

---

## RAPID URBAN ENVIRONMENTAL ASSESSMENT: TOWARD ENVIRONMENTAL MANAGEMENT IN CITIES OF THE DEVELOPING WORLD

*Josef Leitmann*<sup>1</sup>

*Divha natura dedit agros, ars humana aedificavit urbes.*

(It was divine nature which gave us the countryside, and  
human skill that built the cities.)

-Marcus Terentius Varro (127-1 6 BC)

*On Agriculture*

### URBAN MANAGEMENT AND THE ENVIRONMENT

**The rapid urban environmental assessment** approach has been developed by the Urban Management and Environment component of the joint UNDP/World Bank/UNCHS Urban Management Program (UMP). The UMP represents a major approach by the UN family of organizations, together with external support agencies (ESAs), to strengthen the contribution that cities and towns in developing countries make toward economic growth, social development, and the alleviation of poverty. In addition to its environmental focus, the program seeks to develop and promote appropriate policies and tools for land management, infrastructure management, and municipal finance and administration. Through a capacity-building component, the UMP plans to establish an effective partnership with national, regional, and global networks and ESAs in applied research, dissemination of information and experiences of best practices, and promising options.

---

<sup>1</sup> Josef Leitmann is an urban planner and coordinator of the Urban Management Program at the World Bank, 1818 H St NW, Washington DC 20433.

The research summarized in this paper will be used, in combination with background studies and research, to develop an overall document on environmental strategies for cities. The profiles and environmental data have been used as inputs for, among other things, international fora on cities and the environment, the UNCHS Sustainable Cities Program, the World Bank's World Development Report 1992, and the preparation of urban environmental projects. In turn, the results of these and other activities will be used to improve the assessment process over time.

In addition to city-based activities, the environmental component of the UMP is preparing background papers and undertaking research. Background papers cover urban waste management and pollution control, energy/environment linkages in the urban sector, regulatory and economic instruments for pollution control, the environmental dimensions of urban land use, and the urban environmental planning and management process. Each is designed to provide background information on key urban development/environment linkages and/or suggest elements of an environmental management strategy for cities in the developing world.

Finally, research reports are being prepared on (a) the health impacts of urban environmental problems; (b) the economic valuation of urban environmental problems; (c) urban environmental data collection; (d) the local management of hazardous wastes from small-scale and cottage industries; and (e) the application of remote sensing and geographic information systems to urban environmental planning. All of these will be inputs to a final paper on environmental strategies for cities in developing countries.

### **GUIDANCE FROM THE RECENT PAST: OBSTACLES AND OBJECTIVES'**

Very little information is readily available on environmental conditions, the interaction between urban development and ecosystems, or the managerial

<sup>1</sup> Because many of the rest of the numbered notes in this paper are very long, they all appear as **ENDNOTES** at the end of the article (pp. 245-247) just before **APPENDIX 1**.

setting that exists to respond to environmental problems in the cities of the developing world. Recent attempts to develop such information have been incomplete because they (a) focused on a limited number of variables that do not present a complete picture of key environmental issues in metropolises;<sup>1</sup> (b) took a narrow perspective by examining only one sector within the city;<sup>2</sup> (c) required several years of intensive, multidisciplinary research and analysis;<sup>3</sup> or (d) did not develop a set of urban environmental data that would allow for comparison across different types of cities.<sup>4</sup> The end result is that much of this work has not been immediately relevant to those who must respond to the environmental consequences of urban development in the Third World because the information and analysis are incomplete, sector-based, or outdated. For comparative purposes, past investigations may suffer from these problems and not be generalizable to other cases.

To learn from this recent history and overcome past limitations, there appears to be a need for urban environmental research that is comprehensive, multisectoral, relatively short-term, and consistent between cities. Therefore, one objective of the case study work reported herein was to use and test rapid evaluation methods in different cities that cut across sectors. In addition, the work sought to (a) identify generalizable constraints and analytical approaches to problems; (b) outline approaches for setting relative priorities amongst urban environmental problems; and (c) indicate options that could form part of environmental management strategies.

### **RAPID ASSESSMENT AS AN ALTERNATIVE**

A three-step process was developed to rapidly assess the state of the urban environment. This process is based on the need for measurement, observation, and validation. To measure a consistent set of data, an urban environmental indicators questionnaire is used. To observe the nature, trends, and factors that influence environmental quality in the cities, a common framework for preparing an urban environmental profile has been developed. To partially validate the results from the questionnaire and profile, consultations with key actors in the cities were held. These three steps and how they relate to one another are described below.

### Urban Environmental Indicators Questionnaire

A common questionnaire has been used to generate a data base on a range of environmental indicators. The survey instrument was designed over a one-year period (October 1989-September 1990) by a technical working group on urban environmental indicators, consisting of representatives from a number of international agencies (the UN Fund for Population Activities, Statistical Office, Department of International Economic and Social Affairs, Environmental Program, Development Program, and Centre for Human Settlements; the World Health Organization; the Organization for Economic Cooperation and Development; and the World Bank), and international institutes from the field of urban environmental research and policy analysis (International Center for Urban Studies, International Institute for Environment and Development, World Resources Institute, Stockholm Environment Institute, and the Network for Urban Research in the European Community).

