clear role change of a city leading, for instance, to a decline of the economic base of a city (reflected inter alia in population decline, environmental degradation, inefficient energy systems, loss of employment, ex-migration of industries and services, unbalanced socio-demographic
composition, etc.). In general, if the self-organization of an urban system fails (e.g., because of lack of consensus among different individual institutions), a phase of non-sustainability is likely to start. Environmental decay is one of the first signs of non-sustainability.

Policies addressing sustainable development of cities should thus cover multiple fields, like urban pollution, urban rehabilitation, urban land use, urban transport, urban energy management, urban sanitation, urban health care, urban water supply, urban architecture and conservation policy, and even urban cultural heritage. A major task is of course to specify operational criteria for evaluating LSD. Measurable indicators including minimum performance levels and critical threshold levels will then have to be defined, estimated and used in forecasting tools so as to improve awareness of sustainable development issues of modern cities. Local authorities will have to share their tasks with all other actors in the urban space (including the private sector). Nevertheless, it goes without saying that urban sustainable development is a process rife with conflicts and incompatibilities. Commitment to a strict environmentally sustainable urban development by key actors in a city is necessary for a successful implementation of sustainability policies. In doing so strict economic (market-based) incentives may be desirable in order to cope with the negative externalities of modern city life. Failure to develop an effective balanced urban development policy will reinforce urban sprawl and will externalize inner city problems to a much larger area.

A necessary condition for implementing an effective planning system for urban environmental management is the development of a system of suitable urban environmental quality indicators (see OECD 1978). Such indicators, which should represent a balance between the necessary quality of information and the costs involved, would have to be related to economic, ecological, social, spatial and cultural dimensions of the city. The OECD has drawn up a long list of elements which are decisive for urban environmental quality and which would have to be included in such an indicator system. Examples are: housing, services and employment, ambient environment and nuisances, social and cultural concerns, etc. However, it appears to be extremely difficult to operationalize such an indicator system, while at the same time guaranteeing cross-comparative urban analysis. This means that precise empirical evidence on long-run urban environmental quality and on the implications for both the household sector and the business sector is not always available.

In the context of a balanced urban development policy it is therefore necessary that systematic attempts be made to assess, monitor and evaluate the various elements of urban development. In this framework it seems plausible to design systematically an Environmental and Community Impact Analysis (cf. Lichfield, 1990), abbreviated as ECIA, which - analogous to environmental impact analysis in many countries - would provide policy-makers with all relevant information for a sustainable city planning.

Despite the difficulties involved, the need for urban sustainability policies is increasing. As mentioned above, our world is exhibiting a massive transition toward an urban world. The majority of the world population is nowadays living
in urban areas, and this share is still increasing. And for the time being, there are no signs of a change in this pattern of a world-wide urbanization. At face value it seems as though modern cities are exerting a strong centripetal force induced by economies of scale, which are even so strong that all negative externalities of the city are seemingly accepted. However, some words of caution are in order here. Large agglomerations are severely suffering from environmental costs (e.g., New York, London, Rome, Athens, Bangkok, Tokyo, Seoul etc.), and it is precisely these externalities which are decisive for the shape and the role the city is going to take in the future.

In order to explain urban dynamics from the viewpoint of spatial externalities, it is necessary to recognize that cities throughout the world history have played a critical role as nodal points in the spatial-economic network of a country. In this role the city has always attracted urban in-migrants, in both the developed and the underdeveloped world. However, the movement toward the urban territory has at the same time caused high density and as a result also urban sprawl, leading to city regions or functional urban regions. Both land prices and environmental externalities in central areas of the cities became often an impediment for new household and firm locations, so that an outward shift took place. Industries moved to the urban fringe or to special industry parks in the neighbourhood of cities. People moved to suburban - and even more distant - locations, but this massive movement meant essentially only an expansion of the functional urban territory. Thus despite a broadening of the spatial range, the urban system has still kept its original function and has even reinforced its position in the past decades. Thus urban environmental damage tends to show a wider spatial coverage (cf. Orishimo 1982).

Urban sprawl rests on a trade-off of agglomeration economies (notably economies of scale and scope including higher wages) versus diseconomies (e.g., population density and environmental decay). In most cases the external costs of diseconomies are not (fully) internalized in the price system, so that a distorted urban locational pattern will likely emerge. In addition, government policies aiming at restoring the balance are often hampered by severe failures so that the ultimate situation may even get worse. Thus centripetal and centrifugal spatial processes are interchangeably determining the spatial lay-out of an urban system (city, fringe, rural areas).

Although it is likely that environmental quality problems may become more severe with urban size, there is no clear evidence that urban size as such causes environmental decay. According to Orishimo (1982) it is not the sheer city size, but rather the land use, the transport system and the spatial layout of a city which are critical factors for urban environmental quality. Thus the attainment of urban sustainability is undoubtedly a complex and dynamic problem.

It is interesting to observe that cities all over the world are experiencing a process of economic restructuring, accompanied by technological, environmental, cultural, transport and socio-demographic changes. Furthermore, in many countries public policies - in the framework of an overall national policy or of regional policies - have shown in the recent past a marked shift from direct interference to indirect (or conditional) policies (e.g., incubation policies,
innovation policies, etc.). Altogether, modern cities tend to show drastic evolutionary changes, in which the human resource potential in a city - composed of creativity, competence and communication - is exerting a dominant role. In a recent article (Nijkamp 1993) a dichotomy of successful and failing cities has been made, using the notion of a 3C - city introduced by Andersson and Strömqvist (1988). Successful cities are characterized as 3C+ (plus) areas exhibiting the following three positive features: creativity, competence and communication. Unsuccessful (failing) cities, denoted as 3C- (minus) areas suffer from congestion, criminality and closure (or isolation). In this framework, technological innovation and new infrastructure and communication policies are increasingly advocated as effective tools in successful urban and regional development strategies.

As a result of a complex myriad of spatial-economic forces, modern urban systems - with their high density of population and economic activities, their nodal position in interwoven geographical and functional-economic (inter)national networks and their ambition to act as engines in the competitive process of open regions - are faced with increasingly severe environmental problems, ranging from air, soil and water pollution to intangible externalities such as noise annoyance, lack of safety or visual pollution. Clearly, there is a wide variety of sources generating these urban environmental problems, such as demographic factors, socio-economic development, inefficient energy consumption, inappropriate technologies, spatial behavioural patterns and, most important of all, inappropriate and/or badly enforced urban environmental policy measures. Thus an improvement of the current unfavourable situation requires a mobilization of all forces.

In the meantime even a new discipline has arisen, called urban ecology, which aims to design and implement principles for sound urban environmental policy (see also Marahrens et al. 1991). Concrete examples of such principles are:

- minimize space consumption in urban areas (e.g., underground parking areas)
- minimize spatial mobility in the urban space by reducing the geographical separation between working, living and facility spaces
- minimize urban private transport (e.g., by creating pedestrian zones)
- favour the use of new information technology and telecommunication technology to minimize physical movements
- minimize urban waste, favour recycling and install proper sewage systems
- minimize urban energy waste (e.g., via combined heat and power systems, district heating etc.).

Such principles are somewhat comparable to those formulated in the so-called 'Gaia'-concept (see Lovelock 1979). The fulfilment of such principles will of course require an effective urban policy, which is multi-faceted in nature and covers a great many aspects of current city life. Once implemented, they might turn cities into 'islands of renewal in seas of decay' (cf. Berry 1985). Cities and regions would then have to play a much more active role by mobilizing all actors
in the urban territory and by playing a missionary role in convincing them that a sustainable city means a sustainable economy and society.

An interesting illustration of concrete attempts in the industrialized world at achieving sustainable cities can be found in the Danish 'Green Municipality Project' in which various cities in Denmark collaborate with the aim to generate awareness and policy actions at the local level in order to pave the road for economically and ecologically responsible development of cities. Various pilot projects (called 'green projects') have been initiated in the meantime, focusing attention inter alia on life styles in the city, health care, education/information, landscape, clean technology, water management, energy policy, transport and built environment.

In Germany a similar cooperative project between cities has recently started, called 'OEKO CEPT'. It aims to introduce and operationalize ecologically-based concepts and paradigms in urban planning and urban renewal.

In light of the previous observations, the conclusion seems warranted that the road towards sustainable cities is necessary but not an easy one. Cities definitely qualify as focal points for sustainability research and planning, as they play a decisive role as nodal points of people and their activities. They also face often the most severe environmental problems, such as air and water pollution, noise disturbance, waste, degradation of the quality of urban life and visual destruction of urban landscapes and architecture. Therefore, it is conceivable that there is at present a heightened public awareness and concern about the quality of the urban environment (including public health). Urban policies aiming to achieve sustainable development should be more strategic in nature, more integrative, more visionary regarding the role of the private sector, more focused on the provision of market incentives, and more oriented towards the needs of citizens. It is evident that the development of sustainable cities in the Third World deserves absolute priority in view of the central role of cities in developing countries.

