

UNDP/UNCHS (Habitat) World Bank

SEI  
(Stockholm Environment Institute)

URBAN MANAGEMENT AND THE ENVIRONMENT

**UNDERSTANDING ENVIRONMENTAL PROBLEMS IN  
DISADVANTAGED NEIGHBORHOODS:  
Broad Spectrum Surveys, Participatory Appraisal and  
Contingent Valuation**

Gordon McGranahan,  
Josef Leitmann and Charles Surjadi

July 1997

Working Paper No. 16

1997  
UNDP/UNCHS/The International Bank for  
Reconstruction and Development/World Bank-UMP  
1818 H Street, N.W.  
Washington, D.C. 20433 U.S.A.

Stockholm Environment Institute (SEI)  
Box 2142  
S-103 14 Stockholm, Sweden

All Rights Reserved  
Manufactured in the United States of America  
First Printing, July 1997

This document has been prepared under the auspices of the UNCHS/UNDP/World Bank-sponsored Urban Management Programme. The findings, interpretations, and conclusions expressed here are those of the authors and do not necessarily represent the views of the United Nations Development Programme, UNCHS, the World Bank, or any of their affiliated organizations.

John Little  
Officer-in-Charge  
Urban Management Programme  
Technical Cooperation Division  
UNCHS (Habitat)

Sonia Hammam  
Team Leader  
Urban Management Programme  
Urban Development Division  
The World Bank

## FOREWORD

This working paper has been prepared by the Stockholm Environment Institute and the Urban Management Programme (UMP) - a ten-year global technical cooperation programme designed to strengthen the contribution that cities and towns in developing countries make towards human development, including economic growth, social development, and the reduction of poverty.

The UMP is a partnership between the international community: UNCHS (Habitat) is the executing agency; The World Bank is the associated agency and UNDP provides the core funding and overall monitoring. Bilateral donors, multilateral agencies such as the World Health Organization and Non-Governmental (NGOs) provide various types of support.

The ultimate beneficiaries of the Programme are the citizens who live in and use towns and cities, particularly the urban poor, who will receive better-managed services and more accountable, participatory, and transparent management as a result of the Programme

### **The Urban Management Programme**

The UMP seeks to strengthen urban management by harnessing the skills and strategies of networks of regional experts, communities and organizations in the public and private sectors. The goal of the Programme is to strengthen this local and regional expertise through its regional offices in Africa, the Arab States, Asia and the Pacific, Latin America and the Caribbean.

- **City and Country Consultations.** The UMP brings together national and local authorities, the private sector, community representatives, and other parties within a country to discuss specific problems within the UMPs subject areas and to propose reasoned solutions. Consultations are held solely at the request of a developing country and often provide a forum for discussion of a cross-section of issues generally resulting in a concrete action plan for policy programme change.
- **Technical Cooperation.** The UMP uses its regional networks of expertise to follow-up the consultations by providing technical advice and cooperation to facilitate the implementation of action plans and to mobilize the resources needed for their implementation

The UMP supports the regional programmes and networks by synthesising lessons learned; conducting state-of-the-art research; identifying best practices; and dissemination programme related materials through its Core Teams in Nairobi and Washington, D.C.

## **UMP Dissemination**

The UMP produces publications of the findings of specific research activities, which summarize the results of case studies, research, and the insights and broad recommendations developed under the work of the UMP to date, and illustrate instruments, techniques, or procedures the UMP has found useful in addressing the issues surrounding the five components.

### **The UMP's Working Paper Series**

The working paper series has several objectives, the **content** of the series seeks to highlight examples of good and best practice in the various components of urban management or to give an overview of the main issues and options in a particular field of urban management. This will range from case studies and training materials on one or more aspects of urban management in a particular city to regional and even global syntheses of experiences. Much of the latter will increasingly be drawn from the UMP's regional programmes. The **timeliness** of the information in the series is an important objective. Hence, the review and production processes for issuing the series have been streamlined to allow for rapid publication and dissemination. The **sources** of material that will be published in the series are intended to be diverse. Authors will be drawn from the UMP's regional coordinators, programme consultants, members of the UMP's regional networks, UMP core team members, and others.

The **audience** for the working papers will also be diverse, and vary according to publication. The series should be of use to urban managers, urban policy makers at different levels of government, External Support Agencies (ESAs) that provide support for urban development, community and non-governmental organizations, academics, and the media.

In parallel, the UMP also issues a formal publications series that consists of discussion papers, policy framework papers, and management tools. A list of titles that have been prepared in the formal series and working paper series is attached at the end of this paper.

Many of the formal series publications are available in English, Spanish and French. The working paper series is available only in English, though translations could be available at a later date.

## **ACKNOWLEDGEMENTS**

The principal authors of this study are Gordon McGranahan of the Stockholm Environment Institute, Josef Leitmann of the World Bank's Urban Division (on leave), and Charles Surjadi of Atma Jaya University, Jakarta. The document benefited from external reviews by Britha Mikkelsen and Debra Roberts. The authors also received very useful comments from Carl Bartone, Dan Hoornweg, Marianne Kjellén and Diana Mitlin. The fieldwork for the case studies was coordinated by Rachmadhi Purwana. Augustini E. Raintung, with assistance from the staff of Save the Children, Jakarta, led the participatory assessment. Cecilia Ruben helped to create the tables. Lilian Lyons coordinated the preparations at the World Bank. Teresa Ogenstad and Rachel Cole did the editing and layout for the final document.

## ABBREVIATIONS, ACRONYMS AND LOCAL TERMS

CV	Contingent Valuation
CVM	Contingent Valuation Method
ESA	External Support Agency
GIS	Geographic Information Systems
GRO	Grass Roots Organization
GTZ	Gesellschaft für Technische Zusammenarbeit (German technical cooperation agency)
IIED	International Institute for Environment and Development
KIP	Kampung Improvement Program (in Jakarta)
LKMDK	Institute of Village-Community Resilience (in Jakarta)
LPG	Liquid Petroleum Gas
MCK	Public toilet (in Jakarta)
PLA	Participatory Learning (for) Action
PRA	Participatory Rapid Appraisal
RRA	Rapid Rural Assessment
RT	Ruangan Tetanga - neighborhood in Jakarta
RW	Ruangan Warga - cluster of neighborhoods in Jakarta
SEI	Stockholm Environment Institute
SPSS	Statistical Package for the Social Sciences
UMP	UNDP/UNCHS (Habitat)/World Bank Urban Management Programme
UNCHS	United Nations Centre for Human Settlements
UNDP	United Nations Development Programme
WHO	World Health Organization

# CONTENTS







## **EXECUTIVE SUMMARY**

In poor urban areas, serious environmental problems arise in and around people's homes, often creating health hazards. Inadequate sanitation, insufficient or contaminated water, smoky cooking fuels, uncollected solid waste, and insect infestation are all correlated with urban poverty and a lack of environmental services. Many people, especially women, children and the elderly, spend much of their time close to home. Their health is directly threatened by these problems. Respiratory infections and diarrheal diseases are the two biggest childhood killers. Both are linked to inadequate home and neighborhood environments.

Neighborhood environmental health problems and their related economic costs can be enormous. The World Bank's *World Development Report 1993* estimated that feasible interventions to improve household environments (especially water provision, sanitation and indoor air quality) could avert the annual loss of almost 80 million years of "disability free" life. This is far more than the feasible improvement attributed to all other environmental interventions combined. Associated economic costs include health care expenditures, lost wages and lowered productivity.

### **Why Bother Understanding Neighborhood Environmental Problems?**

Understanding neighborhood conditions can play an important role in environmental improvement at the local level. It can be instrumental in helping government officials and others determine what needs to be done. In areas where piped water connections, sewers, electricity, and reliable garbage collection are unattainable luxuries, it is particularly important that priority-setting be well-informed. The opportunity cost of devoting scarce resources to less-than-critical improvements can be a great deal of human suffering. In many ways, a government developing a sound strategy for low-cost environmental management requires a better understanding of local conditions than does one able to afford capital-intensive infrastructure. Much the same applies to the user: for its own protection, a household using a pit latrine, storing water in a bucket and cooking with wood needs to be better informed of risks than does a household using a sewer water closet, drinking good quality tap water that is continuously available and cooking with electricity.

Good information cannot only help motivated reformers make the right decisions but can also help provide the right motivation. Environmental management is as much a political as a technical process. Decision-making almost inevitably involves discussion, conflict and compromise. Generally, discussions and debates based on faulty or inadequate information are more likely to result in faulty and inadequate decisions. Moreover, poorly understood problems are more easily neglected; consequently, economic resources may be diverted to better documented but less important problems. When information is lacking or not made available, the problems of the least vocal and typically most needy segments of society are likely to be ignored or misrepresented in policy debates.