In designing the questionnaire, the working group sought to identify a minimum set of key indicators that have a high probability of successful measurement in a large number of Third World cities. A number of analytical approaches<sup>5</sup> and relevant survey instruments<sup>6</sup> were reviewed to learn from past experience and avoid redundant data collection. It was concluded that indicators needed to be collected in the following categories:

- Baseline social and economic statistics
  - ▶ Baseline housing conditions
  - ▶ Baseline health conditions
  - ▶ Natural environment
  - ▶ Land use
  - ▶ Urban transport
  - ▶ Urban energy use
  - ▶ Air pollution
  - ▶ Noise pollution
  - ▶ Water resources, water supply and sewerage/sanitation
  - ▶ Solid and hazardous wastes

Core indicators were then developed for these categories, with a definition of statistical variables and units of measurement. For example, to describe the predominant ecosystems in and around cities, the Goodall classification of terrestrial and aquatic ecosystems (29 separate descriptors) was selected.

Depending on availability, data were collected for three levels: the city proper, the metropolitan area, and the urban agglomeration. The city proper is defined as the principal political jurisdiction containing the historical city center. The metropolitan area is a politically defined urban area set up for planning and administrative purposes that may combine several jurisdictions (municipalities or cities). The urban agglomeration is the total contiguous built-up area that may spill over defined political boundaries.

The categories and indicators were then translated into a draft questionnaire by the Urban Management Program. A sample section of the survey instrument is included as Appendix 1. The UMP then provided the resources to field-test the questionnaire in each of the seven case study areas. A local consultant, firm, or group of institutions was identified in each city to complete the questionnaire. They were selected on the basis of (a) demonstrated experience in environmental and/or urban research; (b) ability to access information from a variety of public and private sources; and (c) communication skills in English. The names and affiliations of these individuals and organizations are presented in Appendix 2.

The questionnaire was filled out, transmitted to the UMP/E team at the World Bank, and reviewed to identify problems with consistency, misinterpretation, and missing information. Requests for additional information and validation of questionable data were then communicated to the local researchers and, based on their responses, a final questionnaire was completed. This process occurred between September 1990 and March 1992, depending on the city. On average, two staff-months were required to complete, review, and finalize the questionnaire.

### The Urban Environmental Profile

While a questionnaire can provide useful baseline data, more description and explanation are required for a fuller understanding of environmental issues in cities. To get this information, an outline for a generic environmental profile was developed that covers (a) general background information; (b) the status of the environment in the urban region; (c) development-environment interactions; and (d) the institutional setting for environmental management. This was reviewed and modified with suggestions from staff at UNCHS (Habitat). A copy of the final generic outline is provided in Box 1.

---



---

**BOX I: Generic Outline for Urban Environmental Profile**
**I. INTRODUCTION**

Background  
 Geophysical and land use  
 Socio-economic setting (*demographics, economic structure, urban poverty*)  
 Environment-development linkages

**II. STATUS OF THE Environment IN THE URBAN REGION**

Natural resources  
 Air quality  
 Water quality (*surface, ground, coastal, fisheries*)  
 Land (*forests and natural vegetation; agricultural land; parks, recreation and open space; historical sites and cultural property*)  
 Environmental hazards  
 Natural risks  
 Human-induced risks

**III. DEVELOPMENT-ENVIRONMENT (NTBUCTIONS)**

Water supply  
 Sewerage and sanitation  
**Flood Control**  
 Solid waste management  
 Industrial pollution control/hazardous waste management  
 Transportation and telecommunications  
 Energy and power generation  
 Housing  
 Health care  
 Other

**IV. THE SETTING FOR ENVIRONMENTAL MANAGEMENT**

Key actors  
 Government (*central, regional, local*)  
 Private sector  
 Popular sector (*community groups and NGOs, media*)  
 Management functions  
 Instruments of intervention (*legislative and regulatory; economic and fiscal; direct investment; planning and policy development; community organizations; education, training and research; promotion and protest*)  
 Environmental coordination and decision making (*mechanisms for public participation; intersectoral coordination; across levels of government; between public and private sector; intertemporal; information and technical expertise*)  
 Constraints on effective management  
 Ongoing initiatives for institutional strengthening

## REFERENCES

**The introduction** section is intended to provide a historical, geophysical and socioeconomic perspective on urban development for each city, and to explain briefly how developmental activities and the environment have interacted over time. The status section summarizes existing information on the quality of various environmental media (air, water, land, and cultural property), and briefly analyzes the key natural hazards (both geogenic and human-induced) that affect the urban area. The development-environment section describes how development-oriented activities and services in the public, private and informal sectors influence environmental quality, and how environmental factors constrain or promote development. The setting section identifies key public and private actors that are engaged in environmental management that affects the city, the existing management functions (instruments of intervention that are used, and mechanisms for coordination and decision-making), constraints on effective management, and the initiatives that are being undertaken to improve environmental management.

To assemble an initial profile, the same researchers who prepared the questionnaire were used in each city. First drafts were based on information from the questionnaire, interviews, existing reports, and other data. These drafts were completely rewritten, using a large amount of additional information not cited by the researchers. The second drafts were returned to the researchers for their comments and clarification of inconsistencies.

In the case of four cities (Accra, Jakarta, Katowice, and Sao Paulo), responses were used to prepare third drafts that were taken to an international conference, *World Cities and their Environment* (held in Toronto, Canada, August 25-28, 1991), where delegates from each of the cities were present. These draft profiles were reviewed with each of the city delegations and corrections as well as new information were obtained. After review by UNCHS, the World Bank, and two external reviewers, a final environmental profile for each city was prepared by the UMP/E World Bank team.

**Specific Analytical Techniques.** Several different analytical tools were used to interpret the information from the case studies, according to the issue that was being assessed as well as the quality and format of the data. The key techniques and examples of their application are presented in Table 1.