Sustainable cities aim at achieving a balanced (co-evolutionary) development in which economic forces (e.g., efficiency), social considerations (e.g., equity and access to facilities) and environmental concerns (e.g., quality of life) are brought together from the viewpoint of a 'green society' (see also Pearce et al. 1989). Despite the current popularity of the notion of sustainable cities, empirical practice is still disappointing in that convincing examples of successful urban sustainability policies are still rare (see for various European illustrations Nijkamp and Perrels 1993). In many cities, an improvement of the local energy efficiency is likely to be one of the critical success factors for sustainable cities, as energy management and use provides a substantial support to an improvement of the local economy (i.e., higher degree of competitiveness), to a more affordable - and hence equitable - distribution of scarce resources (i.e., a better access to public services) and to a reduction in the environmental burden (e.g., reduction in emissions of $CO_2$). Thus a more sustainable form of urban development requires an increase in pressure to reduce the consumption of fossil fuels, for instance, through the introduction of district heating, industrial cogeneration, combined heat and power (CHP) technologies, biogas technology, or more
efficient transport systems (see for details Nijkamp and Volwahsen 1990).

The main problem in building 'sustainable cities' is not the lack of arguments supporting the need for 'green based' cities, but the question of designing proper concrete co-evolutionary urban development strategies that can boast sufficient public support. As our societies - and our cities - move towards the end of the 20th century, the case for improving drastically the energy and environmental base of our cities takes on a steadily growing importance and urgency. If modern cities want to maintain and improve their role as the 'home of man', intensified efforts are needed to safeguard both the historico-cultural heritage left to the present generation by our predecessors and the socio-economic and environmental potential of modern cities needed to host the future generation. In this framework, it should be stressed that there are close mutual connections between urban economic urban policy objectives and environmental policy objectives:

- urban development requires a good environmental quality, as the latter is conditioning to a large extent the economic attractiveness profile of an area.
- the achievement of a favourable level of quality of life needs quite some financial resources which often have to be generated at the local level
- a neglect of environmental quality conditions may have serious implications for human health at the local level, so that these externalities mean a threat to urban growth objectives.

After this broad exposition on urban sustainability issues in general, the question has to be answered whether such issues have the same relevance for Third World cities. It may be interesting to quote here Hardoy et al. (1992) who in their new environmental agenda for environmental problems in Third World cities state: "The growing interest in urban environmental problems is based too much on Northern perceptions and precedents. It appears biased towards addressing the environmental problems which Third World cities have in common with cities in Europe and North America. This often means a greater attention to chemical agents in the air, rather than biological agents in water, food, air and soil - including those responsible for diarrhoeal diseases, dysentery and intestinal parasites. This bias often means that critical environmental problems such as the control of disease vectors which spread malaria, dengue fever, filariasis and yellow fever are forgotten. It can mean more attention to the loss of agricultural land due to urban spread than to the fact that half, or more, of the urban population lack access to safe and sufficient water supplies" (pp. 21-22).

In light of the specific nature of socio-economic conditions and environmental sustainability problems in cities in the developing world, more explicit attention for sustainable city issues in the Third World is warranted. This will be the subject matter of Part B, which is in particular devoted to urban environmental quality conditions in South and East Asian cities.
4. Urban Sustainability Issues in Developing Countries

Cities and regions are important key actors for sustainable development: they are usually coherent administrative units, have a direct local interest in resource and environmental issues and have usually an abundance of statistical material. As a consequence, urban and regional environmental and energy planning is gaining increasing importance as an effective strategy for implementing ecologically sustainable economic development, as advocated in the Brundtland report. Does this also apply to urban policies in developing countries? Are there specific elements which make the notion of urban sustainability more problematic in developing countries? Is there sufficient evidence to warrant urban sustainability policies in developing countries? Such questions will be dealt with in Part B.

A first problem is the fact that the massive density of people in many Third World cities and unequal access to resources, land and housing aggravates the environmental question. Thus density and poverty lead to diseconomies of scale which even interface exponentially with negative environmental externalities caused by polluting activities (e.g., the Mexico basin).

Next, environmental interests are usually not incorporated in regional and urban development planning in the Third World, so that normative guidelines (based e.g. on carrying capacity, regenerative capacity etc.) are often missing in the practice of planning. Economic progress is often more focused on quantity than on quality.

A main factor is also formed by urban poverty itself. According to the South Commission (1990) poverty causes environmental decay. Agarwal (1992) wonders, for instance, why at international fora the main focus is on conventions on biodiversity and why not on poverty abatement. The 'fight for daily bread' leads to short-term decisions which shift environmental and multigenerational interest beyond the horizon. Some interesting figures on urban poverty in developing countries can be found in Table 1.

| Table 1. | About here |

Another problem is caused by the relatively unequal distribution of income and productive assets in Third World countries and cities. There is often a bimodal distribution of income and wealth which is to the detriment of a rigorous and effective abatement policy for environmental decay.

Finally, the administrative competence regarding strict enforcement of environmental measures and regulations is often lacking, so that the effectiveness of environmental policies in many Third World cities is feeble. And in case of
public interventions in favour of environmental quality in cities we often observe a case of government failures (besides market failures). This is clearly witnessed in a recent study by Hardoy et al. (1992), who claim: "The scale and severity of environmental problems in Third World cities reflect the failure of governments. In most Third World nations, both national and urban governments have failed in three essential environmental actions: to enforce appropriate legislation (including that related to environmental health, occupational health and pollution control); to ensure adequate provision for water supply and solid and liquid waste collection and treatment systems; and to ensure adequate health care provision to treat not only environment-related illnesses but also to implement preventive measures to limit their incidence and severity. The policies and actions that governments take in regard to the urban environment have profound implications for the health and wellbeing of urban citizens and, in the longer term, for the ecological sustainability of cities and the urban and regional systems of which they are part. The extent to which good environmental quality is achieved in cities may be one of the most revealing indicators of the competence and capacity of city and municipal government, and of the extent to which their policies respond to their populations' needs and priorities" (pp. 20-21).

As mentioned in Part A, urban environmental policy in Third World countries can be positioned at the crossroads of economic growth (the efficiency motive), distributional equity and environmental concern (seen from the viewpoint of urban land use and urban physical resources). The choice of efficiency, equity and sustainability as main appraisal criteria can be illustrated by the Dutch policy for development co-operation. Since the early 1980s the overall objective has been "structural combat of poverty". It combined the objectives of increase in production and income (efficiency) and a fair distribution (intradimensional equity). In 1990, without altering the overall objective, ecological sustainability was added as a third attribute. These three elements will now briefly be discussed.

(a) Efficiency

Cities in the developing world tend to act as magnets for people. Apparently the efficiency motive related to urban economies of scale is so strongly dominant that an unprecedented urbanisation process has taken place. Even though negative externalities do exist (e.g., poor health conditions, congestion), many cities are still developing a powerful gravity force based on efficiency grounds for socio-economic activities. In conventional economic plan and programme evaluation, the attributes of aggregate welfare have tended to be directly connected with the efficiency criterion. Efficiency has been a key criterion in policy frameworks in conventional (economic) project appraisal for developing countries (milestones have been Little and Mirrlees 1974; UNIDO 1972; Squire and van der Tak 1975; Squire 1989). Efficiency constitutes the difference between gross aggregate welfare changes (benefits) and all uses of scarce resources (costs). In the past, welfare benefits tended to be equated with availability of material goods and services produced in the socio-economic...
system (maximization of material consumption or income). Such goods are partly traded in markets, partly non-traded (social overhead, public goods). Increasingly, shortcomings of the narrow welfare concept are acknowledged (see, for instance, Van Pelt et al. 1990). Assuming a formal welfare concept, the availability of environmental amenities with a direct impact on the wellbeing of men may also be considered as a welfare attribute (see Figure 4). As mentioned above, on the cost side basic resources comprise both man-made and natural capital. It has recently been proposed to differentiate also between objectives regarding irreversible vis-à-vis reversible environmental problems (Hedman 1990).

Traditionally, cost-benefit analysis (CBA) techniques have been applied as a policy tool, whereby prices serve as socio-economic weights. If available and a true reflection of the value to society, market prices are applied. If markets are imperfect, generate external effects or are considered distorted, shadow prices may be applied. The latter approach, among other things, sets project appraisal for developing countries apart from approaches for developed countries. More recently various types of multi-criteria analysis have been applied to project and plan evaluating in developing countries (see Nijkamp et al. 1990; Van Pelt 1993). Clearly, since the evaluation of urban developments in Third World countries has to consider simultaneously market and non-market aspects, conventional evaluation methodologies tend to lose increasingly their relevance and applicability in a broader urban plan assessment methodology.

(b) Equity

The equity aspect of urban problems in Third World cities refers to the distribution of the 'goods' (income, access to medical care, e.g.) in the city, but also to the 'bads' (environmental pollution, lack of waste disposal facilities, unacceptable water quality etc.). The dual nature of developing countries is often reflected in disintegrated neighbourhoods, social segmentation and differences in housing quality standards, which often form a spatial mapping of unequal distribution of resources and amenities.

Distributional equity is a major ingredient in urban sustainability analysis in developing countries. The equity motive has not only spatial, but also temporal aspects. In traditional project appraisal usually a time horizon encompassing not more than one generation is assumed. The frequently applied discounting technique implicitly assigns consequences of projects affecting future generations a negligible or zero weight. In view of the long-term focus implied by sustainability concerns, it is also necessary to emphasize intergenerational equity, i.e. the distribution of welfare among successive generations. Sustainability concerns draw particular attention to long term ecological risks. Some of these risks may have various specific characteristics (Quiggin and Anderson 1990), as often probabilities associated with various possible events cannot be estimated. Some authors (e.g., Reijnders 1990) argue that long-term ecological risks are unacceptable. This implies that he assigns a weight of 1 to the environmental risk criterion. In this context, it is noteworthy that 'no-regret' strategies aim at avoiding highly uncertain but potentially disastrous events and surprises by
embarking on measures that also can be justified on the basis of their impact on related, but more predictable fields.