In short, good information is critical at every level for effective improvements in household and neighborhood environments, and needs to be made available. It is needed by the households and communities who are most exposed to risks. It is needed by delivery agencies that supply water,

remove wastes and provide sanitation. It is needed by the health authorities involved in primary health care activities. It is needed by those inside and outside of government involved in settlement improvement. And it is needed in order to develop an effective and coordinated strategy for the numerous actors involved.

### **Three Techniques to Improve Understanding**

This report describes and evaluates three research methods applicable to the environmental problems facing households and communities: a) broad spectrum household surveys; b) participatory rapid assessment; and c) contingent valuation. All the methods discussed are action-oriented, and rely on interviews, discussion and simple observations, rather than sophisticated physical tests. The three approaches tend to be associated with the advocacy of, respectively: a) government intervention; b) grass roots activities; and c) private sector service delivery. The approach taken in this report is that each technique has its own advantages and uses depending on the situation.

These techniques are only part of a process of understanding neighborhood environmental issues. The most important means of exchanging information are through the schooling system, the media, informal connections, and the daily work of local residents, activists and government officials. Yet there is often a need for more formalized procedures of gathering information on local environmental conditions and priorities. Thus, the objectives of the report are to: introduce the reader to the techniques; provide overviews that are sufficiently detailed to indicate whether the technique is likely to be appropriate; and point in the direction of practical materials such as textbooks and handbooks.

For each technique, there is an application in Jakarta undertaken as part of the preparation for this report. Rather than attempting to find a situation where all three techniques could be applied and compared directly, three different situations were selected so that the relative strengths of each technique could be illustrated effectively. The strengths of each technique are so different that any comparable application would inevitably favor one of the three. Moreover, it was judged that the applications should not be hypothetical, but each should serve a practical purpose. Thus each application was developed to meet the research needs of the report and the needs of a local client: the broad spectrum survey was used to assist the neighborhood upgrading agency with implementation; the participatory rapid assessment was used by a local NGO to prepare a neighborhood-level program; and contingent valuation was used to assist the water utility in planning service expansion. Given the emphasis on practical application, these case studies are not ideal models but rather illustrative examples. Similarly, there are no direct comparisons of the quantitative results emerging from the different techniques.

## How to Use the Report

The report is deliberately a mixture of practical, technical and theoretical information. For **practitioners** who are potentially interested in using one or more of the techniques, particular attention should be paid to the annotated bibliographies at the ends of chapters 3-5 for information on manuals and guidebooks, as well as Sections 3.1 and 3.4 (on surveys), 4.1 and 4.4 (on participatory appraisal), 5.1 and 5.4 (on contingent valuation) chapter 6 (comparing the techniques), and Annexes 2-3 which contain sample instruments for the survey techniques. For **planners and analysts** interested in understanding the nature of the problems, the theoretical context, and strengths and weaknesses, the following sections are most helpful: Chapter 2, sections 3.2-3.3, sections 4.2-4.3, sections 5.2-5.3, Chapter 6, and Annex 1.

## Findings

Each of the techniques can provide important and often complementary insights. A broad spectrum survey can be an invaluable means of monitoring local environmental conditions and providing a benchmark against which to measure planned improvements. Participatory appraisal can help identify obstacles to environmental improvement and establish the basis for active participation in environmental management. Contingent valuation can provide critical insights into the pricing of environmental services and the economic value of an improvement. The table below compares the instrumental strengths of the three techniques.

### *Comparing instrumental strengths of the three techniques*

	<b>Broad spectrum Sample survey</b>	<b>Participatory appraisal</b>	<b>Contingent valuation survey</b>
<b>Monitoring changing conditions</b>	<b>very useful</b>	less useful	NA
<b>Providing data base for centralized planning</b>	<b>very useful</b>	less useful	less useful
<b>Identifying obstacles to environmental improvement</b>	useful	<b>very useful</b>	useful
<b>Establishing basis for active participation</b>	less useful	<b>very useful</b>	less useful
<b>Conducting economic evaluation of an improvement</b>	less useful	useful	<b>very useful</b>
<b>Pricing environmental services</b>	less useful	less useful	<b>very useful</b>

**Broad spectrum surveys** are most effective for monitoring changing conditions across an urban area or set of areas. Participatory appraisal is constrained by the difficulties of organizing the exercises across a wide area as well as the difficulty of combining information from different appraisals. Contingent valuation does not really examine conditions and is not suited for more than one or two carefully designed problems. For somewhat similar reasons, the broad spectrum survey is best suited for providing databases for planning purposes.

**Participatory appraisal** is most appropriate for establishing a basis for local participation in environmental management. Both of the other techniques generally extract information only for use by others and not by the respondents themselves. Participation is also best at identifying obstacles to environmental improvement, especially for outsiders not familiar with local conditions. Both of the other approaches can be used to evaluate obstacles but usually only if

they have already been identified. PRA is more open to new perspectives and insights into why environmental problems arise and persist.

**Contingent valuation** provides information that can be compared directly with costs in an economic evaluation of a particular environmental improvement. The other techniques can only be used indirectly to assess economic costs and benefits. Similarly, contingent valuation provides information directly relevant to developing or evaluating a pricing policy for a specific service. These features make it more appropriate to use when there are one or two clearly defined improvements being considered.

Each technique does not have to be used to the exclusion of the others; they can be applied in parallel or sequentially (or in some circumstances in combination). For example, assume that a government or NGO is preparing a local environmental management program. Information on existing conditions is generally lacking. After contacting a number of community organizations, they agree to conduct PRAs in three neighborhoods selected to reflect different conditions in disadvantaged settlements. After the initial PRAs, a broad spectrum survey of 1000 households is designed, based, in part, on results of the PRA. This provides baseline data for the program, is used in an assessment of how representative the different PRA neighborhoods are, and provides critical inputs to a stakeholder meeting held the following year. Water emerges as a key local issue so a contingent valuation survey is undertaken, revealing that residents are willing to pay the cost of piped water. And the story continues, a little optimistically perhaps.

Ultimately, proposals to undertake assessments based on one of these techniques must be judged on their merits. In general terms, it is possible to describe some of the possible uses to which a technique can be put, to identify potential pitfalls commonly encountered, and to discuss relative strengths and weaknesses. In the end, though, there is no substitute for sound judgement, good practice and the active support of good governance, whichever technique is being considered.

## **1. AN OVERVIEW OF ENVIRONMENTAL PROBLEMS IN DISADVANTAGED NEIGHBORHOODS**

For many reasons, poor homes and neighborhoods tend to be environmentally degraded and unhealthy. Often some of the worst environmental problems are specific to the locality. It is poor neighborhoods that will tend to be located in the vicinity of polluting industries, be particularly susceptible to floods, or be located on unstable slopes. This chapter is more concerned with endemic problems which, while their severity may vary greatly, are present to some degree in most low-income neighborhoods where public services are restricted. Water is often difficult to get or of poor quality. Sanitation is often inadequate and drainage poor. People often use smoky fuels, polluting the indoor and sometimes neighborhood air. Waste often accumulates in marginal areas. Pest infestation is common. Food is at risk from microbial contamination.<sup>1</sup>

These problems are typically interrelated. One of the functions of modern environmental services is to sever potentially hazardous environmental interconnections in and around the home. Clean water is piped into homes, and waste water is piped out. Feces are immediately sealed off from air and insects, and flushed away with the waste water. Solid waste is bagged, placed in closed containers, and then carted away. Wires carry electricity into every room, where it can be cleanly converted into heat, light or mechanical drive. Utilities and municipalities are left to manage the potentially polluting energy conversions, and the disposal of large quantities of liquid and solid waste, but the residential environmental health hazards are greatly reduced.

In poor urban neighborhoods without utility-provided environmental services, it can be hard to even distinguish between different problems areas. Bad sanitation may lead to contaminated groundwater, and feces finding its way into the solid waste, onto the open land, into the drainage ditches, and generally into contact with other people. Flies may breed in the human and solid waste, and contaminate the food. Solid waste may find its way into the drains, causing accumulations of water where mosquitoes breed. Microbial food contamination makes thorough cooking important, but cooking with smoky fuels may expose women and children to hazardous pollutants. The mosquito coils and pesticides used to combat mosquitoes may add to the air pollution and chemical hazards.

In addition to threatening health, these problems can lead to severe inconvenience and additional social and economic hardship. Carrying water long distances is extremely burdensome, and in areas of scarcity water from private vendors can be very expensive. Waiting in lines for public toilets, or having to go out at night, can be very inconvenient, time consuming and sometimes embarrassing. Pests are a nuisance, and may destroy food. In all of these areas, the manner in which these problems impinge on residents' day-to-day life may matter as much to them as any threat to health.

---

<sup>1</sup> Parts of this Chapter were originally prepared by one of the authors for the *World Resources Report - 1996-97* (World Resources Institute, 1996).