Technique	Example of Application
Spatial analysis of land use, seismic and other maps	Assessment of open space availability, flood-prone and seismically active areas in Accra
Review of survey data and institutional analyses	Evaluation of functioning of sewerage and sanitation services in Accra
Overlay analysis of maps	Association between water-borne diseases and bio-chemical oxygen demand in Jakarta
Energy balance	Sectoral concentration of polluting fuel usage in Jakarta; air pollution in Tunis
Trend analysis	Growth and shift in peak hour transport modes in Jakarta
Organizational analysis	Environmental authority by level of government in Sao Paulo, Tianjin
Long-run marginal cost pricing	Evaluation of degree of cost recovery in Sao Paulo's water and sewerage charges
Flow chart	Occupational and environmental health data flows in Katowice

### Environmental Consultations

In four of the cities (Accra, Jakarta, Katowice, and Sao Paulo), a series of consultations with key individuals and organizations-culminating in a town meeting-were held to discuss urban environmental problems, priorities, and possible solutions. This process served to (a) obtain feedback on the draft profiles and questionnaires from interested citizens in the cities; (b) acquire additional information from the organizations and individuals that participated in the meetings; and (c) conduct an *ex post* comparison between priorities that emerged from the analysis of the data and profiles, and those that were perceived by the key actors.

The consultations and town meetings were organized by the **Five Cities Consultation Project** (the fifth city being Toronto) through the University of Toronto's Centre for Urban and Community Studies, an effort that was funded by the Canadian International Development Association, Ministry of External Affairs, and Mortgage Housing Corporation, the City of Toronto, and the Urban Management Program. In each city, a firm or local coordinators were hired to organize individual interviews and/or small roundtables with municipal politicians, local government planners, environmentalists,

regional/national officials, community groups, universities, NGOs, and private industry, and bring these actors together in a final forum to discuss their perspectives and determine whether there was a consensus on metropolitan environmental priorities.

The format for the consultations and town meetings was determined by the organizers, in order to accommodate local cultural practices and group dynamics.<sup>7</sup> However, the consultations all covered a minimum common set of issues (water resources, supply and sanitation/sewerage, land use, urban transport, energy use, solid and hazardous wastes, air pollution, and the natural environment), and the town meetings were organized under the auspices of the top local official (mayor or governor).<sup>8</sup>

Successful meetings were held in each of the cities, concluding in town fora that took place in May and June of 1991. The dates and details for each forum are summarized in Table 2. The results of this process are discussed and analyzed in a later section.

City	Date	Number and Types of Participants
Accra	5/15/91	50; local & national government, NGOs, donors, industries, community organizations, environmental consultants
Jakarta	6/12/91	40; provincial and national government, research/academia, donors, industries, community organizations
Katowice	5/17/91	25; municipal politicians, city & regional officials, state industries, research institutes, academia, community groups, NGOs, private sector
Sao Paulo	5/31/91	120; city & state government, NGOs, research institutes, academia, professional organizations, media

After the consultations, an effort should be made to rank urban environmental problems by combining results of the public discussions with information contained in the questionnaire and profile. The following criteria can be used to rank the relative importance of these problems:

- ▶ The magnitude of health impacts associated with the problem
- ▶ The size of urban productivity losses caused by the problem

- ▶ The relative impact of the problem suffered by the urban poor
- ▶ The degree to which the problem results in or is caused by unsustainable consumption of resources
- ▶ Whether or not the problem leads to an irreversible outcome
- ▶ The extent to which local support or a constituency exists to support resolution of the problem

The information necessary to apply the first five criteria may need to be further developed during preparation of the environmental management strategy (see below). The results of the consultations can be a useful guide for applying the final criterion.

## RAPID ASSESSMENT: A STEP TOWARD URBAN ENVIRONMENTAL MANAGEMENT

Rapid assessment is the first phase of an approach that will enable urban managers to tackle priority environmental problems in their cities. Subsequent steps include (a) formulation of an environmental management strategy; (b) development of an environmental action plan at the urban level; and (c) sustained investments for environmental improvement. These steps are briefly described below.

### Environmental Management Strategy

The process of rapid urban environmental assessment (data collection, profile, and consultations) is designed to provide an informational and consensual basis for preparing an urban environmental management strategy (EMS). The goal of the EMS is to accelerate the improvement of environmental conditions in cities, especially by integrating key aspects of urban policy and environmental management. The objectives are to (a) establish long-term environmental goals for the urban region; (b) set interim environmental goals and objectives; (c) rank pollution control and other measures to improve environmental quality; (d) identify priority sectors for channeling investments; and (e) recommend policy reforms, instruments, and institutional arrangements needed to implement the EMS.

The EMS process builds on existing sector and project work but emphasizes continuity in decision making to implement agreed policies and approaches. It should provide a decision-making framework for public and private investments, while recognizing that the investments will be primarily private (by households and firms). An EMS therefore requires a participatory process among decision makers in government and the private sector, often using working groups of officials in consultation with technical specialists and key private/informal sector actors, to agree and commit themselves to act on the policies and strategies they themselves will define.

In general, the EMS is developed by the following steps:

- a. Overcoming information gaps identified in the rapid assessment by intensive data collection and analysis;
- b. Preparing a detailed diagnosis of the present state of environmental infrastructure and services, existing urban development and sector plans, related environmental risks and impacts, and possible interventions;
- c. Carrying out a diagnosis of institutions with urban environmental management authority, including policies, regulations, and capacities;
- d. Using a cost-benefit or cost-effectiveness framework to establish first order estimates of the costs of environmental interventions and corresponding impact reductions; and
- e. Formulating a strategy that includes socially acceptable, long-term environmental quality goals, identification and phasing of priority sectoral actions to achieve the long-term goals, and needed policies, instruments and institutional development.