Speaking about risks for a sustainable urban development in Third World cities, Khosh-Chashm (1991) for instance argues: "Safety regulations for roads, houses, workplace etc. are not observed. One of the most fundamental detriments to the environment and the city's health is the lack of a proper legal framework and the ability of the system to safeguard the rights, safety and wellbeing of their citizens" (p. 246). The same author also claims: "Poverty has probably much more adverse impacts on environment and health than any other factor. To alter people's self-esteem and, consequently the betterment of their life and environmental quality, the major task for the 1990's will be to create enough jobs to employ billions of new workers throughout the developing world" (p. 248).

(c) Sustainability

Plan and programme evaluation for cities and regions did often not include constraints on the use of environmental resources. Implicitly, any use of natural resources was supposed to be permitted, provided compensation is offered in the form of a larger production of man-made goods and services. The environment criterion played often a subordinate role in sustainability-oriented project appraisal. Urban sustainability aims to respect the critical role of environmental and health conditions for present and future generations, for instance, by imposing certain threshold levels regarding the use of environmental capital (or the total stock of capital, comprising man-made capital as well). More data-demanding forms of sustainability criteria involve measurement of the degree of sustainability on a cardinal or ordinal scale expressing the relative difference between normative threshold levels and actual resource use (see Opschoor and Reijnders 1989).

The choice of threshold levels for sustainable resource use depends to a large extent on how the present generation judges its responsibilities to future generations (the so-called 'trustee' principle), including assessment of risks and possibilities for technological substitution in production functions (intergenerational equity).

It should be emphasized that the sustainability criterion should not be regarded as a luxurious policy motive, but as one of fundamental importance for Third World cities. The reason is that urban populations in the Third World are suffering from a high illness and mortality rate which is geared to low environmental conditions. For example, water quality and infant mortality are two closely related phenomena in the poorer segments of Third World cities. Thus, urban poverty, urban mortality and urban sustainability cannot be seen as separate issues. Consequently, improvement of urban environmental quality (e.g., discouragement of the use of toxic materials, water quality standards, improved housing quality, better waste treatment etc.) has to run parallel to urban economic development programmes.
Having indicated the above three main dimensions of a balanced (co-evolutionary) LSD, it is now desirable to offer more empirical evidence on Third World cities in subsequent sections.

5. Environmental Quality Conditions in Third World Cities: Sources and Facts

Environmental quality conditions in mega-cities in the Third World originate from various background factors: demographic growth, socio-economic inequality, extreme density of poor people, topography, meteorology, lack of abatement equipment for industrial pollution, old car fleet, absence of water sewage systems, lack of proper waste incineration technology, and poor enforcement of environmental regulations. The sources of pollution in Third World cities are manifold and concern many areas, like air, water, soil, cultural heritage, quiet, residential quality etc. Here we present some interesting selected data on some of these fields, viz. air pollution and residential quality.

(a) Air Pollution

High urban air pollutant emission is caused by energy consumption as a result of cooking, heating, lighting, transport and industry in the city (see UNEP/WHO 1992). Especially the use of fossil fuels leads to a high concentration of various types of direct and indirect air pollution, such as sulphur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds, ozone, suspended particulate matter and lead. In many Third World cities motor vehicles appear to constitute the main source of air pollution. In addition to the above mentioned well known pollutants, an increasingly large number of toxic and carcinogenic chemicals are detected, such as heavy metals, trace organics, radionuclides and fibres. Such chemicals are emitted by various sources such as waste incinerators, industrial production, building materials and urban transport. In most Third World cities information on air pollution is not very systematically gathered and monitored, and especially information on the above chemicals is rare. A recent study of UNEP/WHO (1992) contains, however, interesting air pollution data on various mega-cities. Here we will present some selected information for cities in South Asia and the Pacific (see Figure 5).

Figure 5. About here

The impacts of urban air pollution may be wide ranging. Major examples are human health (via respiratory and cardiovascular systems as a result of inhalation, drinking water or food contamination etc.) and natural environment (via acid deposition causing soil and fresh-water acidification, crop losses, forest damage, destruction of terrestrial ecosystems etc.)

The health impacts of air pollution in Third World cities have not precisely been measured, but some indicative figures can be found in Table 2.
Table 2. Ongeveer hier

The WHO has established air quality standards for many pollutants in order to be able to assess ambient air quality levels in the framework of public health. Although many cities have adopted such guidelines, they are not (or not sufficiently) implemented because of lack of financial or organizational resources. Insufficient (technological or market-driven) incentives exist in order to enforce compliance with air quality standards.

The information contained in the 10 cities in Figure 5 shows clearly the failure of environmental policy in these cities. There appears to be no city among the 10 listed in Figure 5 which does not exceed at least one of the air quality standards set by the WHO. Besides, the trend of air pollutant emissions is not significantly diminishing and in many cases even rising, so that severe problems are to be expected regarding the achievement of urban sustainability in the cities in South Asia and the Pacific. Despite these alarming conclusions, some optimism is still justified, as is witnessed by an observation in the UNEP/WHO (1992) report: "It should be noted, however, that in some of the megacities studied the severe air pollution conditions observed today could have been much worse if certain control measures had not already been introduced. Examples are Beijing, Delhi, Seoul and Shanghai where, because of controls, the rise in air pollution levels has been slowed and, in some cases, stabilized before they could reach the high air pollution levels which, for example, were found in London 40 years ago. Over the past 30 years, London, Los Angeles, New York and Tokyo have reduced their air pollution dramatically" (p.43).

It seems as though most Third World cities follow the historical pace set by large cities in the Western world: after a period of moderate pollution, the transition towards industrialization, motorization and high density concentration causes a rapid rise in air pollution. Gradually a declining growth and a stabilization may be reached following the implementation of pollution control measures and programmes. Given the massive scale of urban environmental pollution, their consequences for human health and their implications for local and global sustainability, urban environmental policies should be effectuated without any further delay.

(b) Residential quality

Besides air pollution, Third World cities are also suffering from a low residential quality (or even lack of shelter) for a majority of the urban residents, thus causing ill health, disability and premature death as a result of diarrhoeal diseases, malaria, intestinal parasitic infestations, respiratory diseases and the like. In general, the picture of Third World cities reveals one of lack of sustainable development, as there is for considerable segments of the urban
population a lack of basic urban services, lack of social and medical care, inadequate housing for low-income residents, unemployment among the urban poor, an old vehicle fleet causing much air pollution, noise and congestion, lack of proper water and of modern sewage systems, and in general a threatening environmental deterioration. A manifest contrast between cities in the developed and the developing world is thus the relatively low quality of life for a substantially proportion of residents in Third World countries. The previous remarks can be illustrated with a reference to incidence data on slums and squatter areas taken from Lo (1992) (see Table 3). Although these figures are somewhat outdated, they nevertheless reflect clearly the pattern sketched above.

Further relevant data on demographic, socio-economic and environmental conditions in four Asian cities can be found in Table 4.

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For further information on problems of urban shelter, municipal services and the poor in South Asian cities we refer to Wegelin (1993).

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It should be added to the above observations that - even though squatter settlements may have extreme densities - especially their unplanned and uncontrolled nature causes the main problems: provision of health care services and adequate infrastructure (e.g., roads, telecommunication, electricity, water, sewage, waste treatment) is extremely difficult and costly to offer, once illegal and informal neighbourhoods have already been built up, as no space has been reserved for community infrastructure. The Israeli example of temporary housing programmes for Russian immigrants shows clearly that it is possible to reconcile high density with sufficient public infrastructure. The main problem is again lack of enforcement of environmental, land use and housing building regulations.

Apart from urban sustainability problems caused by overcrowding - a situation which can also be found in cities in the Western world, like Naples or Athens - , negative impacts on human health are - besides air pollution (including indoor air pollution caused by low quality cooking and heating equipment) - frequently originating from the low equality of drinking water and the lack of waste disposal and water sewage systems. The consequences are really disastrous in many Third World cities: millions of infants, children, adults and elderly die every year from diarrhoea, dysenteries, typhoid or food poisoning. Some rather shocking information on inadequate provision of drinking water and sanitation facilities in Third World cities can be found in Table 5.
Further numerical information on urban water supply and sanitation conditions in urban areas in ESCAP countries can be found in Figure 6.

Urban policies have in general failed to offer drinking water and sewage systems of a reasonable quality. Even though it is conceivable that not all urban residents in mega-cities can immediately have piped water into their homes, the quality of water from a stand-pipe should have sufficient quality in order to prevent infectious diseases. Furthermore, the quality of water sold by private vendors is normally not imposed or guaranteed by the city government, while there are usually neither price regulations for the sale of water by private vendors. This failure in policy leads often to the strange situation that poor people have to buy water of doubtful quality at a price which is far higher than the price paid for clean piped water by the urban rich. Investments in drinking water infrastructure and water sewage systems seems thus to be an urgent policy issue in Third World cities.

It is also interesting to look at the rate of improvement of the current situation. Interesting information is contained in Figure 7, which shows that water supply and sanitation conditions are gradually improving, but nevertheless lag behind compared to population growth. This suggests the need for an intensified urban drinking water and sanitation programme in cities in the ESCAP region.