While the following discussion examines different environmental topics in turn and emphasizes their health aspects, in considering what needs to be done it is important to recognize the broader context within which solutions must emerge. All too often one environmental problem is treated at the expense of another, or environmental improvements are sought with too little regard for the priorities of those whom the improvements are meant to help.

### **1.1 Water and Sanitation**

Various diarrheal and other diseases are spread via fecal-oral routes, and these routes are far more heavily traveled where water supplies and sanitary conditions are inadequate. Water can carry many fecal-oral diseases, but is also a critical tool in maintaining good hygiene. Washing, even with water that might be better not to drink, can help curb fecal-oral diseases, as well as a variety of other health problems ranging from scabies to louse-borne typhus. Better sanitation can lead to less contact with fecal material at defecation sites, and less indirect exposure via water, insects, food or human carriers. Given the importance of diarrhea, it seems fair to say that human feces remains the world's most hazardous pollutant, and that related water and sanitation inadequacies still constitute one of the world's most serious environmental health problems. Water can also carry harmful chemicals, such as lead, though the relative health burden of chemical water contamination is small.

There is still a tendency to associate fecal-oral diseases with contaminated public water supplies, despite considerable evidence that in most poor urban centers other water, sanitation and hygiene problems are more important to their transmission. This tendency to overemphasize water quality may reflect the critical role inadequate urban water treatment facilities played in some of the more memorable cholera and typhoid epidemics in European history (Cairncross and Feachem, 1993). It may be reinforced by the common term "water-borne diseases," which avoids potentially impolite references to feces, at the risk of reinforcing the notion that diseases which **can be** transmitted by water **are being** transmitted by water. But it should also be kept in mind that in a poor city, contaminated public water supplies may be the principal water and sanitation problem for wealthy and articulate minority, even if, for example, shared latrines and distant water supplies dominate the water and sanitation problems of the majority. As with most other health policy issues internationally, choosing water and sanitation priorities is not a politically neutral process dominated by concerns for overall public health, but reflects whose concerns are taken more seriously.

While many aspects of the transmission of fecal-oral diseases are well known, even within a given neighborhood it is usually difficult to identify the most important routes. Pathogens have a number of features (e.g. infective dose, latency, ability to persist or multiply outside a human host) which help determine which routes they will favor (Kalbermatten et al., 1982). However, in many poor urban neighborhoods in low income countries, the disease burden is so varied, and the water and sanitation related health hazards so numerous and interconnected, that it is futile to try to rank different environment-health links in a rigorous fashion. Indeed, the boundaries between water, sanitation, food contamination, insects, and solid waste problems are blurred. Overall, the category "water and sanitation" is not a coherent category of environmental health problem but helps focus attention on two important technical interventions: providing new

facilities for water supply and sanitation. There is general agreement that water and sanitation improvement, to be effective, must be accompanied by changes in hygiene behavior, drainage, and a variety of other factors. However, for better or worse, investment in improved technology still lies at the heart of many improvement efforts.

Taken together, epidemiological studies demonstrate that water and sanitation improvements reduce diarrhea morbidity substantially (the median improvement found in a recent review of 49 studies was 22% (Esrey et al., 1990). They also tend to support the notion that water quality improvements are less critical to curbing diarrhea than water supply and sanitation (Esrey et al., 1985; Esrey and Habicht, 1986; Esrey and others, 1990). Difficulties and complex interconnections are characteristic of the epidemiology of water and sanitation, however. At times the failures to find associations between water, sanitation and health have been revealing. In some studies where no beneficial effects from improved sanitation were detected, children, whose feces tends to be more of a health risk, were not using the facilities (Cairncross and Feachem, 1993). In other cases, the differences were between children living in households within the same neighborhood, whose risk of contracting diarrhea probably depend more on the overall conditions of the neighborhood than their individual household situations (Pickering, 1985).

For the poor in low income cities, water and sanitary facilities tend to be characterized by both inadequacy and diversity. Households without indoor piping often have to obtain their water from a number of sources such as overcrowded or distant communal standpipes, expensive private water vendors, or heavily polluted wells or open waterways. Households without flush toilets, may end up using one of a wide range of alternatives, including pit latrines, pan latrines located over ponds, streams, drains or open sewers. Technical improvements are undoubtedly possible, and there has been some success with relatively simple but more hygienic latrines (Franceys et al., 1992). However, overcrowding, combined with poor maintenance, can and often does defeat design improvements. Even among private latrines, there is evidence that sharing increases sanitation problems (Surjadi et al., 1994). Public latrines are very difficult to manage, and when overused can become public health hazards, less hygienic for the user than open defecation.

In addition to public health improvement, good water and sanitation also have economic and social benefits. Collecting even 30 litres of water a day can be an onerous task, and distant or malodorous toilets are worse than inconvenient. Personal and household cleanliness are important in their own right: contrary to some stereotyping, the economically disadvantaged dislike being dirty, and they can suffer socially as well as physically. It is not just for health reasons that good access to clean water and sanitation is often found to be a priority among shanty-town dwellers.

## **1.2 Food Contamination**

Food, like water, can transmit infectious diseases and harmful chemicals. Infectious bacteria can multiply in food, and some of the bacteria and fungi which grow on food produce toxins. For viruses, protozoa and helminths, food acts primarily as a carrier. Like water and sanitation, the



major health burden arising from food contamination is almost certainly its contribution to the diarrheas and dysenteries that figure so highly in the morbidity and mortality of children in the low income countries. However, the extent to which food contamination is involved in the spread of these diseases is poorly understood. Most fecal-oral diseases can be borne by food, but monitoring exposure to contaminated food is far more difficult than for water, and there are no clearly identifiable food practices or facilities through which one could expect to capture a major part of the variation in food quality. Epidemiological studies give little indication of the relative importance of food contamination, and one of the few attempts to estimate indirectly the share of diarrheas involving food contamination gave a strikingly wide range: 15 to 70 per cent (Esrey and Feachem, 1989).

Microbial food contamination is undoubtedly a more severe health problem in poor countries than in wealthy countries, though some foodborne infections and toxins, such as salmonellosis and staphylococcal enterotoxigenesis, may be more common in wealthier countries. Food contamination can occur within the home. Food handling and storage practices are critical, and the dangers of contamination are greater given inadequate water and sanitation. Washing hands before food preparation and avoiding contact between food and flies are two obvious examples of preventive measures in the home. They are also practices that are easier that are easier, though less important, in homes with good water and sanitation facilities.

The rural-urban difference in food contamination problems is also greater in low income countries. In rural areas where subsistence agriculture is practiced, the delay between food production and consumption evolves from the need to store food seasonally, and food handling is largely under the control of the consumer. In urban areas there is also a delay stemming from the need to transport, process and market food before it is obtained by the consumer. More important, in urban areas the food handling which takes place before the food is purchased is difficult for the consumer to monitor.

In wealthy countries, complex regulations and inspection procedures are instituted to help control food handling practices. In poor countries such regulations are too costly to enforce, and people's food priorities are so diverse it would in any case be difficult to design appropriate standards. Informal means of avoiding bad food provide an important alternative to regulation: for example, the economic lure of future sales and the psychology of personal contact can induce a vendor to avoid selling contaminated food to regular customers. However, such informal mechanisms are generally less effective in an urban context (McGranahan, 1991). Finally, urban consumption patterns can create food contamination problems. In a study of Monrovia (Molbak et al., 1989), it was found that most urban (slum) households stored food, and 63% of the stored food samples were contaminated with enterobacteria (83% for baby foods). On the other hand, rural households were less inclined to store cooked food, and only 39% of their food samples were contaminated.

Instituting improvements in food safety in low income countries is complicated by the very diverse requirements of the population. In many poor countries there is little point in mandating that lists of chemical additives or "sell by" dates accompany retailed food: foods are rarely packaged appropriately, the costs would be considerable, the information would be largely incomprehensible, and the retailing system is too decentralized to enforce such a system. The

importance of informal food distribution also means that centralized food inspection is of limited relevance. In any case, severe malnutrition among the poor dictates against prohibitions which sacrifice food supply to long term or uncertain health advantages. Measures which help prevent food spoilage are likely to be far more acceptable than measure which attempt to stop spoiled food from being sold.

Food spoilage can be an economic burden, and an inconvenience, as well as a potential health risk. There is no evidence (to the knowledge of the authors), for example, that introducing refrigerators provides direct health benefits, though it is clearly desired by many consumers because it allows foods to be kept longer, and allows for more flexible shopping patterns.

### ***1.3 Air Pollution from Domestic Sources***

For much of this century, air pollution has been identified with urban smog, or smoke spewing forth from factory chimneys. In wealthy countries these images can seem out-dated amid discussions of invisible pollutants. However, it is smoky household fires in low income countries that probably constitute the largest air pollution-related health hazard, with women and children the principal victims.