Broad-based acceptance of the resulting strategy requires participation of all stakeholders in this process, including mechanisms for negotiation and conflict resolution. A suggested approach is to name an EMS manager to be charged with day-to-day supervision of the effort, supported by a steering committee, a public advisory committee and technical working groups. Strategy development would require between nine and twelve months.

### The Urban Environmental Action Plan

The EMS provides the framework for integration and coordination to ensure consistency across environmental media and across sectoral strategies. Within this framework, sectoral action plans need to be formulated to implement the EMS. These plans consist of both a sectoral development strategy and a set of short and medium term environmental interventions, both corrective and preventive, for implementing the sectoral strategy. Then, an urbanwide environmental action plan (EAP) can be formulated that combines needed actions in the various critical sectors to achieve the objectives set forth in the EMS.

The EAP should be developed using the same participatory process for preparing the EMS. It would consist of the following elements:

**Status of the urban environment** — a description of the existing quality of environmental media, the risk of environmental hazards, key environment-development interactions, and the setting for environmental management.

**Optimal environmental quality** — a summary of long-term urban environmental objectives, and interim targets to be achieved.

**Possible scenarios** — a presentation of the health impacts, productivity effects, and ecological consequences associated with different levels of environmental degradation. This could include a business-as-usual case, a scenario based on interim objectives, and a long-term/best-case situation.

**The least-cost approach** — a series of pre-feasibility studies that develop the alternatives that comprise the least-cost strategy in greater detail.

**Economic and financial analysis** — an assessment of the projected economic and financial costs and benefits of least-cost strategy. The strategy could be assessed as one single project, or as a set of separate but linked activities;

**Institutional analysis** — an assessment of the managerial improvements, organizational arrangements, jurisdictional changes, training requirements, etc. , that would be necessary in order to implement the strategy.

**Implementation program** — the costed, scheduled and coordinated core of the action plan that covers issues such as financing, institutional responsibility, timing of investments and policy changes, monitoring, evaluation, and public participation.

It is estimated that preparation, review and completion of this plan would take between 12 and 24 months.

### Sustained Investment Program

The EMS/EAP process results in priorities for investments in pollution control and other measures to improve urban environmental quality, which are in turn incorporated in a multiyear economic plan. Implementation of a sector investment package must be supported by the corresponding policy reforms and institutional, legal, and fiscal programs resulting from the EAP. Depending on budget constraints and current environmental conditions, a succession of staged investments spread over 15-20 years will be needed to reach the EMS environmental quality goals. Success will depend on sustaining both investments and institutional development programs over the long term. Procedures for long-term monitoring and evaluation are needed, as are feedback mechanisms into an iterative EMS/EAP process.

## CASE STUDIES FOR APPLYING THE METHODOLOGY

The case study approach was selected as the means of testing the methodology partly by default and partly because of the advantages it brings to helping identify appropriate urban environmental interventions. There is no unified theory for explaining and predicting the dynamics of the urban environment. Consequently, there is no rigorous, theorydriven methodology for conducting analysis in this field. Still, there is a need to collect information, describe observations, and suggest explanations for phenomena in an attempt to establish a pre-theoretical cause-effect framework. Though

second-best in comparison with the more replicable and generalizable techniques of theory-based inquiry, the case study method is a valid research tool in the absence of theoretical guidance.

This argument aside, preparing and comparing cases is a worthwhile approach to problem evaluation for several reasons. To begin with, cases that focus on previously underexplored territory collect knowledge that is based on experience; as lessons from practice are accumulated and assessed, a base of data becomes available for developing theories. Next, cases allow for observation of a wide range of variables, their interactions, and the outcomes of this interplay. Third, they provide an opportunity to test hypotheses in a number of different settings. Finally, case studies have a nonacademic value: because cases are derived from experience, they are more readily understood by practitioners who are responsible for shaping policy, prioritizing problems, and implementing solutions.

If the case study method is to be used, how should one select the individual cases? Criteria for selecting the cities were derived from several simple assumptions:

- ▶ Transnational generalizations will require evidence from diverse geographical, political, and economic settings.
- ▶ Urban environmental problems vary according to the level and distribution of a city's wealth.
- ▶ These problems also vary depending on the structure and location of a city's economic base.
- ▶ Megacities have different and more complex systems for managing environmental problems than smaller ones.
- ▶ Rapid data collection and analysis are more readily achieved in cities where work of a related nature is already taking place.

The following criteria flow from these assertions: (a) the cities should be selected from different continents, cultures, and political systems; (b) they should reflect different levels of per capita income, with varying degrees of poverty; (c) they should be characterized by different stages and types of

industrialization; (d) both large and smaller cities should be included in the sample; and (e) baseline data should be available from ongoing activities in the cities so that primary research can be minimized.

These criteria were combined with a resource limitation to select six cities and one urbanizing area: Accra (Ghana), Jakarta (Indonesia), Katowice (Poland), Sao Paulo (Brazil), Tianjin (China), Tunis (Tunisia), and the Singrauli region (India). Though Singrauli is not a city, it was selected for two reasons. First, it is a good example of the urban environmental shadow that cities cast on the hinterland (in this case, environmental degradation from urban demand for electricity and, secondarily, coal). Second, it is a rapidly urbanizing region that has a special set of environmental problems. Table 3 presents information on these seven areas, organized according to the criteria for their selection.

The ability to tie into related work was crucial for the process in each city.