A final environmental issue in Third World cities is waste disposal (see ESCAP 1992). Collection of industrial and household garbage is another major environmental issue in Third World cities. In many cities only one half to two third of all urban solid waste is collected, while the remaining refuse is often dumped on vacant land, waters or just on the streets. It goes without saying that the health impacts of this deficient public policy are enormous. A selected overview of failing garbage collection systems in various Third World cities can be found in Table 6.
In this framework we may observe two weak points in urban waste disposal policy. First, there is no clear enforcement of garbage regulations in the city. Second, even if waste is collected, it is in many cases not treated in an environmentally sound way. Dumping in open sites or just burning is still normal practice. Smoky Mountain in Manila, where thousands of poor people live on the garbage of many urban rich, is a tragic example of a failing urban waste disposal policy.

Finally, it is noteworthy that the distribution of environmental costs in Third World cities is not equally shared by all residents. Especially the poorer segments of urban population are unable to afford quality of life, better provision of water, sanitary facilities and health care. Thus poverty and low environmental quality are strongly correlated forces.

Fortunately, there are also promising examples. The greening policy of Singapore is well-known. In this city, the Parks and Recreation Department and the Housing Development Board have deliberately and consistently worked together to maintain the scarce green environment in the area. Tree planting programmes, protected areas, a park network system and waterfront development plans are illustrations of successful initiatives to ensure urban sustainability.
PART C. POLICIES

6. A Framework for Environmental Policies in Third World Cities

Parts A and B of this report have highlighted the urgency of urban environmental policies in all directions in the developing countries. The need for clear, feasible and effective urban sustainability policies is clearly present. Such policies should be initiated and implemented without delay, as a neglect of such policies will lead to unsurmountable problems in the future. Failure of public policies to effectuate urban environmental management in the short run will severely aggravate urban environmental quality problems in the longer term and cause dramatically high social costs in terms of health, quality of life, natural environment, cultural heritage and social tension.

In addition, the supply of environmental services and infrastructure (e.g., water sewage systems, electricity supply, drinking water) has in most cities a distribution bias, as it is often confined to medium and high income groups, which do usually not pay the full price for these publicly provided goods. Thus urban sustainability problems are often also an urban equity issue.

Such environmental policies should have a wide coverage. They should focus on both short-term, realistic strategies at alleviating or improving local and small-scale urban environmental problems (e.g., better water sewerage, strict rules on the quality of drinking water sold by private vendors, expansion of piped-water systems so as to serve public water distribution points, better collection and processing of garbage etc.) and long-term, structural initiatives and preventive measures to improve water and air quality and, in general, urban quality of life (investments in public infrastructure, effective energy savings programmes, recycling of urban waste etc.).

It should be noted that also the private sector (including NGOs) may play an important role in developing a more satisfactory urban sustainability policy in the Third World. All initiatives - both private and public - that aim to minimize the use of renewable and non-renewable resources in the city so as to keep environmental quality conditions within the carrying capacity of the city are to be welcomed. This requires of course an action-oriented and effective urban environmental policy in Third World countries.

In a recent UNESCO study Young (1992) has offered various guidelines for a general environmental policy in Third World countries which are presented in Table 7.

| Table 7. About here | 22 |
The guidelines from Table 7 are interesting and deserve to be developed and used at a wider scale. Nevertheless, their relevance for Third World cities is still limited, as the nature of (un)sustainable cities is significantly different in developing countries, especially as far as the political dimension is concerned. This is clearly stated by Hardoy et al. (1992): "Most environmental problems are political problems. They arise not from some particular shortage of an environmental resource such as land or fresh water but from economic or political factors which deny poorer groups both access to it and the ability to demand changes. In most cities, poorer groups' lack of piped water supplies is not the result of a shortage of fresh water resources but the result of governments' refusal to give a higher priority to water supply (and the competent organizational structure its supply, maintenance and expansion requires). There are some cities or metropolitan areas with critical shortages of fresh water resources (for instance Mexico City) but rarely are supplies so constrained that they prevent piping sufficient supplies for health to poor households. The same is true for land; most cities or metropolitan areas in the Third World have sufficient unused or under-utilized land sites within the current built-up area to accommodate most low-income households currently living in very overcrowded conditions. The many poor households who live in settlements on dangerous sites such as floodplains steep slopes choose such sites not in ignorance of the dangers but because the authorities failed to plan for and allocate more suitable sites. Again, there are cities with critical land shortages because of special site characteristic but even here, governments could do much more to reduce risks for those in hazard-prone areas" (p.23).

From the observations made in Part A and B, it has become clear that all items on the list given by Young are relevant for an effective urban sustainability policy in developing countries, but that especially the policy failures of governments have come to fore as major causes of worsening environmental quality conditions in these cities. Thus, avoidance of government failures and adherence to market-based environmental policy principles accompanied by a strict enforcement of regulations seems to offer the most effective policy strategy. Policy measures should focus in particular on a higher quality of drinking water, better sanitation facilities and sewerage systems, avoidance of unnecessary air pollution (both indoor and outdoor), upgraded health care services, better planning of housing and land use, and adherence to sound environmental policy principles. Only then the unacceptable number of preventable deaths can be coped with. A change in policy priorities in favour of the environment and a more equal distribution of - and access to - environmental goods and services is a sine qua non for urban sustainability policies in Third World countries. The previous observations are succinctly summarized by Hardoy et al. (1992) as follows: "A failure of governance underlies most environmental problems - failure to control industrial pollution and occupational exposure, to promote environmental health, to ensure that city-dwellers have the basic infrastructure and services essential for health and a decent living environment, to plan in advance to ensure sufficient land is available for housing developments for low-income groups and to implement preventive measures to reduce environmental problems or their
impacts. This is often, in turn, linked to the national economy's weakness; effective governance in ensuring a healthy environment for citizens is almost impossible without a stable and reasonably prosperous economy. Strong support for efficient resource use, minimum waste, cities and urban systems which limit the need for private automobiles and maximum recovery of materials from waste streams can ensure that increasing prosperity does not also mean increasing environmental degradation" (pp 23-24).

The main question is however, to what extent human, financial and other resources are available to remedy the above mentioned environmental problem situations. For the time being, the experiences and results are disappointing: apart from a few exceptions, no significant improvement of quality of life conditions can be found in the majority of Third World countries. Therefore, in the next section we will explore in more detail critical success factors for sustainable urban development in the developing world.

7. Critical Success Factors for Urban Sustainability in Third World Countries

As mentioned in the previous section, it is not an easy task to design signposts for a sustainable city policy. Therefore, it seems to be a meaningful question which critical success factors are to be fulfilled in order to ensure a viable urban sustainability policy. Here we will use the notion of the pentagon model (see Nijkamp et al. 1993) which takes for granted the existence of five necessary and crucial conditions which have to be met in order to ensure that a policy given is in principle feasible (see Figure 7). This pentagon prism has been used in various applications of policy analysis, for instance, infrastructure, environment, energy, public services etc. Here we will use a specific version of the pentagon model that is more geared towards urban sustainability policy in the developing world. In the context of sustainable city policy these five factors have the following meaning:

Figure 8. About here

- **hardware**: development of customized technical skill and technologies for pollution and waste treatment drainage, route guidance for traffic in urban areas etc. A particularly weak element in many Third World cities is the frequent absence of urban basic infrastructure services (e.g., sanitation services). The development of such services has recently been given due attention in various countries (e.g., Pakistan, Thailand). Various interesting examples can be found in a study by the ADB (1991). Seen from the viewpoint of a sustainable city, quality of housing and of fundamental public services such as education, socio-medical
care and pollution abatement seem to play a critical role. Modern technology may be pivotal in generating the necessary technical equipment here and concerns inter alia urban pollution control, appropriate waste treatment plants, industrial pollution control equipment, hazardous waste control, environmental biotechnology, and clean energy production (see ESCAP 1992). Success stories can be found amongst others in Singapore where 96 per cent of the population is served by modern sanitation through an extensive network of public sewers with a total length of over 2000 kilometres, controlled by a computer-based automation system.

**sociware:**

Development of and access to community-oriented socio-medical and related urban support systems (e.g., community organizations, NGOs, non-profit foundations) for an effective combat of poverty and degradation of quality of life. Especially decentralized service delivery systems focusing on specific problem groups (e.g., children, elderly, handicapped or ill people) would be necessary. This would often be based on private or semi-public initiatives. Various countries (e.g., Sri Lanka, Philippines or India) offer interesting examples of success stories, in which decentralized policies seem to be the most successful strategies (see ADB 1991). Decentralized solid waste disposal and decentralized heating systems are also good examples of sociware oriented towards the needs of local communities in large cities in the Third World. A necessary condition for sociware is the provision of adequate environmental education, the enhancement of environmental awareness, the development of environmental campaigns and the design of environmental communication networks (see ESCAP 1992). Examples are the Magic Eye anti-littering campaign in Thailand and the campaign to keep Singapore clean.

**orgware:**

Development of an efficient, alert and pro-active administrative system with sufficient coordination and cooperation among different institutional configurations (e.g., community-based organizations) aiming at improving urban quality of life by means of viable development programmes or in-situ slum upgrading projects. It is evident that a good cooperation between local community leaders and local developers is also of critical importance, as often also the prevailing ownership conditions of urban land become part of a restructuring process. In view of the multiplicity of needs (e.g., shelter, water supply, public transportation) a flexible institutional framework for achieving urban sustainability has to be designed. Participatory service delivery systems, self-help community-based programmes
and private-public community development programmes offer a
great potential in this context. As mentioned above, the main
weakness in most Third-World cities is the lack of administra-
tive competence, which might lead to a mobilisation of all
public and private forces for enhancing urban environmental
quality. Korea, Thailand, the Philippines and Indonesia have
recently developed initiatives to integrate environmental con-
cerns into regional and local economic development planning
(see ESCAP 1992).