There are three major health risks which have been associated with the domestic use of polluting fuels (Chen et al., 1990). First, by irritating the respiratory passages, and perhaps through other means, pollution from domestic fuels may facilitate the spread of acute respiratory infection, a major killer of children in low income countries. Second, exposure may contribute to chronic obstructive lung disease, a significant health problem among adult women. Third, long term exposure is a risk factor in cancer. Studies of personal exposure and indoor air pollution levels indicate that, while there is considerable variation, many users of "smoky" fuels are exposed to disturbingly high levels of particulates and other pollutants (Smith, 1993). Epidemiological evidence is slowly accumulating, and seems likely to confirm that domestic fires can contribute significantly to all three of these health problems.

As with water and sanitation, the extent of ill health actually caused by exposure to domestic smoke is difficult to assess. Cancer and chronic respiratory problems are likely to be the consequence of long term or past exposure, which is hard to assess. There are many other risk factors for respiratory infection, and they tend to be interrelated: crowding, poor ventilation, malnutrition, poor sanitation, lack of immunization (Berman, 1991; Graham, 1990). Also, there are other sources of domestic air pollution which may relate to respiratory illness, such as mosquito coils, waste burning and smoking. Generally, the women and children who are more exposed to air pollution from domestic fires are also likely to be more exposed to other environmental hazards which could also account for ill health.

Household fuel choice in low income countries is often described as an energy ladder, with fuels such as crop residues and firewood at the bottom, followed by charcoal, kerosene, LPG and finally electricity (Smith et al., 1994). Generally, the higher up the ladder, the less polluting the fuel. Since the less polluting fuels are also cleaner and more convenient, they are usually favored by wealthy households who can afford to switch. Through fuel switching, wealthy

households can receive a far higher level of energy services, with far less exposure to pollution. There is also a rural-urban dimension to the ladder, with crop residues and firewood being more rural fuels.

While wood is less common in cities, charcoal and coal are characteristic urban household fuels in many countries. Charcoal is commonly used by poor and even middle class households in Africa and a lesser extent Asia and Latin America. With regard to respirable particulates, which probably represent the major health risk, it is considerably less polluting than wood, though carbon monoxide exposure may be higher (Ellegård and Egnéus, 1992). Coal emissions are heavily dependent of the type of coal, but can be relatively high for both particulates and carbon monoxide (Terblanche et al., 1993b). Studies of coal use in China have produced some of the most convincing evidence of a link between domestic fuel use and cancer (Smith and Liu, 1993). Indeed coal occupies a somewhat ambiguous place on the energy ladder, sometimes being viewed as a step up from charcoal, even though the health risks can be greater.

Table 1-1 provides rough estimates of average particulate concentrations in 8 major human micro-environments. The highest concentrations are in rural indoor environments. However, as indicated above, concentrations in the homes of the urban poor, especially those in small towns, are likely to be higher than urban averages.

**Table 1-1 Estimates of Average Annual Particulate Air Pollution in Eight Major Microenvironments**

	Micrograms of Pollutant per Cubic Meter	
	Outdoor	Indoor
<b>Developed countries</b>		
Urban <sup>a</sup>	75	100
Rural <sup>b</sup>	25	75
<b>Developing countries</b>		
Urban <sup>c</sup>	200	250
Rural <sup>d</sup>	50	300

*Notes:*

<sup>a</sup> Based on World Health Organization (WHO) recommended outdoor levels. The estimate for indoor air is modified for environmental tobacco smoke.

<sup>b</sup> Based on clean outdoor air, the figures are modified by wood stove emissions. The estimate for indoor air is also modified for environmental tobacco smoke.

<sup>c</sup> The figures are based on data from WHO and the United Nations Environment Programme (UNEP). "Global Pollution and Health": Results on Health-related Environmental Monitoring" (London: WHO, 1987) and interpretations presented in WHO and UNEP, "Assessment of Urban Air Quality Worldwide." Draft, PEP/88.2 (Geneva: WHO, 1988), and modified by some solid-fuel cookstove emissions. The estimate for indoor air is also modified by environmental tobacco smoke.

<sup>d</sup> The estimate for outdoor air is based on clean outdoor air modified by solid-fuel cookstove emissions. The estimate for indoor air based on typical daily averages determined from studies listed in source.

*Source:* Smith, Kirk R. 1988. Assessing Total Exposure in the Developing Countries. *Environment*

Poor households living in crowded conditions can create specifically urban problems. A large number of domestic users of smoky fuels can create a neighborhood air pollution problem, and even contribute to city wide problems (domestic coal use was responsible for London smog). Comparisons of particulate exposure of children in South Africa indicate that whether the neighborhood is electrified, and perhaps even whether the school is located in an electrified neighborhood, can make a significant difference (Terblanche et al., 1993a). This implies that, like water and sanitation, in urban areas exposure to pollution from domestic fires is not something households can easily protect themselves from individually.

Many other factors contribute to the international and local variation in fuel use and exposure. The quantity of fuel a household uses, as well as the relationship between emissions and personal exposure, depend very much on the climate, and whether the fire is being used for space heating. In a cold climate, measures designed to keep heat in the house are likely to keep the air pollution in as well. In Northern Europe, indoor pollution increased with the price of oil in the 1970s as households improved insulation at the cost of poor ventilation. The health implications of this indoor pollution caused considerable alarm, and now overly "tight" houses are viewed with suspicion by many house buyers. Poor households using wood fuels or coal in a cold climate face a far less attractive trade-off. In Nepal, many poor households use large quantities of wood fuels in very poorly ventilated fires, leading to extremely high levels of indoor air pollution. On the other hand, in warmer climates, including much of urban Africa, low income households that cook with wood have their fires outdoors when it is not raining.

In the long run, fuel switching is the obvious means of reducing exposure in poor neighborhoods. However, subsidies on clean fuels tend to benefit primarily the households who already use them, and the costs of gas and electric appliances are often sufficient to prevent poor households from switching even when the clean fuel is cheaper (McGranahan and Kaijser, 1993). Moreover, there are many other less costly measures which could also lower exposure from cigarettes, and mount an anti-smoke campaign against both. In many poor neighborhoods, smoke from domestic fires may well be a more significant health problem than cigarette smoking, and it may be tempting to devise a combined "anti-smoke" campaign. However, three differences should be kept in mind. First, cooking is critical to survival, and not all households can afford clean fuels. Second, while those most exposed are usually women and children, those who decide what cooking device to purchase will often be men. Third, people generally dislike smoke from cooking fires. This makes it all the more important that efforts to inform people of the risks of smoke exposure take an educational approach, and not, for example, simply scold women who use smoky fuels.

#### **1.4 Pests**

Rats, fleas and the plague firmly established pests in the annals of urban environmental health. Even today, a minor outbreak of plague can quickly reach the international headlines, as illustrated by the reporting on Surat in 1994. However, for urbanites in affluent countries, vector borne diseases are no longer a major concern, though the inconvenience may persist.

Even in urban areas in low income countries, mosquitoes and flies are far more important to health than rats or fleas. Neither mosquitoes nor flies are particularly urban. Indeed, there are a far greater variety of habitats and species in rural areas, and the opportunities for controlling these insect vectors are generally greater in urban areas. However, there are mosquitoes and flies which have adapted well to particular urban habits, and find themselves relatively free of competition (Lines et al., 1994). Some are disease vectors,

Mosquitoes breed in standing water. Water in towns tends to be either polluted or in containers, rendering it a less suitable breeding site for most mosquito species. Pollution has helped to virtually eliminate malaria in cities like Jakarta, once renowned for its high malaria prevalence. As species adapt and migrate, however, the urban advantage can be lost.

The *Aedes* mosquitoes which carry dengue, an increasingly important disease in urban Latin America and Southeast Asia, breed in small containers, such as empty cans and water drums. In India, the malaria vector *Anopheles stephensi* breeds in overhead water storage tanks and has become a significant urban mosquito. In African cities, the most important breeding sites are a by-product of urban cultivation, though there is some evidence of increased breeding in household water containers (Chinery, 1990).

Just as urban mosquito problems are intimately linked to water, urban fly problems are linked to waste. Various families of flies have adapted to the opportunities of urban ecology. The most obvious health risk is that they provide possible short-cuts on fecal-oral routes. The house fly,

along with several other species, is a filth feeder and breeder. Given poor sanitation, some flies are likely to be in contact with human feces and later land on human food, drink or skin. Open, uncollected piles of garbage increase the fly populations. Open food preparation areas, and especially food stored in the open, provide opportunities for flies to land on food. Particularly where the risks are already high, flies are likely to increase the prevalence of the diarrheas and dysenteries often associated with bad water and sanitation (Levine and Levine, 1991).