For **Accra**, environmental information has been developed from the UNCHS (Habitat)-supported structure planning process, known as the Accra Planning and Development Program, preparation of Ghana's national environmental action plan, the Stockholm Environment Institute (SEI) urban household environment study, and through the World Bank's first urban project in Ghana (completed in 1991) and second urban loan (initiated in 1991).

For **Jakarta**, related work included activities of the UNDP World Bank Metropolitan Environmental Improvement Program, the SEI study, and the World Bank's First, Second, and Third Jabotabek Urban Development Projects (initiated respectively in 1988, May 1990, and June 1990).

For **Katowice**, environmental data have been collected by a number of national and local research institutes in Poland, and the World Bank's environmental management project (initiated in 1990).

Criteria	Accra	Jakarta	Katowice	Sao Paulo	Singrauli	Tianjin	Tunis
Diversity: Geography	Africa	SE Asia	Europe	S. America	S. Asia	NE Asia	N. Africa
Political & economic systems	Military/dereg. to market economy	1-party/dereg. to market economy	Democracy/former socialist economy	Democracy / market economy	Democracy /regulated market economy	1-party /socialist economy	1-party /market economy
Wealth: US\$ per capita	350	850	4475	2540	340+	310	1260
% in poverty	48	17	2	37	47	6*	18
Industrialization: level and base	Low; agric. products	Medium manufacturing	High; heavy industry	High; wide-ranging	High; mining and energy	High; wide-ranging	Medium; manufacturing
City size: Metro. population ('000)	1,565	16,828	2,180	16,938	696	8,660	1,558
Related work	UNCHS Structure Plan; SEI; NEAP; IBRD Urban I & II	MEIP city; SEI; IBRD Jabotabek I-III	Local research institutes; IBRD Env. mgmt. loan	CETESB; NGO work; SEI; IBRD loans	EdF EIS; TCP study; IBRD review	IBRD loans	UNDP/WB EPM; NEAP; IBRD loans

\* Percentage of population living in substandard housing. No information is available on incomes below the poverty line.

For **Sao Paulo**, urban environmental work has been conducted by the Sao Paulo state environmental company (CETESB), nongovernmental research organizations and the city government, the SEI study, and a number of World Bank sector loans over a 15-year period (industry, pollution control, water supply, sanitation).

For **Singrauli**, environmental information has been developed through a number of studies in the region: (a) an environmental impact assessment prepared by Electricite de France; (b) an environmental review by the Indian Town and Country Planning Department; and (c) an ongoing IBRD environmental planning study.

In **Tianjin**, environmental and background information had been developed as part of the World Bank's Light Industry Project (Report No. 7165-CHA) and the Urban Development and Environment Project (Report No. 10284-CHA), **appraised in 1992**.

Finally, in **Tunis**, the assessment could draw on work of the UN/World Bank Environmental Program for the Mediterranean, the national environmental action plan, and a range of World Bank lending operations for urban development, water supply, sewerage, flood protection, and transportation.

## LESSONS FOR FUTURE RESEARCH

The research described in this paper yielded observations on process as well as substance. This information can be divided into two categories: (a) the utility of the research methodology, and (b) areas that would benefit from further inquiry or different research approaches. For the former set of information, a brief critique of the research methodology is presented below. For the latter, some thoughts on directions for future research are presented.

### Advantages and Limits of the Methodology

The benefits and disadvantages of the overall methodology will be reviewed first, followed by comments on each of the three components (questionnaire, profile, and consultations).

Briefly, the advantages of the general approach are that it (a) is rapid; (b) costs relatively little; (c) centralizes diverse information; and (d) benefits from local access to information. On average, the three-step rapid assessment required six person-months of efforts over an elapsed period of five to nine months. The local costs for research, writing, and organization of the consultations ranged between \$16,000 (Accra) and \$27,000 (Jakarta) per city. The research and public discussions led to the centralization of a wide range of environmental information in one place for the first time in each city. Involving local researchers and institutions facilitated access to information and decision makers for a variety of reasons (knowledge of the local language(s) and cultural practices, past experience with the subject

matter, relevant organizations and individuals, and established reputation in the field).

The general methodology also suffered from a number of disadvantages. The first limitation is an intrinsic part of the process: the methodology generates purely descriptive information; it provides some guidance as to what might be a priority problem but little or no indication as to what might constitute the range of possible solutions. Second, the approach relies on existing sources of information. By using secondary data, results (numbers, analyses, discussions) are confined by the range and quality of work that has already been done. (On the other hand, the methodology identifies gaps in knowledge.) Third, results cannot always be used for comparison between cities because the information applies to different time periods, was derived in a different manner, or is based on a different sample.

Narrowing the critique to each step of the process, the benefits of the **questionnaire** are that it (a) is a straightforward guide to gathering a comprehensive set of data on a particular city or metropolitan area; (b) brings together data from many different sources and allows for intra- and intersectoral comparisons that are often not possible from a single source of information; and (c) can serve several useful purposes, e.g., by generating information for preparing the profile, the consultations, and intercity comparisons.

On the negative side, some of the questions were subject to misinterpretation. A good deal of effort went into correcting these errors and/or explaining the meaning and means of answering particular questions. Also, in each city, certain data were simply not available from secondary sources. This meant that the question or table was left blank, that conversion factors from other cities were used to calculate values (with uncertain degrees of error), or that primary data should have been collected (unfortunately, funds were not available for this option).