**ecoware:**

sufficient recognition of environmental interests and presence of
a legislative and institutionalized system ensuring an adequate
incorporation of environmental interests in urban development
planning. In particular, the development of monitoring and of
emissions registration deserves full scale attention here (includ-
ing environmental impact assessment). Simple and rapid
methods for air quality monitoring and assessed will have to be
favoured, while also environmental risk management and envi-
ronmental accounting are becoming relevant issues. Sufficient
attention would have to be given to the needs of the urban poor
in terms of quality of life, healthy living and working conditions,
clean water etc. Physical planning measures including efficient
transport infrastructures are important here: much of the envi-
ronmental damage and annoyance in Third World cities is
related to poorly designed spatial lay-out of urban areas and
outdated urban infrastructures causing a lot of unnecessary
spatial movements. Finally, water quality has to be mentioned
here also as a critical factor which is of decisive importance for
health and quality of life in cities in the developing world. A
good example can be found in Indonesia where a team of the
World Resource Institute has developed a framework for natu-
ral resource accounting. The method followed the one used in
national income accounts, except that it led to the calculation
of net GDP, which was derived by subtracting estimates of net
national resource depreciation from GDP.

**finware:**

development of an economic and financial support system which
is able to generate the necessary financial resources for those
urban development and environmental projects (or pro-
grammes) which have a net positive social benefit. This question
does not only concern the (quantitative) size of scarce financial
resources, but also the institutional competence for allocating
these resources from various sources and decision levels. Fur-
thermore, a main challenge would be to develop savings mech-
anzims among the local population to stimulate the financing of
basic community infrastructure (e.g., financing medical care
based on matching grants). Decentralized community-based initiatives would then be necessary so as to generate sufficient interest (and hence financial resources). Examples can be found in the Philippines, South-Korea, Indonesia and Pakistan. Of course, also local tax revenues (preferably based on user charge principles) could play an important complementary function (e.g., fuel tax, property tax, telephone tax etc.). Finally, also financial management and expenditure administration of local authorities would have to be improved. Clearly, both the private and the public sector could play an important role here. Especially the role of the private sector has to be emphasized here in view of the fact that usually the government is short of capital. A link between the informal sector and privatisation of environmental services seems to be in place here, provided strict quality standards are imposed and enforced.

The previous critical success factors incorporated in the pentagon model seem to offer a useful framework for analyzing the viability of urban sustainability programmes. Some further reflections will be offered in the next section.

8. Areas of Feasible of Urban Environmental Policies

The above considerations on critical success factors are still fairly general and ought to be translated into economically and ecologically meaningful strategies for urban sustainability in developing countries. In the general area of global sustainability policies various guidelines have been proposed to national and supranational governments. An example can be found in Table 8 taken from Young (1992).

| Table 8. Ongeveer hier |

The previous list of criteria offers various interesting economic principles for effective sustainability strategies with a strong emphasis on market principles. However, a crucial question is whether such principles can easily be applied at the urban scale in developing countries, where cities have often turned into 'pollution havens'. Given the specific features of environmental problems in Third World cities (see Section 3), it seems as though such general economic guidelines are insufficiently customized and geared to needs of those cities, so that their applicability still remains questionable in these areas.

A necessary condition for effective and efficient urban sustainability policy is the existence of a competent, representative, non-bureaucratic and action-
oriented government, which is able to cooperate closely with NGOs and the private sector in order to mobilize all forces for successful urban environmental management. A joint effort is needed to alleviate poverty and to improve environmental quality conditions in cities, by improving housing and living conditions, by supporting proper environmental technologies and pollution abatement systems, by providing better public infrastructure (including waste treatment, sewerage and drinking water) to all urban residents, by offering training and educational programmes on the environment, by involving also the poorer segments of the urban society in decision-making, by strengthening urban institutions dealing with environmental protection, and by strictly enforcing land use and environmental regulations.

This missionary calendar means an enormous task for cities in East and South-east Asia, but needs to be undertaken with great rigour in light of the current and foreseeable high social costs. The 'growth-first' strategy adopted in many Third World countries and cities is only in the short run offering clear benefits, but more expensive in the long run (cf. Kobayashi 1991). Some first signs of the recognition of the benefits of a co-evolutionary strategy can be found in Taiwan, which explicitly adopted a policy to cope with environmental degradation that reduces social welfare and has launched a rigorous environmental clean-up programme.

In order to put forward some more practical considerations, we will discuss here a (limited) set of fields in Third World cities where sustainable policies may be effective. Notions from the above pentagon model and the above guidelines will also be used as a test framework. The following fields of sustainable urban policies in the developing world will be distinguished here:

- urban resources and waste management
- urban quality of life
- urban transport
- financing urban sustainability policies

All these items will be discussed in the following subsections 8.1 - 8.4, respectively.

8.1 Urban resources and waste management

Cities are concentration points of economic and social activities, based on scale economies. The related negative externalities of urban compactness should preferably also be coped with on the basis of strategies based on scale economies (e.g., centralized waste treatment). This means that policies to increase the efficiency of raw materials, energy and waste treatment have to be stimulated and implemented. For instance, cities offer unique possibilities for selective re-collection, recycling and re-utilisation of materials, or for district heating (or perhaps district cooling) or industrial co-generation. Illegal dumping of waste has to be strictly prohibited, while strict environmental standards in industrial
processes, waste treatment plants and water sewage systems are a sine qua non for a sustainable city. Several cities in developing countries offer good examples of environment conscious strategies, inter alia by using intensive publication campaigns to increase local awareness. Thus education and communication (related to socioware) are - besides appropriate hardware equipment - necessary to achieve a sustainable urban development.

In general, a source-oriented environmental policy is more effective and less costly than effect-oriented measures, although it has to be recognized that curative policies may be necessary next to preventive environmental policies. A strict market-based enforcement of 'polluter-pays' principles seems to be a necessary condition in order to cope with environmental externalities in cities in the developing world. An interesting example can be found in Malaysian palm and rubber factories, where fees are levied on palm-oil and rubber factories for the discharge of polluting effluents (see ESCAP 1992, p. 190).

Another point concerns the need to develop in Third World cities rapidly and efficiently environmentally sound conditions for low-income groups, using also market-oriented strategies. Polluter pays principles, user charges and matching grants seem to offer interesting ways of improving environmental conditions in many Third World cities. Thus also finware has to be regarded as a critical success factor (see also Subsection 8.4).

8.2 Urban quality of life

Urban quality of life is related to the quality of the housing stock, the availability of shelter, the prevailing land use patterns, the availability of sociomedical care, and in general the entire package of urban infrastructure services. Land use and housing are critical issues in cities in Third World countries, as illegal land use and squatter settlements are common phenomena. Especially low-income groups tend to become victims of semi-institutional and informal changes in land use and ownership conditions. A reconciliation of the needs of the poor with the public needs to enforce laws on land use and ownership appears to be fraught with many difficulties in most Third World cities. The organisation of an improvement of urban quality of life on the basis of community participation seems to be the only viable way in the long run, but many cities show that this is a long lasting process. Thus the orgware of urban quality of life policies is a critical issue, as is also clearly reflected in discussions on the modalities of public service delivery (e.g., medical care) in Third World cities (e.g., centralisation vs. decentralisation, public vs. private service provision, formal vs. informal delivery channels etc.).

Interesting examples of community-based approaches at achieving urban sustainability can be found in an ESCAP (1992) document, where it is stated: "For example, the pioneering works of kampong improvement in Bandung, Indonesia (Hasan Parebo) and the Orangi Pilor Project in Karachi, Pakistan (Akhtar Hameed Khan) have helped bring sustainability into the urban environment. These projects assist low income urban dwellers to form effective com-
munities and undertake shelter and area environmental improvements on a self-help basis. This has also resulted in civil works of moderate quality at costs much lower than that of contracted construction. The proliferation of such self-help schemes, besides substantially improving the environment, can relieve the financial burdens on city and state governments” (p. 184).

It goes without saying that institutional rigidity and public inertia may be detrimental to an effective quality of life policy in Third World cities, but an equally important factor is the lack of funds to pay for all services needed. A variety of mechanisms can in principle be imagined, ranging from local taxes or central government transfer payments to self-financing service revenues, but in most Third World cities the financial possibilities are extremely limited. Consequently, alternative modes of quality of life services have to be envisaged as well, such as self-help, participatory and community-based serviced delivery systems, or improved technologies. Thus a mix of hardware, socioware, finware and orgware is a sine qua non for a more satisfactory quality of life in Third World cities.

8.3 Urban transport

It is abundantly clear that most Third World cities face severe transport problems which do not only cause unacceptable negative social externalities (e.g., congestion, pollution, health effects, fatalities), but also affect negatively the economic performance of these cities. Such social costs and inefficiencies are the dramatic consequences of poorly functioning transport systems in many Third World cities.

However, the solution of these transport problems is far from easy. In general, financial resources for implementing infrastructure investments are lacking (or at least insufficient). The lack of means to improve the efficiency of public transport services and to reduce economic losses caused by traffic jams is even more serious in developing countries, given the foreseeable rise in car ownership and car use in the next decade. In a recent study (see ESCAP 1990) it was found that finware (i.e., lack of funding for urban transport investment) was perceived to be a main problem in Indonesia, Pakistan, the Philippines and Thailand, whereas orgware and hardware (i.e., lack of technological skills and lack of appropriate coordination channels) appeared to cause a major bottleneck in South Korea and Hong Kong.