There are also a number of other diseases more closely linked to the pests that help to spread them, several of which are significant in urban areas. Chagas' disease is carried by triatomine bugs, leishmaniasis by sandflies, schistosomiasis by snails, scabies by mites, and yaws by face flies. Globally, these diseases are less important urban health problems than the diseases spread by mosquitoes, and probably less appreciable than the contribution flies make to the spread of fecal oral diseases. Locally, however, they can be critical. All are intimately linked to housing or the neighboring environment (Schofield et al., 1990; World Health Organization Expert Committee on Vector Biology and Control, 1988).

Some of the measures taken to control insects and other pests create their own environmental health problems. Mosquito coils, and other substances burned to repel insects, cause air pollution. Indoor spraying with aerosols and pump sprays exposes residents to potentially damaging pesticides. The health risks of using such measures can outweigh their sometimes minimal effect on the spread of vector borne disease. Also, mosquitoes and other disease vectors are developing resistance to insecticides, including those applied in many government programs. These and other reasons indicate the importance of controlling breeding sites, a form of environmental management which should be far easier in urban than rural areas.

Most people in affected areas know that mosquitoes breed in standing water and that flies often breed in waste. However, eliminating breeding sites is not a feasible means for an urban dweller to protect him or her self. The majority of flies and mosquitoes any individual encounters are likely to come from a breeding site beyond their own residential plot. Effective measures require a collective response, or some sort of centralized involvement. In the case of mosquitoes, even community organized efforts will tend to focus on the most conspicuous sites, which are not always the most important (Stephens et al., 1995). On the other hand, centrally managed programs which treat the concerns of local residents as obstacles to overcome, can be less successful. As with water and sanitation, the institutional question is not where on the public-private spectrum the solution lies, but how to combine private and public interests and responsibilities.

## **1.5 *Solid Waste***

Most domestic solid waste is not a direct threat to health, but local accumulations can quickly become unpleasant, a nuisance and eventually an obstacle. Compared to industrial waste, it contains few hazardous chemicals. However, fecal matter is often mixed with domestic waste, especially where disposable diapers are used or sanitary facilities are very scarce. If kept in closed containers and removed regularly, the health risks and unpleasantness to local residents are minimal. Even within and around the home, the more serious solid waste problems involve

inadequate disposal, and accumulations of waste which attract pests, block the drains, or otherwise degrade the local environment. These problems tend to be more severe in urban than in rural areas, and in poorer than in wealthier neighborhoods. The two groups most directly exposed to solid waste are children and waste pickers.

Both the quantity and composition of waste varies with wealth. Not surprisingly, wealthy households tend to produce more waste, and much of the additional waste is non-compostable materials such as paper, glass, metal and plastics (Cointreau, 1986). It is in low income cities, however, that problems removing waste from residential areas are most severe. Door-to-door waste collection is too expensive for many households or municipalities to afford, and in any case the streets of many poor neighborhoods are too narrow for vehicles. Collection points can easily become small garbage dumps, especially when collection is intermittent. In many poor countries, public budgets have been under great pressure in recent years and waste collection is often among the services to suffer most (Stern and White, 1989). Solid waste often creates one of the most visible environmental problems in low income communities.

Accumulations of decaying waste provide a breeding ground for flies and other insects, whose possible role in spreading fecal-oral diseases was described above. *Aedes* mosquitoes, the vectors of dengue fever, can breed in rainwater collecting in empty containers. Rats can feed on the refuse. And in tropical cities, when the rains come, the waste can block the drains leading to flooding and accumulations of water where other mosquitoes can breed.

The most obvious approach to solid waste problems in poor neighborhoods is improving collection, but simply replicating the services provided in wealthy areas is often unaffordable and inappropriate. Utilities servicing wealthy urban neighborhoods can deal directly with households, provide a standard service, charge a standard fee, and control the collection and disposal processes. In poor neighborhoods in low income cities, the collection sites are often communal, creating a very different set of physical and social problems. Informal waste recovery is often important in low income cities, particularly in Asia (Furedy, 1990). Successful waste collection procedures in poor communities must take the various waste pickers and traders into account, deal with communities as well as households, cope with their very diverse needs and priorities, and, most important, avoid being financially burdensome.

## ***1.6 Other Household and Neighborhood Environmental Problems***

There are a number of environmental problems people encounter in and around their homes besides those described above. Some, such as ambient air pollution from non-domestic sources, are better classified as city-wide problems. Others, such as "sick buildings" radon exposure in the home, and low level exposure to various chemicals associated with consumer products, are environmental risks of concern to people relatively well protected from the more serious hazards described above. There are, however, a number of very serious local environmental problems which arise from inadequate housing itself, or from the location of low income neighborhoods. While perhaps too varied to generalize about, it is important not to neglect them in practice.

One of the roles of housing is to protect inhabitants from natural environmental hazards, such as rain and excessive heat or cold. At times, inadequate housing not only fails to fulfill this role, but creates new environmental problems through excessive crowding, indoor damp, and concentrations of unventilated pollutants. Such problems can be greatly exacerbated when, as is common in many low income settlements, the home is also a commercial work place. Women are often forced to combine child care with informal sector activities in the home, ranging from commercial cooking to cottage industries. The risks depend upon the nature of the activity, and remain poorly documented. It is likely, however, that there are locations where the juxtaposition of small scale industry and housing create extremely hazardous conditions.

Many environmental problems also arise because low-income residential areas are situated in unsuitable areas. Inexpensive land is often inexpensive for good reasons, some relating to environmental conditions. Alternatively, the location of many disadvantaged settlements is determined not through planning or market forces, but through a lack of planning or market forces. People settle where there are no well articulated plans or ownership patterns. Such land may be located on steep, unstable slopes or in flood prone areas. Moreover, polluting industries are less likely to encounter resistance from already disadvantaged residents.



### ***References for Chapter 1***

- Berman, S. 1991. Epidemiology of acute respiratory infections in children of developing countries. *Reviews of Infectious Diseases*. 13 (Suppl. 6):455-462.
- Cairncross, S. and Feachem, R.G. 1993. *Environmental Health Engineering in the Tropics: An Introductory Text*. Chichester, John Wiley & Sons. 306p.
- Chen, B.H., Hong, C.J., Pandey, M.R. and Smith, K.R. 1990. Indoor air pollution in developing countries. *World Health Statistics Quarterly*. 43:127-138.
- Chinery, W.A. 1990. Variation in frequency in breeding of anopheles gambiae s.l. and its relationship with in-door adult mosquito density in various localities in Accra, Ghana. *East African Medical Journal*. 67(5):328-335.
- Cointreau, S.J. 1986. *Environmental Management of Urban Solid Wastes in Developing Countries: A Project Guide*. World Bank (Washington D.C.)
- Ellegård, A. and Egnéus, H. 1992. *Health Effects of Charcoal and Woodfuel Use in Low-Income Households in Lusaka, Zambia*. EED Report no. 14. Stockholm Environment Institute (Stockholm).
- Esrey, S.A. and Feachem, R.G. 1989. *Interventions for the Control of Diarrhoeal Diseases among Young Children: Promotion of Food Hygiene*. WHO/CDD no. 89.30. World Health Organization (Geneva).
- Esrey, S.A., Feachem, R.G. and Hughes, J.M. 1985. Interventions for the control of diarrhoeal diseases among young children: Improving water supplies and excreta disposal facilities. *Bulletin of the World Health Organization*. 63(4): 757-772.
- Esrey, S.A. and Habicht, J.-P. 1986. Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiologic Reviews*. 8:117-128
- Esrey, S.A., Potash, J.B., Roberts, L. and Schiff, C. 1990. *Health Benefits from Improvements in Water Supply and Sanitation: Survey and Analysis of the Literature on Selected Diseases*. Technical Report no. 66. Water and Sanitation for Health Project (Arlington, Va.).
- Franceys, R., Pickford, J. and Reed, R. 1992. *A Guide to the Development of On-Site Sanitation*. Geneva, World Health Organization. 237p.
- Furedy, C. 1990. Social aspects of solid waste recovery in Asian cities. *Environmental Sanitation Reviews*. (30):2-52.
- Graham, N.M.H. 1990. The epidemiology of acute respiratory infections in children and