The benefits of preparing the **profile** were that it (a) summarized information on causal relationships between environmental quality and development activities, and the institutional dimension of urban environmental issues that were not collected in the questionnaire; (b) brought together conclusions from reports developed in different sectors or over time that referred to a

common problem; and (c) served as a useful background document for the consultations, government agencies, NGOs, donors, and others.

The principal drawback of the profile is that it is a static document. Each will have a relatively short lifespan as no provisions were made to institutionalize the updating of the profile. There were also a set of practical problems, similar to those for the questionnaire, concerning preparation of the document-information was missing, key reports were not available in the city or were not used by the local researcher(s), significant amounts of time and effort were required to explain particular sections and review the draft information, and the quality of the writing itself was often poor. In most cases, the revised version of the profile bore little resemblance to the locally prepared research.

The co-ultations and town meetings had the advantage of being flexible instruments for involving a broad spectrum of concerned publics. Because they were organized locally according to local traditions, they generated meaningful discussion for the participants and allowed them to reach a consensus in each case. However, since the method for arriving at a consensus differed in each case (from subtle negotiation and polite acquiescence in Jakarta to a formal parliamentary-style session in Sao Paulo), the ability to compare results is limited. More importantly, the consultation process ended with the final forum. The consensus was not linked to any formal planning or decision-making process (although the mayor's or governor's office was centrally involved in each of the town meetings). Thus, whatever momentum that was built up did not have anywhere to go; in many ways, the consultation process was a lost opportunity. This will not occur when the rapid assessment is linked to the development of an urban environmental management strategy.

### Directions for Research

Some topics that would constitute fruitful areas for future research include (in no particular order of priority):

**Linking health effects with environmental conditions.** In all of the cities except Katowice, there was relatively little information on the cause-effect relationships between environmental problems and their human health consequences. Useful epidemiological and other analytical

work could be done on the emissions-dispersion-exposure-health impact pathway.

**Valuing the economic costs and benefits of urban environmental activities.** Reliable values for the productivity, amenity, and other losses and gains associated with environmental conditions and hazards were not available in all of the cities. There are many techniques for calculating the monetary value of these impacts; they could be tested to determine which are most appropriate for different types of problems and levels of available information.

**Alternative methods of assessing public priorities.** Consensus-oriented discussion is only one of several techniques for developing a sense of what people think is important. Other approaches include: revealed preference, contingent valuation, and willingness to pay;" classic public opinion survey research;" and special models for discerning public preferences.<sup>12</sup> These could be tried in the same cities and compared with consultation results, or used in conjunction with consultations in other cities.

**Matching jurisdictions with ecological boundaries.** More information is needed about the results, limitations, and opportunities for creating or modifying institutions so that their area of responsibility corresponds with the ecosystems that affect them. Research could be done on authorities in cities of developing countries that are organized around water basins, air-sheds, waste management areas, agricultural zones, sites of historic or cultural value, and so on.

**Comparing policy instruments for environmental management.** Cities often adopt similar or different policies to deal with the same type of environmental problem. Why do the same or different approaches succeed or fail? For example, both Jakarta and Sao Paulo are faced with degradation of their main watershed. Guided land and infrastructure development was a fairly successful protection policy in Jakarta. Regulation and enforcement of zoning have been near-complete failures in Sao Paulo. What factors were behind these experiences?

## ENDNOTES

1. An example of this incomplete picture is evident in the Population Crisis Committee's analysis of environmental quality in the world's 100 largest metropolitan areas. An "urban living standard score" is developed for each city by combining scores on indicators of public safety, food costs, living space, housing, communications, education, public health, peace and quiet, traffic flow, and clean air. This approach forces the often-arbitrary selection of one value to represent a complex indicator, e.g., public health is assessed on the basis of infant mortality per 1,000 live births, which excludes consideration of the status of adult mortality and morbidity. A second methodological problem is that different data are used for different cities to rank the same indicator, e. g., air quality is measured on the basis of ozone, sulfur dioxide, suspended particulate matter, or nitrogen oxides. Third, in order to develop a table and rankings without missing variables, the number of indicators was limited to those mentioned above, resulting in the **exclusion** of important areas such as water quality, open/green space, sanitation, and industrial pollution. (See *Cities: Life in the World's 100 Largest Metropolitan Areas*, Population Crisis Committee, Washington DC, 1990.)

2. For example, studies have been done on the linkages between environment and health in particular cities. Some representative titles include: Radhika Ramasubban and Nigel Crook, "Mortality Toll of Cities: Emerging Patterns of Disease in Bombay," in *Economic and Political Weekly XX(23), 1985*; C. Hertzman, "Poland: Health and Environment in the Context of Socio-economic Decline," Health Policy Research Unit Report No. 90:2D, University of British Columbia, Vancouver, January 1990; Pedro Jacobi, "Habitat and Health in the Municipality of Sao Paulo," in *Environment and Development 2(2)*, October 1990; and "Ranking Environmental Health Risks in Bangkok, Thailand," Office of Housing and Urban Programs, USAID, Washington DC, December 1990.

3. One of the first efforts in this area, the Hong Kong Human Ecology Program, is a good example of this limitation. It was initiated in 1972, fieldwork was completed in 1975, analysis was completed in 1980, and the results were published in 1981 (see S. Boyden, S. Millar, K. Newcombe,

and B. O'Neill, *The Ecology of a City and Its People: The Case of Hong Kong*, Australian National University Press, Canberra, 1981).