A major problem is that often urban transport policy is regarded as a (segmented) traffic management issue, whereas in reality this is closely connected with land use policy, housing policy and industrialisation policy.

It is clear that - in view of the central economic position of cities in developing countries - more investments in transport infrastructure are warranted (possibly to be paid out of user charges). Also appropriate training schemes for traffic managers, public transport operators and infrastructure owners/mangers seem to be in place here. Finally, a more thorough economic basis for fare structures and investment decisions on all infrastructures is necessary in order to
avoid inefficient spending of extremely scarce public financial resources. The same applies also to fuel taxes, vehicle taxes and vehicle regulations. Clearly, public transport would need a drastic upgrading (a 'quality jump') in almost all cities in the Third World. Such improvements may range from large scale mass transit systems to small scale adjustments (e.g., separate bus lanes, priority for buses on traffic lights, better information provision on routes and destinations of public transport, more (light) rail investments for medium and long distances etc.). Price distortions would have to be avoided in all cases, and cost recovery principles would have to be strictly applied in order to offer a quality product that is needed by the market. The following table (see Table 9) gives interesting information on investments in highways and public transport in three cities in developing countries (ESCAP 1990).

Clearly, many possibilities exist to improve local traffic conditions. An example of the broad range of public policy measures can be found in a study by Heggie (1992) on urban transport in developing countries (see Figure 9). For the time being, a broad combination of both charges or taxes and environmental or technological standards seems to be the best strategy to alleviate the high social costs of urban transport in cities in the developing world.

Table 9. About here

Figure 9. About here

8.4. Financing urban sustainability policies

The above pentagon model has claimed that finware is one of the most critical conditions for a substantial improvement of urban quality of life conditions. Does an urban sustainability policy generate sufficient 'value for money' which would justify a mobilisation of huge financial resources? Similar questions have recently also been raised in the context of other 'non-productive' assets such as housing, infrastructure and culture (cf. Montanari and Petrario 1991, and Struyk et al. 1990). Despite the indigenous merits of housing, infrastructure and culture, it appeared necessary to show also that these assets would create a positive contribution to social welfare to such an extent that it was worth investing in them.

It is evident that net positive socio-economic benefits are a sine qua non to justify public intervention in the urban environment. Such benefits comprise both primary economic benefits (e.g., extra tourist revenues as a result of a strict urban environmental policy) and secondary benefits (e.g., new enterprises attracted by a nice urban climate). Clearly, the distributional effects would have to be considered as well, so that a careful analysis of the beneficiaries (and externalities) of environmental policies favouring a sustainable city is necessary.

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The previous remarks can be illustrated by some cases. In industry new technologies and better insulation of buildings may lead to a considerable rise in energy efficiency, although this clearly has a long lead time in normal circumstances. In the residential sector, housing insulation programmes may also lead to drastic energy savings for both space heating and air conditioning (e.g., by means of better insulation, heat pumps, solar energy installations, wind turbines, and economizers for central heating systems). Also in the transport sector considerable savings are in principle possible (e.g., through more energy efficiency engines, vehicle weight reduction or - in the long run - through a more energy-efficiency physical planning aimed at a reduction of commuting distance and/or a shift of the modal split in favour of public transport)(see also Button 1992). At a more integrated and meso level of urban energy planning, various possibilities are offered by central heat distribution, recycling of energy from heat, by combined heat and power either in district heating or in co-generation, or by using urban/industrial waste as fuel for generating plants. Especially at a local level these energy saving options are likely to be more efficient than at a more region-wide level, as in general such options require fairly high densities of energy demand. In addition, land use zoning and physical planning might also provide some of the regulatory regions for environmental policy.

In all cases, environmental programmes are expensive and require much public money. In light of severe public budget constraints and deficits of governments at all levels (national, regional, local), an increasing plea is made for private financing of public programmes or projects, especially after the deregulation movement. In most cases however, an entire private financing is not regarded as a desirable option. Hence we see in practice the emergence of various types of public private partnership (PPP) configurations. Such cooperative agreements require the solution of two problems:

- the institutional model
- the financial arrangements

The institutional setting in which an urban environmental and energy policy would have to operate is of paramount importance for the feasibility and effectiveness of such a policy. For example, private-public oriented district heating systems, private based industrial co-generation systems and private (but collective) solar and wind energy systems are increasingly becoming popular, but require clear and well set agreements among all parties involved. Synergy in urban environmental and energy policy measures will certainly increase the viability of urban sustainability.

In general, urban environmental and energy planning may comprise a whole set of different and complementary environmental and energy policy strategies ('packaging' of policy measures), such as industrial co-generation, district heating, combined heat and power (CHP) generation (using steam turbines, internal combustion engines, gas turbines or combined cycle gas turbines), combined urban waste management and energy production, transport policies, load management, and institutional reforms in the structure of utilities. Various
European cities provide good examples of the potential of urban energy planning (e.g., Berlin, Odense, Amsterdam, Gothenburg, Torino, Rennes and Grenoble). Such policy strategies might be followed by Third World cities.

The financial aspects deserve of course also closer attention. A significant part of the success of environmental and energy conservation policies in many cities can be attributed to various financial incentives programmes. Examples in various sectors are:

- industry:
  - grants to stimulate discrete conservation investment
  - tax incentives to encourage energy efficient production processes
  - loans to stimulate less energy intensive capital investments

- residential/commercial sector:
  - grants to help develop energy conservation schemes
  - tax incentives to induce building insulation
  - loans for specific energy conservation purposes

In addition, in various countries information programmes (e.g., publicity campaigns, residential and industrial energy audits, appliance labelling or transportation fuel efficiency information) and regulation/standard systems (e.g., building codes, appliance efficiency standards, fuel economy standards for new passenger cars) have been introduced as a policy tool to increase environmental and energy awareness.

Traditional economic theory would teach us that the expected financial revenues of new urban environmental programmes would induce a willingness to pay of actors involved. In light of the poverty level in many cities in developing countries this does not always offer a plausible option. And therefore, a cooperative agreement where governments or public authorities would provide a leverage of private support seems more likely. Especially a system of matching grants between the public and the private sector may be promising. Schuster (1989) makes a distinction between three types of matching grants:

* co-financing
* challenge grants
* reverse matching grants

Despite the potential of matching funds, governments nevertheless have to generate the necessary financial resources. Money from the public budget may then originate from fees or charges levied on the use of environmental facilities. Specific pollution abatement measures may also be based on polluter pays principles (industries, household, transport etc.) and may be complemented with command and control regulations for achieving urban sustainability.
9. Concluding Remarks

The nodal position of cities in all economies - including those of developing countries - necessitates a careful analysis and thorough policy attention regarding the socio-economic potential of these cities. Urban sustainability may be regarded as an appropriate motive for effective and efficient strategies to find a balance between growth, equity and environment. This means that local government capacity has to be strengthened, so that environmental considerations are integrated in urban development plans.

The particular situation of Third World cities - characterised by massive urbanisation, poverty, low levels of public services and a dual economy - makes them very vulnerable, so that indeed the issue of sustainability is at stake here. The close connection between urban poverty and urban environmental conditions will reinforce the trend to seek for short-term solutions without alleviating the long term trends. Governments are faced here with extremely difficult and delicate choice problems in finding a balance between the fulfilment of urgent needs and the necessity to work on a sustainable city. The paradoxical situation tends to emerge in many Third World countries that the increase of welfare levels of the poor will lead to more pollution and waste, and hence will erode the urban basis for sustainable development. In this context, a keen combination of hardware, socioware, orgware, ecoware and finware measures has to be found.

It is evident that - besides an improvement of welfare prospects and related behavioural changes - also technology development in the area of environmental management and pollution abatement is a sine qua non. At both national and local levels effective steps have to be undertaken to discourage the use of polluting technologies. At the same time, it has to be recognized that many abatement technologies and other industrial or household technologies with a polluting nature are acquired from abroad and hence part of the solution to the (urban) pollution problem in Third World cities has to be found in the developed economies. This means that there is a need for an international code preventing the transfer, trade or export of polluting technologies and products. This means that the development of agreements with multi-national companies or exporting companies would deserve high priority in order to safeguard urban sustainability in Third World countries, especially regarding those activities involving aid-funded projects. Also the use of polluting products by households at the local level (e.g., plastic bags, CFC's) has to be strictly discouraged. Thus hardware and ecoware would have to lead to a mutually support mechanism, for instance, by developing products incorporating indigenous natural raw materials and by favouring recycling schemes. Such a strategy will also alleviate urban poverty and unemployment and does hence favour socioware.

Another point worth emphasizing is the active role to be played by local actors (both private and public) to reduce pollution from all economic activities and energy use. Price and tax schemes on fuel, electricity and gas have to be properly applied so as to ensure an efficient use of scarce resources in combination with a sufficient availability of such resources for the low income categories. In general, an inappropriate pricing of environmental resources and services has
to be avoided. Besides, positive stimuli have to be given to safeguard the urban environment (e.g., re-plantation schemes of trees, maintenance of urban parks, selective (controlled) disposal of waste and garbage, installation of drainage and sewage systems, construction of flood control systems etc.) in order to upgrade the urban environment.

Finally, the positive role of the city in the Third World has to be emphasized. A city is a node of economic activity, entrepreneurial spirit and social renewal. Not only industrial and service activities should be promoted in the city, but also many other activities which increase urban sustainability. For instance, many Third World cities house collections of monuments and cultural amenities which could attract many foreign tourists. Various cities have been successful in exploiting this indigenous resource, but in many cities in developing countries such resources remain largely untapped. In this context, a more market-oriented approach to the development of tourist amenities in Third World cities would have a great potential. Thus here a proper mix of ecoware, finware and socioware would greatly improve the competitive position of cities in the developing world.