- adults: A global perspective. *Epidemiologic Reviews*. 12:149-178.
- Kalbermatten, J.M., Julius, D.S., Gunnerson, C.G. and Mara, D.D. 1982. *Appropriate Sanitation Alternatives: A Planning and Design Manual*. McEuen J., (ed.). Baltimore, Johns Hopkins University Press. 160p.
- Levine, O.S. and Levine, M.M. 1991. Houseflies (*Musca domestica*) as mechanical vectors of shigellosis. *Reviews of Infectious Diseases*. 13 (July-August):688-696.
- Lines, J., Harpham, T., Leake, C. and Schofield, C. 1994. Trends, priorities and policy directions in the control of vector-borne diseases in urban environments. *Health Policy and Planning*. 9(2):113-129.
- McGranahan, G. 1991. *Environmental Problems and the Urban Household in Third World Countries*. Report. Stockholm Environment Institute (Stockholm).
- McGranahan, G. and Kaijser, A. 1993. *Household Energy: Problems, Policies and Prospects*. EED Report no. 19. Stockholm Environment Institute (Stockholm).
- Molbak, K., Hojlyng, N., Jepsen, S. and Gaarslev, K. 1989. Bacterial contamination of stored water and stored food: A potential source of diarrhoeal disease in West Africa. *Epidemiology and Infection*. 102:309-316.
- Pickering, H. 1985. Social and environmental factors associated with diarrhoea and growth in young children: Child health in urban Africa. *Social Science and Medicine*. 21(2):121-127.
- Schofield, C.J., Briceno-Leon, R., Kolstrup, N., Webb, D.J.T. and White, G.B. 1990. The role of house design in limiting vector-borne disease. In: Hardoy J.E., Cairncross S., Satterthwaite D., (eds.). *The Poor Die Young*. London, Earthscan Publications. P189-212.
- Smith, K.R. 1993. Fuel combustion, air pollution exposure, and health: The situation in developing countries. *Annual Review of Energy and the Environment*. (18):529-566.
- Smith, K.R., Apte, M.G., Yuqing, M., Wongsekiarttirat, W. and Kulkarni, A. 1994. Air pollution and the energy ladder in Asian cities. *Energy*. 19(5):587-600.
- Smith, K.R. and Liu, Y. 1993. Indoor air pollution in developing countries. In: Samet J., (ed.). *Epidemiology of Lung Cancer*. New York, Marcel Dekker. p151-184.
- Stephens, C., Masamu, E.T. et al. 1995. Knowledge of Mosquitoes in Relation to Public and Domestic Control Activities in Cities of Dar es Salaam and Tanga, Tanzania. *Bulletin of the World Health Organization* (73):97-104.

- Stren, R.E. and White, R.R. (eds.) 1989. *African Cities in Crisis: Managing Rapid Urban Growth*. Boulder, Colo., Westview Press. 335p.
- Surjadi, C., Padhmasutra, L., Wahyuningsih, D., McGranahan, G. Kjellén, M. 1994. *Household Environmental Problems in Jakarta*. Stockholm Environment Institute (Stockholm).
- Terblanche, A.P.S., Danford, I.R. and Nel, C.M.E. 1993a. Household energy use in South Africa, air pollution and human health. *Journal of Energy in Southern Africa*. (May): 54-57.
- Terblanche, A.P.S., Nel, C.M.E., Opperman, L. and Nyikos, H. 1993b. Exposure to air pollution from transitional household fuels in a South African population. *Journal of Exposure Analysis and Environment Epidemiology*. 3(Suppl. 1):15-22.
- World Health Organization Expert Committee on Vector Biology and Control. 1988. *Urban Vector and Pest Control*. Technical Report Series no. 767. World Health Organization (Geneva).
- World Resources Institute. 1986. *World Resources 1996-97*. New York, Oxford University Press. 365p.

## **2. BROAD SPECTRUM HOUSEHOLD SURVEYS**

### **2.1 *Background***

This section examines the use of sample surveys to collect, simultaneously, a broad spectrum of data on household and neighborhood environments and related health conditions in an urban area. The focus is on household surveys, relying on questionnaires administered by enumerators with little or no background in environment or health. Of the three approaches under consideration, this is very much the most conventional. It is the approach one would expect a government statistics office to adopt, for example, were it given the task of collecting information on household environmental conditions. On the other hand, improvements in information technology are radically changing the manner in which such information can be used. Coherent data sets, capable of being analyzed from a variety of perspectives, are beginning to displace pre-structured tabulations of statistics. Over time, this should greatly facilitate environmental analysis, for which inter-sectoral relationships are of central importance. It could also allow a far smaller number of high quality household surveys to provide a far richer source of information than the multitude of household surveys now conducted.

Three critical questions which need to be answered before implementing a household survey are:

- Is there an audience that can and will use the information targeted?
- Is there a less expensive way of gathering (or doing without) this information?
- Will the survey results really be able to deliver the information desired?

Most of this chapter attempts to sketch out and provide examples of the sort of information a survey can be expected to provide. The questions of audiences and alternative sources of information will be covered briefly in this introduction. Throughout, it should be kept in mind that the data obtained are not sequences of facts but answers to pre-formulated questions. This not only places serious constraints on what can realistically be expected of a household survey, but affects how the results can and cannot be interpreted.

While household surveys are now undertaken regularly in almost all countries, surveys focusing on a broad spectrum of environmental and related health conditions are comparatively rare. In part, this reflects the prevailing division of governmental responsibilities. Typically, a number of ministries or agencies are involved in activities intended to support some aspect of household environmental improvement, but no single ministry or policy body is responsible for developing an overall strategy. As such, interest in integrated household environment surveys is often too dispersed to create a spontaneous demand.

Even within the water and sanitation field, where close environmental and environment-health linkages have long been recognized, basic statistics are often unavailable or inappropriate to the health issues (Kolsky and Blumenthal, 1995). In part, this reflects inherent difficulties in ascertaining local environmental conditions: the situation varies radically from house to house and neighborhood to neighborhood; a great many environmental conditions are involved,

including many pertaining to intimate details of hygiene behavior; and the environment-health links remain poorly understood. In addition, much of the data that are routinely collected provide little insight into environmental health problems. For example, most measured qualities of water (e.g. Biochemical Oxygen Demand, suspended solids, nitrogen and phosphorous) are more relevant to the sustainability of aquatic ecosystems than the spread of disease.

In a recent study of three cities in Central America (Guatemala City, Tegucigalpa and El Salvador) an attempt was made to use existing data to compile a basic set of urban environmental health indicators relating to water and sanitation, that might be expected to exist despite the limitations noted above (Chudy, 1993; Rothe and Perez 1993). Only about a quarter of the data could be located, largely because the desired data either did not exist, had restricted access, were of doubtful quality, or were inappropriately structured. This was taken to reflect, at least in part, the extent to which policy implementation "is vertically operationalized but has no horizontal linkage" (Chudy, 1993, page viii). In other words, such information is not compiled because the decision-makers who could demand it are situated in sectoralized organizations and, since they are not responsible for the broader environmental consequences of their programs, are not interested in cross-sectoral information on environmental conditions.

In some countries and cities this is changing, however. The growing concern for environmental management generally has helped create opportunities for developing more coherent approaches to household environmental improvement. For many years, an important goal of environmental management has been the identification and "internalization" of private sector environmental externalities. It is becoming apparent that unmanaged intersectoral impacts can create the public sector equivalent of environmental externalities.<sup>2</sup> Household surveys can play a role in supporting efforts to reduce such public sector externalities. In areas where environmental health is a priority, the environmental aspects of long-standing health concerns are receiving renewed attention.

While the existence of a local audience is critical, the availability of routinely collected data relevant to environmental health concerns also depends on other features of a city, including its economic status, and the nature of its problems. In wealthier cities, where existing statistics are relatively comprehensive and fecal-oral diseases are not a major health problem, there may be considerable scope for using secondary source data (some of which, of course, typically relies on household surveys) (Stephens et al., 1995). In poorer cities, where existing statistics are patchy and fecal oral disease is critical, household surveys may provide a wide range of important and otherwise unavailable information (Songsore and Goldstein, 1995).

Policy makers are the obvious audience, but researchers, educators, and even the general public are potentially interested in information about household environmental problems. Attempting to inform policy makers alone can be a mistake. First, it is important to distinguish between central and local government. Local authorities often have responsibility for service delivery and should be vitally interested. It is often observed that many fact-filled reports gather dust in

---

<sup>2</sup> The Penguin Dictionary of Economics defines externalities as "Consequences for welfare or costs not fully accounted for in the price and market system." Thus, pollution is an externality when its costs are not born by the polluter. The public sector equivalent would arise, for example, if urban water system development did not take full account of the impacts of water provision on health, drainage and long term sustainability, because these are the concerns of other different public sector entities.

government offices. If, however, the findings are picked up by other groups, and stimulate debate and discussion, policy makers are likely to pay as much attention as anyone. Academic approval of the quality of the information typically does matter to government officials. Politicians in most countries are notoriously sensitive to the media. Educators and others also influence action through other means than policy. In short, even if the goal is better policy, the role of information must be understood in a broader context. For this purpose, it is worth considering the interests of a diverse set of audiences.