4. For example, the United Nations has collected a set of data for over 100 cities internationally (UN Population Fund. *Cities: Statistical, Administrative and Graphical Information on the Major Urban Areas of the World*, Institut d'Estudis Metropolitans de Barcelona, Barcelona, 1988). However, most of it is quite general and does not allow for any detailed environmental analysis. The "Ecoville" project (University of Toronto) generated a number of environmental reports on cities in the developing world during the mid-1980s, but the content and quality of these documents varied greatly, limiting their comparability.

5. These included: *Concepts and Methods of Environment and Human Settlements Statistics - A Technical Report*, UN Statistical Office, 1988; *Green Paper on the Urban Environment* (draft), European Economic Community, 1990; *Survey of Resource and Environmental Accounting in Industrial & Developing Countries*, World Bank, 1990; and *Urban and Regional Environmental Planning and Management Guidelines*, UNEP/UNCHS, 1987.

6. These included: the questionnaire on "The State of the Environment" used by the OECD/EUROSTAT; the "City Data Framework" used by UNCHS; the ECE's "Experimental Compendium on Environmental Statistics in Europe and North America"; the questionnaire for NUREC's *International Statistical Yearbook of Large Cities*; and the draft UNEP/IEO questionnaire to evaluate national hazardous waste situations.

7. For example, three roundtables (on water resource problems and priorities, air pollution, and housing and the natural environment) and two seminars (on hazardous waste and industrial development) were organized to accommodate the large number of actors, and to avoid duplication of previous consultations. In Sao Paulo, institutions and key individuals were contacted separately, both through interviews and questionnaires.

8. Summarised from Patricia McCarney, "Draft Terms of Reference for Local Consultants Working on *World Cities and Environment: A Five City Consultation Process*," Centre for Urban and Community Studies, University of Toronto, Toronto, 1991.

9. Recently, these and other reasons provided the justification for a case-study approach to evaluating environment-development linkages in rural Africa. See Jonathan Blackwell, Roger Goodwillie, and Richard Webb, *Environment and Development in Africa: Selected Case Studies*, ED 1 Development Policy Case Series #6, World Bank, Washington DC, 1991.

10. This approach is being used by the Stockholm Environment Institute's household environment survey teams in Accra, Jakarta, and Sao Paulo.

11. See, for example, Kathleen Beatty, "Public Opinion Data for Environmental Decision Making: The Case of Colorado Springs," in *Environmental Impact Assessment Review* 11(1991): 29-51; or, for a developing country city, Layi Egunjobi, "Perception of Urban Environmental Problems: A Pilot Study of the City of Ibadan, Nigeria," in *African Urban Quarterly* 4, February and May 1989.

12. Several of these exist. A recent application, based on weighting and ranking the discussions and responses of concerned publics, focuses on public priorities as they relate to equity and efficiency in air quality: Climis Davos *et al.*, "Public Priorities for Evaluating Air Quality Management Measures," in *Journal of Environmental Management* 33:205-267, 1991.

---

**APPENDIX 1**

URBAN ENVIRONMENTAL INDICATORS QUESTIONNAIRE

**CONTENTS**

**GENERAL INFORMATION**

- I **SOCIO-ECONOMIC BACKGROUND**
- II **HOUSING CONDITIONS**
- III **HEALTH CONDITIONS**
- IV **NATURAL ENVIRONMENT**
- V **LAND USE**
- VI **URBAN TRANSPORT**
- VII **ENERGY USE**
- VIII **AIR POLLUTION**
- IX **NOISE POLLUTION**
- X **WATER AND SANITATION**
- XI **SOLID AND HAZARDOUS WASTES**

**ANNEXES**

The following pages of this appendix are an excerpt from the questionnaire showing Section VI on urban transport.

**HELP NOTES**

**VI 1** Motorization Rate

Private Sector Share of Public Transport

Be sure to quote the area defined by these statistics

**Motorized Trips/Total Trips**

Proportion (%) of public transport owned and/or operated by the private sector (e.g. taxis, buses, subways, collectives, etc.)

**BACKGROUND**

**VI URBAN TRANSPORT**

1 BASIC STATISTICS			
Motorization Rate		%	
Energy Intensity of Urban Transport		kgoe/cap/day	
Private Sector Share of Public Transport		%	
Road Network	Paved	km	
	Unpaved	km	
Gasoline	Lead Content	g/l	
Diesel	Sulphur Content	g/l	
Coal	Sulphur Content	g/kg	

JURISDICTION
AREA DEFINED
SOURCE (1)
SOURCE (2)
YEAR

2 VEHICLE STOCKS			
Mode		Number	Increase (No./yr)
Cars			
Electric Buses and Trolleys			
Diesel Buses and Goods Vehicles			
Other Buses and Goods Vehicles			
Motorized 2-3 Wheeler			
Bicycles			
Water Transport (taxi, ferry, barge, etc.)			

JURISDICTION
SOURCE (1)
SOURCE (2)
YEAR

HELP NOTES

VI 3 If available, include Bicycle/Pedestrian data under Others

VI 4

CO <sub>2</sub>	Carbon Dioxide
CO	Carbon Monoxide
H-C	Hydro-Carbons
NO <sub>x</sub>	Nitrogen Oxides
SO <sub>x</sub>	Sulphur Oxides
A	Aldehydes
SPM	Suspended Particulate Matter
Pb	Lead

For more information on emission coefficients, refer to page 46 of *Automotive Air Pollution - Issues and Options for Developing Countries* a PRE Working Paper published by the World Bank in August 1990, by Asif Faiz et al.