In conclusion, Third World cities are not concentration points of socio-economic despair, but focal points of a sound sustainable development. The five critical success factors mentioned in this study, viz. hardware, socioware, orgware, ecoware and finware would require to be implemented and respected in a proper combination to ensure long run success. Thus urban sustainability policy in developing countries is a formidable task, which badly needs more political attention. It is a challenge for creative urban policy, but poses at the same time complicated questions regarding private-public cooperation and financial matching.

References

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By the year 2000 it is estimated that 75% of Latin America's population, along with 42% of Africa's and 37% of Asia's, will be urbanized. The world's 25 largest cities in 2000 will all have populations of over 9 million.

Figure 1. Ranking of megacities according to population size

Source: Lo (1992)
Figure 2. Relationship between GNP and urbanisation
Source: Lo and Salih (1978)
Figure 3. Ratio of population of mega-cities to urban centres in the ESCAP Region, 1950-2025
Figure 4. An economic-ecological interaction systems model
Figure 5. Air pollution data on selected cities in South Asia and the Pacific
Source: UNEP/WHO (1992)
Figure 5. Air pollution data on selected cities in South Asia and the Pacific
Source: UNEP/WHO (1992)
Figure 5. Air pollution data on selected cities in South Asia and the Pacific
Source: UNEP/WHO (1992)
Legend: Each column is made up of two parts; The left hand side refers to the percentage of urban population with access to safe drinking water. The right hand side refers to the percentage of urban population with access to sanitation services.

Figure 6. Urban water supply and sanitation situation in selected countries of the ESCAP Region (1985)

Source: ESCAP (1992, p.122)
Figure 7. Urban water supply and sanitation coverage and targets for selected countries of the ESCAP region

Source: ESCAP (1992, p.123)
Figure 8. A pentagon prism with necessary conditions for policy success
<table>
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<th></th>
<th>Market based incentives</th>
<th>Command and control regulations</th>
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<td>Emissions fees</td>
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<td>- Tax allowances for new vehicles</td>
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<td>- Differential fuel taxation</td>
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<td>- Congestion charges</td>
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Figure 9. A taxonomy of policy instruments to control the environmental impacts caused by motor vehicles in Third World cities

Source: Heggie (1992)
<table>
<thead>
<tr>
<th>Region</th>
<th>Urban Population (million)</th>
<th>Share of Each Region Below Poverty (per cent)</th>
<th>Urban Population Below Poverty Line (million)</th>
<th>Share of Each Region Below Poverty Line (per cent)</th>
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<tbody>
<tr>
<td>Africa</td>
<td>133.24</td>
<td>11.2</td>
<td>55.46</td>
<td>17.0</td>
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<tr>
<td>Asia</td>
<td>591.91</td>
<td>49.7</td>
<td>136.53</td>
<td>42.0</td>
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<td>EMENA a/</td>
<td>174.14</td>
<td>4.7</td>
<td>59.53</td>
<td>18.0</td>
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<tr>
<td>Latin America</td>
<td>291.66</td>
<td>24.5</td>
<td>77.27</td>
<td>24.0</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,191.95</strong></td>
<td><strong>100.0</strong></td>
<td><strong>329.79</strong></td>
<td><strong>100.0</strong></td>
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a/ Europe, Middle East and North Africa.


Table 1. Incidence of urban poverty in developing countries (1988)

Source: ADB (1991)
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<th>City</th>
<th>Impact</th>
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<tr>
<td>Bangkok</td>
<td>Particulates 51 million restricted activity days (including 26 million work loss days) and 1,400 excess mortalities in 1989</td>
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<td>Bangkok</td>
<td>Carbon monoxide 20,000-50,000 people at risk of increased angina pain/day; 900,000-2,300,000/day at risk of minor effects such as headaches</td>
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<tr>
<td>Beijing</td>
<td>Lead (all sources)* 200,000-500,000 cases of hypertension/year; 300-900 heart attacks and strokes/year; 200-400 deaths/year; 400,000-700,000 IQ points/year lost in children</td>
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<tr>
<td>Beijing</td>
<td>Air toxic less than one cancer case/year** (mobile sources)</td>
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<tr>
<td>Beijing</td>
<td>Air toxic (at city dumpsite)</td>
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<tr>
<td>Calcutta</td>
<td>900,000 cases of respiratory illness</td>
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<td>Bombay</td>
<td>900,000 cases of respiratory illness</td>
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<td>Bombay</td>
<td>Lung cancer rates increased 145 per cent from 1949 to 1979</td>
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<tr>
<td>Calcutta</td>
<td>Tuberculosis and respiratory diseases are the major killers in the city</td>
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<tr>
<td>Calcutta</td>
<td>60 per cent of residents suffer from respiratory diseases</td>
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<tr>
<td>Chinese cities</td>
<td>Lung cancer mortality is 4-7 times higher in cities than in the nation as a whole</td>
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<td>Chinese cities</td>
<td>High rates of chronic bronchitis and chronic respiratory infections in the cities as opposed to the rural areas</td>
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<tr>
<td>Delhi</td>
<td>30 per cent of the population suffers from respiratory diseases, 12 times the national average</td>
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<td>Delhi</td>
<td>30 per cent decrease in crop yield and poor quality of grains; millions of rupees lost in engineering materials, textiles, building materials, and leather goods.</td>
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<tr>
<td>Manila</td>
<td>471,100 cases of upper respiratory tract infection and 79,400 cases of bronchitis reported in 1988</td>
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a USAID 1990a Impacts are not empirical, but are calculated using standardized risk formulas.  
b Bangkok Post, September 11, 1990  
c Krupnick and Sebastian 1990  
d Hardoy and Satterthwaite 1989; WHO 1988  
e India Today, August 31, 1991  
f Hechanova 1990  
* Airborne lead may account for about 40 per cent of the lead intake of adults and 70 per cent of that for children.  
** Recalculated with the authors' adjusted unit risk (Vol. 2, P. A-19)  

Table 2. Health impacts attributed to ambient air pollution in selected cities in the ESCAP region  
Source: ESCAP (1990, p.5-19)
Slum» and squatter
regions as
percentage of city
dPopulation

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<tr>
<td></td>
<td>Ghana</td>
<td>30</td>
<td>40</td>
<td>35</td>
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<tr>
<td></td>
<td>Kenya</td>
<td>30</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Lower Volta</td>
<td>30</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Nigeria</td>
<td>70</td>
<td>80</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Upper Volta</td>
<td>70</td>
<td>80</td>
<td>75</td>
</tr>
</tbody>
</table>

Note: Definitions of "slums" and "squatter areas" vary from region to region and from city to city; therefore, these data only present the roughest indication of the housing problem in these cities.

Source: Lo (1992)

Table 3. Incidence of slums and squatter areas in selected Third World countries
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Metro Manila</th>
<th>Jakarta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population (millions of persons)</td>
<td>6.4</td>
<td>8.0</td>
</tr>
<tr>
<td>Area (square kilometers)</td>
<td>646.0</td>
<td>550.0</td>
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<tr>
<td>Urban Density (persons per hectare)</td>
<td>96.0</td>
<td>200.0</td>
</tr>
<tr>
<td>Urban Growth Rate (per cent)</td>
<td>3.8</td>
<td>4.0</td>
</tr>
<tr>
<td>Average Household Size (number of persons)</td>
<td>5.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Average Annual Income ($US per capita per year)</td>
<td>296.0</td>
<td>132.0</td>
</tr>
<tr>
<td>Absolute Poverty Level ($US per capita per year)</td>
<td>266.0</td>
<td>124.0</td>
</tr>
<tr>
<td>Percentage of Population Below Absolute Poverty Level</td>
<td>35.0</td>
<td>60.0</td>
</tr>
<tr>
<td>Percentage of Population in Substandard Housing (slums)</td>
<td>45.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Percentage Living in Squatter or Illegal Settlements</td>
<td>30.0</td>
<td>n.a.</td>
</tr>
<tr>
<td>Education level (literacy rate)</td>
<td>85.0</td>
<td>78.0</td>
</tr>
<tr>
<td>Percentage of Labour Force in the informal Sector</td>
<td>50.0</td>
<td>65.0</td>
</tr>
<tr>
<td>Percentage with Access to Water (house connection)</td>
<td>43.0</td>
<td>47.0</td>
</tr>
<tr>
<td>Percentage of Garbage Collected Daily</td>
<td>70.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Percentage with Access to Human Waste Disposal Systems</td>
<td>60.0</td>
<td>42.0</td>
</tr>
</tbody>
</table>

\(^{\dagger}1975, ^{\ddagger}1980, ^{*}1982, ^{\dagger\dagger}1984, \text{n.a. = not available.}


Note: Although the data are drawn from the most authoritative and reliable sources, they may not be internationally comparable because of the lack of standardized definitions and concepts used by different countries in collecting the data. The data are, nonetheless, useful to describe orders of magnitude, to indicate trends, and to characterize certain significant differences among countries.

Table 4. The incidence of poverty and marginal settlements in four Asian metropolises
Source: ESCAP (1992, p.121)
I, septic tanks or latrines are very inadequate. A serious problem, especially in the rainy season, and provisions to empty septic tanks or latrines are very inadequate.