## ***2.2 Experiences Using Broad Spectrum Household Surveys to Evaluate Local Environmental Problems in Urban Settlements***

Historically, most surveys of household and neighborhood level environmental problems have focused on public health issues. Techniques employed in the 19<sup>th</sup> century, including Chadwick's famous assessment of environmental health conditions among the working class in Great Britain (Chadwick, 1965), actually bear more resemblance to "rapid urban appraisal" (see Chapter 3 below) than to sample surveys. Sample surveys did eventually come to play an important role in sanitary reform, however, and the largest share of recent sample surveys covering aspects of local environmental conditions have probably been conducted from the perspective of human health.<sup>3</sup> Indeed, from a health perspective, one of the advantages of household surveys is that they can be accompanied by observations of environmental conditions in and around the home.

Water and sanitation data were collected in many Demographic and Health Surveys, funded by USAID, which conducted nationally representative samples of women between the ages of 15 and 49 years, with sample sizes ranging from 3,000 to 10,000 (Bateman et al., 1993). These surveys have been analyzed by epidemiologists attempting to examine the relationships between health and water and sanitation (Bateman and others, 1993; Esrey, 1994; Stephens et al., 1994). The fact that these surveys were of considerable interest to epidemiologists studying environmental health, despite the very limited number of relevant questions actually asked, reflects the general paucity of data. While the findings were generally not definitive, the results certainly contributed to ongoing debates about, for example, the relative importance of water supply and sanitation to the health of small children. By including more environmental topics and fewer health questions, such surveys could converge towards the sort of broad spectrum environment and health survey envisaged in this chapter.

A number of more academic studies have collected a broad spectrum of environment and health data. A study of environmental determinants of acute respiratory symptoms and diarrhea in South Africa employed a single survey some 1,227 urban and peri-urban (colored) household, and identified a number of environmental variables which bore a statistically significant relationship to one or other these health problems. A very ambitious longitudinal survey of child health and survival in Metro Cebu, Philippines, using a somewhat different sample design, collected a wide range of information on environmental, health and socio-economic conditions, and has led to several pathbreaking papers examining links between the environment and health (Adair et al., 1993; VanDerslice and Briscoe, 1993). Generally however, for reasons outlined

---

<sup>3</sup> Health professionals were also some of the first to adapt recently developed rapid appraisal methods for community level environmental assessments. See for example United Nations Environment Programme and World Health Organization, 1987.

above, most epidemiological studies use different sample designs, and focus more narrowly on particular links which they want to assess, other factors being treated as potential "confounders".

Sample surveys of local environmental conditions have also been commonly employed in upgrading programs. Thus, for example, surveys designed for assessing household sanitation facilities, public water taps, communal sanitation surveys and surface drains, are provided in a World Bank publication entitled "Urban Sanitation Planning Manual Based on the Jakarta Case Study" (Zajac et al., 1984). With the growing emphasis on integrated environmental improvement, within for example the Kampung Improvement Program in Jakarta, broad spectrum surveys have become more important. The application of a broad spectrum survey described below in Section 3.4 is employed to compare two neighborhoods in Jakarta, one already upgraded and one prior to upgrading.

Well documented uses of broad spectrum surveys of local environmental conditions to assess overall conditions in an urban area are surprisingly rare, however. There is a comparatively large body of survey based research on particular topics such as water and sanitation, or on particular types of neighborhoods such as slums and squatter settlements. But few studies have attempted to conduct an integrated analysis of household environmental problems across different types of neighborhoods. One of the few examples of this sort of broad spectrum sample survey approach is provided by a recent study of Accra, Jakarta and São Paulo, coordinated by the Stockholm Environment Institute. Before turning to the small scale application in Jakarta, it is worth summarizing the results of this research project, and the extent to which the results are relevant to action.

The SEI study of household environmental problems in Accra, Jakarta and São Paulo was initiated in 1991.<sup>4</sup> The initial goal was threefold: to support environmental management efforts in each of the cities; to develop methods applicable to other cities; and to inform international discussions on urban environmental issues. In each city, the study covered water, sanitation, air pollution, solid waste disposal, food contamination, pests and crowding. Each major problem area was assessed not only in terms of the physical processes and severity, but also of the health risks involved, the priorities of local residents, and their opinions regarding what needed to be done. Surveys of approximately 1,000 representative households were to be undertaken in each city, along with physical tests of water (and in Accra air) quality in a subset of 200 households. These sample surveys provided the empirical bases of the study. A list of the topics covered by the household surveys is given in Table 2-1. The example survey instrument provided in Annex 2 was adapted from the surveys used in this study.

The surveys were designed to support:

- Household environment profiles, displaying environmental conditions both across different wealth levels and geographically.

---

<sup>4</sup> SEI collaborated with the following local research institutions in the design and execution of the study:  
Accra: Department of Geography, University of Ghana-Legon; Water Resources Research Institute.  
Jakarta: Urban Health Study Group, Atma Jaya University; KPPL Research Centre.  
São Paulo: CEDEC; Faculty of Public Health, University of São Paulo.

- Analysis of environment-health associations, with a focus on diarrhea and respiratory illness in children and respiratory problems in the principal female householders
- Assessments of the value people (the principal female householders in particular) attach to environmental improvement
- Analysis of the factors which contribute to environmental hazards, including physical (e.g. living in an area with salinated groundwater) or institutional (e.g. living in a squatter settlement) factors.

### **2.2.1 Comparing Conditions Across Cities**

One of the purported strengths of sample surveys is the comparability of their results, and one feature of the SEI three-city study was that a common core survey instrument was adapted to three very different cities. Nevertheless, the comparability of the results is quite restricted. Table 2-2 provides summary indicators for each problem area compared across the three cities. While a number of other variables could be presented, many of the relevant environmental problems and technologies are so different that quantitative comparisons become meaningless, especially among those households where the environmental health problems are potentially a very serious threat. In comparing Accra and Jakarta, survey based statistics have little to say about the relative merits of the pan latrines in Accra versus the helicopter toilets of Jakarta, the recycled pigfoot containers of Accra versus the "bak" water containers in Jakarta, the relative dangers of the pesticides used in the two cities, and so on. The number of indicators which can even be presented across three such diverse cities is itself small.



**Table 2-1 Topics Covered in Household Environment Surveys of Accra, Jakarta and São Paulo**

---

---

**Background Information**

Household size and age structure; Indicators of income/wealth; Gender of household head; Education (principal male & female); Migratory status (principal homemaker); Type and quality of residence; Size of residence and plot; Tenure of residence; Time householders spend at home.

**Water**

Type of water supply by use; Ease of access to drinking water supply; Water storage practices; Water filtration or boiling practices; Water supply disruptions; Valuation of improved water supply.

**Sanitation & Hygiene**

Type of toilet; Toilet sharing; Toilet use practices (e.g. use of toilets by children); Indications of unhygienic toilets; Hand cleansing practices of principal homemaker.

**Solid Waste**

Solid waste storage practices; Waste disposal practices; Waste picking and recycling; Valuation of improved waste collection service.

**Pests**

Presence of flies in kitchens and toilets; Mosquito biting; Animals kept; Rodent problems; Cockroach problems; Valuation of improved insect control.

**Housing Problems**

Crowding; Damp problems; Building materials.

**Air Pollution**

Fuels used for cooking and heating; Location of cooking place; Cooking practices; Pesticides use; Smoking practices; Valuation of improved ambient and indoor air quality.

**Food Contamination**

Food storage practices and facilities; Food preparation practices; Indications of poor food hygiene; Use of food vendors.

**Health**

Children's diarrhea problems; Children's respiratory problems; Principal homemaker's respiratory problems.

---

---

Despite only containing five simple indicators, Table 2-2 does illustrate the extent to which the proportion of households facing severe environmental problems varies across the cities. Individually, one could question the relevance and comparability of the indicators. For example, the indicator "flies observed in the food preparation area": 1) can have quite different implications in different cities; 2) can vary significantly within a given household with the time of day and the type of food being prepared; and 3) it is difficult to define in a meaningful way when the food is being prepared out-of-doors. Taken together, and backed up by more detailed statistics, the overall message is nevertheless clear: Household and neighborhood level problems are most extensive in Accra, followed by Jakarta and finally São Paulo.

***Tale 2-2 Household Environment Indicators in Accra, Jakarta and São Paulo: 1991/92***

<b>Environment Indicators</b>	<b>Accra</b> sample % (N= 1000)	<b>Jakarta</b> sample % (N = 1055)	<b>São Paulo</b> sample % (N = 1000)
<b>Water</b>			
No water source at residence	46	13	5
<b>Sanitation</b>			
Share toilets with > 10 households	48	14-20	<3
<b>Solid Waste</b>			
No home garbage collection	89	37	5
<b>Indoor air</b>			
Main cooking fuel wood or charcoal	76	2	0
<b>Pests</b>			
Flies observed in food preparation area	82	38	17

*Source:* McGranahan and Songsore. 1994

The first three indicators illustrate another important aspect to the changing profile of environmental problems the three cities face. As one moves from Accra to São Paulo, the proportion of households which must share environmental amenities or services with other households falls dramatically. Thus, the indicators not only suggest that conditions are likely to be worse in Accra, but that informal and formal institutions between the households and the utilities have a larger role to play in environmental management, since the utilities do not reach the individual households. As with the more narrow physical interpretation of the indicators, a more detailed look at the situation in each city can validate conclusions drawn from such indicators.