BACKGROUND

VI URBAN TRANSPORT

3	MOTORIZED TRAVEL BY MODE			
	Mode	Vehicle-km per day	Passenger-trips per day	Passenger-km per day
	Cars			
	Electric Buses			
	Trolley Buses			
	Rail or Subway			
	Goods Vehicles			
	2-3 Wheelers			
	Others _____			

JURISDICTION  
 SOURCE (1)  
 SOURCE (2)  
 YEAR

4	EMISSIONS FROM URBAN TRANSPORT (Ktons/year)								
	Mode	CO <sub>2</sub>	CO	H-C	NO <sub>x</sub>	SO <sub>x</sub>	A	SPM	Pb
	Cars								
	Electric Buses								
	Trolley Buses								
	Rail or Subway								
	Goods Vehicles								
	2-3 Wheelers								
	Ships/Boats								
	Others _____								

JURISDICTION  
 SOURCE (1)  
 SOURCE (2)  
 YEAR

HELP NOTES

VI 5 Accident Index Number of Deaths/vehicle-km

VI 6 Describe all Environmental Restrictions

BACKGROUND
------------

VI URBAN TRANSPORT						
5	<b>INJURIES RESULTING FROM VEHICLE ACCIDENTS</b> (Number/year)					JURISDICTION <hr/> SOURCE(1) <hr/> SOURCE(2) <hr/> YEAR
	Accident	Vehicle Occupants	Pedestrians	Total	Accident Index	
	Injuries					
	Deaths					
6	<b>PASSENGER CAR RESTRICTIONS</b>					JURISDICTION <hr/> SOURCE(1) <hr/> SOURCE(2) <hr/> YEAR
	Are there any environmental restrictions placed on the circulation of Private Passenger Cars ?			YES	<input type="checkbox"/>	
	If YES, describe below:			NO	<input type="checkbox"/>	

## APPENDIX 2

### LIST OF LOCAL CONSULTANTS AND INSTITUTIONS

#### **Accra**

Dr. A.T. Amuzu Assistant Director, Water Resources Research Institute, and Director, Environmental Management Associates

#### **Jakarta**

Suhadi Hadiwinoto National Project Coordinator, UNDP/World Bank Metropolitan Environmental Improvement Program, and Former Chief, Environment and Infrastructure Division, Jakarta Regional Development Planning Board  
(Mr. Hadiwinoto was assisted by Dr. Giles Clarke, consultant to the UMP)

#### **Katowice**

Dr. Jerzy Borkiewicz Director, Institute of Material Economy  
Dr. Ewa Mieczkowska Chief, Department for Utilization of Industrial Waste, Institute of Material Economy  
Dr. Alicja Aleksandrowicz Research Scientist, Institute of Material Economy

#### **Sao Paulo**

Ceslo N.E. de Oliveira Professor, School of Public Health, University of Sao Paulo  
Arlindo Philippi Head, Pollution Control Program Department, CETESB (State Environmental Protection Company)

#### **Singradi**

Dr. Ranjan Bose Tata Energy Research Institute, New Delhi

#### **Tianjin**

Ms. Guo Lian-cheng Director, Environmental Protection Information Center, Tianjin Environmental Protection Bureau  
Qin Bao-ping Division Head, Tianjin Environmental Monitoring Center

#### **Tunis**

Abdelkader Baouendi Director, National Environmental Protection Agency (NEPA)  
Hedi Larbi Co-founder, Engineering Company for Economic and Social Development (SIDES)  
Ahmed Basti Senior Engineer, SIDES  
Mohamed Hentati Director, Prevention and Control Department, NEPA

---

## REFERENCES

- Amuzu, A.T., and J. Leitmann. 1991. "Environmental Profile of Accra" (draft). Washington DC: UMP.
- Bartone, Carl, J. Bernstein, and J. Leitmann. 1992. "Environmental Strategies for Cities: A Framework for Urban Environmental Management in Developing Countries" (draft). Washington DC: UMP.
- Blackwell, Jonathan, R. Goodwillie, and R. Webb. 1991. *Environment and Development in Africa: Selected Case Studies*. ED1 Development Policy Case Series No. 6. Washington DC: The World Bank.
- Borkiewicz, Jerzy *et al.* "Environmental Profile of Katowice" (draft). Washington DC: UMP.
- Hadiwinoto, Suhadi, G. Clarke, and J. Leitmann. "Environmental Profile of Jakarta" (draft). Washington DC: UMP.
- Leitmann, Josef. 1992. *Environmental Management and Urban Development in the Third World*. PhD Thesis. Berkeley: University of California.
- \_\_\_\_\_ 1991. "Environmental Profile of Sao Paulo" (draft). Washington DC: UMP.
- \_\_\_\_\_ 1991. "Environmental Profile of Tianjin" (draft). Washington DC: UMP.
- McCarney, Patricia. 1991. "Draft Terms of Reference for Local Consultants Working on *World Cities and Environment: A Five City Consultation Process*." Toronto: Centre for Urban and Community Studies, University of Toronto.
- McNeil, Mary. 1991. "Local Concerns Voiced on Urban Environment." *The Urban Edge* 15(6).
- Nirody, Anita. 1992. "Environmental Profile of the Singrauli Region of India" (draft). Washington DC: UMP.

Population Crisis Committee. 1990. *Cities: Life in the World's 100 Largest Metropolitan Areas*. Washington DC: Population Crisis Committee.

SIDES (Engineering Company for Economic & Social Development). 1992. "Profil environnemental de Tunis" (draft). Washington DC: UMP.

Urban Management Program (UMP). 1992. *Urban Environmental Indicators Questionnaire*. Washington DC: UMP.

World Bank. 1991. *Urban Policy and Economic Development: An Agenda for the 1990s*. World Bank policy paper. Washington DC: World Bank.