Table 5. Inadequacies in Third World cities' water supply and sanitation

| Source: Hardoy et al. (1992, p. 40-42) |
Accra (Ghana): The Metropolitan Authority has very limited capacity to collect garbage; a study in 1989 found that only 10 per cent of garbage was collected with 81 per cent dumped and 9 per cent burned. Although there were 130 official communal refuse dumps, some 100 unauthorised dumping sites have been created along with widespread dumping of refuse along water courses, channels, on waste ground and roadside verges.

Bangkok (Thailand): Although 80 per cent of the population is served by a refuse collection service, in 1987, 24 per cent of solid wastes were dumped, mostly onto vacant land or on canals and rivers.

Bogota (Colombia): Around half the 1.5 million tons of garbage generated every year is collected and disposed of by local authorities. Every day, some 2500 tons is left uncollected - some is partially recycled informally while the rest is simply left to rot in small tips or in canals, sewers or the streets.

Dar es Salaam (Tanzania): Some two thirds of all solid wastes from both residential areas and from commercial enterprises remains uncollected.

Guatemala City: Of the some 1100 tons of garbage produced each day, only some 750 tons are collected by private and municipal companies; the rest is thrown into clandestine garbage dumps or left to rot in the ravines that surround the city.

Jakarta (Indonesia): Around 40 per cent of the solid wastes generated within Jakarta are not collected; much of it ends up in canals and rivers and along the roadside where it clogs drainage channels and causes extensive flooding during the rainy season.

Karachi (Pakistan): Only one third of the solid waste produced by households in the city is being collected and transported to dump sites.

Kampala (Uganda): Less than 10 per cent of the city’s population benefits from a regular collection of household wastes and less than 20 per cent of the solid wastes generated within the city are collected. Large volumes of organic wastes are evident in public spaces, backyards, lanes, pathways and vacant plots. A household survey in one district of Kampala found that 90 per cent of households had nowhere in which to dispose of household wastes. City Council collection bins, where they exist, are usually overflowing.

Kinshasa (Zaire): The collection of household waste is only undertaken in a few residential areas. In the rest of the city, household waste is put out on the road, on illegal dumps or in storm-water drains or buried on open sites.

Manila (Philippines): Less than half of the solid waste generated in metropolitan Manila is collected and transported to solid waste sites.

Nairobi (Kenya): Newly developed residential estates and the informal settlements (in which a high proportion of the total population live) are not served by the city’s garbage collection service.

São Paulo (Brazil): One third of the population are living in areas with no service to collect solid wastes.

NB: These are simply cities for which data was available and several of these cities seem relatively well served by garbage disposal services compared to many cities which could not be included for lack of accurate data.


Table 6. Inadequacies in household garbage collection in nations’ largest cities

Source: Hardoy et al. (1992, p. 59-60)
<table>
<thead>
<tr>
<th>Constraints</th>
<th>Prescriptions</th>
</tr>
</thead>
</table>
| 1. maintain environmental quality | · conserve nutrient and material cycles  
|  | · limit waste emission  
|  | · maintain landscape amenity  
| 2. efficient resource use | · make users (consumers) pay  
|  | · make polluters (consumers) pay  
|  | · compensate for the production of positive non-market benefits  
|  | · allocate and enforce use rights  
|  | · couple resource security with environmental security  
|  | · avoid selective price distortions  
|  | · do not mask ecological signals with subsidies  
|  | · pursue technical efficiency  
|  | · promote recycling and product durability  
| 3. avoid government failure | · use market mechanisms  
|  | · promote resource stewardship  
|  | · tax resource extraction and use  
|  | · package decisions to favour the poor  
|  | · maintain political and economic stability  
| 4. maintain future options | · off-set environmental degradation  
|  | · when ecologically uncertain, take a precautionary approach  
|  | · increase ecological, social and economic diversity  
|  | · low, stable interest rates  
| 5. stop population growth | · create self-replacing populations  
|  | · make primary and preferably secondary education compulsory (especially for girls)  
| 6. conserve natural capital | · replacement cost pricing  
|  | · invest to enhance conditionally-renewable resource productivity  
|  | · harvest at no more than the regeneration rate  
|  | · off-set conditionally-renewable resource degradation and depletion  
| 7. maintain the aggregate value of mineral stocks and conditionally-renewable resources | · re-invest rent  
|  | · complement conditionally-renewable resource productivity  
| 8. redistribute wealth to per capita-poor countries | · promote freer trade  
|  | · set equivalent trading standards  
|  | · reduce rent in per capita-poor countries  
|  | · facilitate wealth transfer to per capita-poor countries |

Table 7. Environmental policy guidelines

Source: Young (1992)
Policy targets for all areas where pollution is a problem and a phased strategy for the eventual elimination of these problems;

Emphasis on a mixed-policy approach to ensure that investment and resource use is efficient, is equitable, adapts to change, is dependable, dynamically encourages innovation, promotes continuing improvement beyond the policy target, has low information requirements, is administratively feasible, is not vulnerable to swings in public opinion and is politically acceptable;

No subsidized resource use and no price-support schemes that mask market signals;

Resource prices reflect the User-Pays and Polluter (Consumer)-Pays Principles;

Regulations and safe minimum standards underpin a wide array of resource-right and other economic instruments;

Heavy reliance upon self-enforcing policy mechanisms backed by an administrative structure not prone to regulatory capture and corruption;

Widespread use of fees, levies and charges to ensure that prices paid by consumers include the costs that their purchases impose on other people and the administrative costs of pollution prevention and control;

Existence of off-set policies that encourage developers to either offset any loss of environmental services, landscape amenity and other similar considerations, or pay for the cost of replacing these functions;

Use of deposit-refund and security-deposit schemes, especially for heavy metals and other chemicals which do not readily assimilate into natural environments;

Compensation for people who maintain environmental services backed by resource-right systems which ensure that the benefits from such services are maintained in perpetuity.

Table 8. Economic Guidelines for Sustainability Strategies
Source: Young (1992)
<table>
<thead>
<tr>
<th>Investments in highways, subways, railways</th>
<th>Bangkok</th>
<th>Seoul</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>congestion</td>
<td>high</td>
<td>low</td>
<td>med/high</td>
</tr>
<tr>
<td>effectiveness investments</td>
<td>good</td>
<td>medium</td>
<td>good</td>
</tr>
<tr>
<td>investment level planned</td>
<td>medium</td>
<td>very high</td>
<td>medium</td>
</tr>
<tr>
<td>Integration bus system and subway</td>
<td>poor</td>
<td></td>
<td>good</td>
</tr>
<tr>
<td>General conclusion about investments</td>
<td>serious underinvestments: subway systems needed railway needs revitilisation</td>
<td>low congestion through very high investments but not total value for money by not applying better planning methods</td>
<td>investments were very effective, but more is needed</td>
</tr>
<tr>
<td>General conclusion about public transport</td>
<td>poor due to underinvestment: congestion and operation problems through low fares</td>
<td>reasonable: subway system does not serve all major areas, bus system not enough integrated</td>
<td>good; the high usage in subways makes further investments necessary; good integration, more priority on buses is needed</td>
</tr>
</tbody>
</table>

Table 9. Evaluation of investments in highways and public transport in three Asian cities

Source: ESCAP (1990)
<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>Local Balance in Ongoing Networks with Positive and Negative</td>
<td>R.J. Blommeke, N.M. van Dijk</td>
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<td></td>
<td>Customers</td>
<td>H. Vosker</td>
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<td>1992</td>
<td>Towards International Instruments for Sustainable Development</td>
<td>H.L.M. Kos</td>
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<td>1992</td>
<td>Automatic Relational Database Restructuring</td>
<td>M. Boggaard, R.J. Veldwijk</td>
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<td>1992</td>
<td>Assessing the Software Cost. Why Information Systems are Beyond</td>
<td>R.J. Veldwijk, M. Boggaard</td>
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<td></td>
<td>Control</td>
<td>L.K. Vosker</td>
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<td>1992</td>
<td>Comparison of Two Approximations for the Loss</td>
<td>M. Miwa, T. Ueda</td>
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<td>Probability in Finite Buffer Queues</td>
<td>H. Hida</td>
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<td>1992</td>
<td>Non-Cooperative Bargaining in Infinitely Repeated Games with</td>
<td>H. Hida</td>
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<td>Binding Contracts</td>
<td>J.C. van Oorschot</td>
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<td>1992</td>
<td>Job Competition by Educational Level</td>
<td>G. Drioli</td>
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<td>A model for quarterly unemployment in Canada</td>
<td>L. Breton, P.H. Prasch</td>
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<td>A Control Perspective on Information Technology</td>
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<td>Equity and Efficiency in Unemployment Insurance</td>
<td>J.A. Vrijbrief</td>
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<td>Organizational Typology: Superficial Informance of Organization</td>
<td>J.B. Minke, A. Pastor</td>
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<td>Redesigning Information Production Processes for Controlled Production</td>
<td>J.W.M. Gerrits, R.L.M. Peeters, H. Vosker</td>
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<td>Towards a Web Scope of Using Information in Organization</td>
<td>M. S. A. Gong, E. Y. Roel</td>
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<td>Different Perspectives on Organizational Learning and Literature</td>
<td>M. Hanstein</td>
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<td>Transaction Regimes: An Instrument for Research in Industrial</td>
<td>P. Komorinka, H. L. Kos</td>
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<td>Influence of International Markets on Ecological Sustainability</td>
<td>L. J. van der Weijden, R. Stellinga</td>
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<td>H. Weijland</td>
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