### **2.2.2. Comparing Conditions Within Cities**

Indicators can also be compared across different areas or social groups within a city. Table 2-3 presents the same indicators used in the city comparison for wealth quintiles in Accra.<sup>5</sup> The overall tendencies observed as one moves between the relatively low income Accra to the relatively wealthy São Paulo are also evident as one moves from poor to wealthy categories of households: Household environmental conditions improve, and there is less sharing of environmental services and amenities.

<sup>5</sup> The wealth quintiles were also derived from the survey results, and reflect primarily the ownership of consumer durables such as lamps, televisions, refrigerators and the like.

**Table 2-3 Household Environment Indicators by Wealth Quintiles in Accra, 1991/92**

Environment Indicators	Wealth Quintile					
	Poorest	-----				Wealthiest
	I	II	III	IV	V	ALL
	sample%	sample%	sample%	sample%	sample%	sample%
	(N=205)	(N=205)	(N=205)	(N=205)	(N=205)	(N=205)
<b>Water</b> - No water source at residence	81	63	49	27	11	46
<b>Sanitation</b> - Share toilets > 10 households	78	67	54	31	13	48
<b>Solid Waste</b> - No home garbage collection	97	96	91	88	74	89
<b>Indoor Air</b> - Main cooking fuel wood/charcoal	96	88	88	68	38	76
<b>Pests</b> - Flies observed in food prep. area	96	93	89	79	51	82

Source: Stockholm Environment Institute/University of Ghana Household Environment Survey, 1991

Within a city, it is possible to compare conditions in more detail. Table 2-4, for example, portrays some of the differences in water sources that exist among wealth classes in Accra. Vendors and communal taps are shown to be the principal sources of the poor, private standpipes are the most common source in the middle class, and in-house piping dominates among wealthy households. Similar tables could be constructed for other problem areas or for other aspects of water supply. The overall trends are rarely surprising to those already familiar with the problems, and indeed the transition in water sources is somewhat similar to the transition in sanitation, solid waste, cooking fuels and other problem areas (Benneh et al., 1993). Nevertheless, a solid base of statistics such as these can help convey the situation to those less familiar, and prevent outlandish views (such as that there is no significant reselling of water in Accra) from gaining ground. By and large such tables help set limits on policy debate rather than indicating what particular policies should be pursued. The importance of such limits should not be underestimated, however. Even local residents can develop extreme misperceptions of how people in other segments of their society live.

**Table 2-4 Principal Drinking Water Source (%) by Wealth Quintiles in Accra, 1991/92**

Water Source	Wealth Quintile					
	Poorest	-----				Wealthiest
	I	II	III	IV	V	ALL
	(N=205)	(N=187)	(N=210)	(N=200)	(N=198)	(N=1000)
<b>In-house piping</b>	6.3	17.1	26.2	49.0	77.8	35.2
<b>Private standpipe</b>	16.1	27.8	35.2	30.0	12.1	24.3
<b>Communal standpipe</b>	21.0	7.5	5.7	3.5	3.1	8.2
<b>Vendor</b>	49.3	41.2	28.6	14.5	6.6	28.0
<b>Other</b>	7.3	6.4	4.3	3.0	0.5	4.3
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: Stockholm Environmental Institute/University of Ghana Household Environment Survey, 1991.

### 2.2.3 Evaluating Environmental Burdens - Health

In addition to providing simple profiles of existing conditions, the results of broad spectrum surveys can sometimes be used to examine more complex interconnections. The relationship between environmental conditions and health is of obvious importance to policy, though it is a particularly difficult relationship to analyze.

Simple tables displaying the health status of households facing different environmental conditions can provide a powerful but potentially misleading message. The suspected risk factors in fecal oral diseases, as for many other environmental health problems, tend to be correlated. A household without water in the home is less likely to have a toilet in the home than one with a water connection. Thus a table displaying diarrhea prevalence among households with and without water connections can seem to assign to water connections health differences which are due to environmental risks that better water supplies will not remedy. Indeed, most variables that are related to poverty will be statistically associated with a higher prevalence of diarrhea. It may seem revealing that in the survey of Accra, households with refrigerators had significantly less diarrhea than those without. However, a closer look at the statistics would reveal an almost identical difference between households using aerosol spray pesticides and those not using them. Both differences quite likely reflect the fact that wealthier households have more refrigerators, are more likely to use spray insecticides, and face many fewer environmental health hazards.

More sophisticated statistical techniques can be applied to survey data of this type, though it is impossible to eliminate all of the difficulties which arise when so many of the potentially important factors are interrelated. One of the more common multivariate techniques employed in epidemiology is logistic regression, which can be suitable when the condition one is trying to explain can be expressed as a dichotomous variable (e.g. 1 if the condition is present, 0 if it is absent).<sup>6</sup> An advantage of the technique is that when the explanatory variables are also dichotomous, the results can be expressed in terms of the approximate relative risks, or odds ratios.<sup>7</sup>

Table 2-5 summarizes some of the results of a logistic regression, again using childhood diarrhea as the dependent variable. All of the environmental factors listed were statistically significant in the logistic regression model, and the estimated relative risks ranged from 2 to over 4. The results suggest that, for example, among households with small children those having to share a toilet with more than five other households are approximately 2.7 times as likely to report a child having had diarrhea within the past two weeks as households whose other factors are the same but who share with five or less households. While these results almost certainly reflect a very

---

<sup>6</sup> There are a large number of text books covering the use of statistical techniques for health research (Armitage and Berry, 1994, for example).

<sup>7</sup> The odds ratio is the odds that the condition will be present if the factor is present divided by the odds that the condition will be present if the factor is absent. Thus if the odds of having a disease given the environment hazard is 1/10 and the odds of having the disease in the absence of environmental hazard is 1/100, the odds ratio is 10. The relative risk in these circumstances would be based on proportions rather than odds: 1/11 divided by 1/101, or 9.2. Since, especially when the odds are long, the odds ratio is approximately equal to the more intuitively meaningful relative risk, the odds ratio is sometimes called the approximate relative risk.

real and damaging relationship between inadequate local environments and health, it is still important not to overinterpret the individual coefficients. As with the simple tabular presentations, it is easy to misinterpret the results.

**Table 2-5 Approximate Relative Risk Associated with Environmental Factors with Respect to Diarrhea among Children Under Six - Accra, 1991/92**

Environmental Factors	Approximate relative risk	95% confidence interval
Use of pot for storing water	4.3	(1.7-11.1)
Experience regular water supply interruptions	3.1	(1.4-6.6)
Share toilet with more than 5 households	2.7	(1.2-5.8)
Purchase vendor prepared food	2.6	(1.1-6.2)
Use open water storage container	2.2	(1.1-4.3)
Outdoor defecation by neighborhood children	2.1	(1.1-3.9)
Many flies in food area at time of interview	2.1	(1.1-3.8)
Do not always wash hands before preparing food	2.0	(1.1-3.8)

Many factors which, taken individually, appear to be closely related to diarrhea prevalence are not statistically significant in the logistic regression. Indeed, even the household's water source is insignificant. However, several of the factors listed could reflect water supply problems related to the type of water source. The water source may affect the prevalence of water supply interruptions and of not washing hands before food preparation, for example, both of which were found to be associated with diarrhea prevalence in the multivariate analysis. Through these variables, the water source could well be having an appreciable affect. On the other hand, the significance of having many flies in the food preparation area at the time of the survey may be because the conditions leading to the flies are also leading to disease, rather than because the flies themselves are spreading disease. Thus, the presence of flies could still be statistically significant despite having no appreciable affect.

### **2.3 Selected Methodological Issues**

Many of the skills needed to conduct a good household survey involve standard survey techniques, commonly employed, but easy to get wrong. Undertaking a household environment-health survey is much simpler if a household sample frame is already available, and a good set of procedures has been developed for testing questionnaires, training and supervising enumerators, and entering and checking data. Otherwise, and things usually are otherwise, many of the methodological problems encountered are likely to lie in procedures which are common to other household surveys. A general guide to all of the steps in a household survey is beyond the scope of this report (see Casley and Lury, 1989; Fink and Kosecoff, 1985; Nichols, 1991). In any case, written materials can supplement, but not replace field experience. Any research team attempting to undertake a significant survey of household environment and health should include people with experience and demonstrated competence in the design and management of household surveys.

The statistical theory and procedural standards associated with rigorous sample surveys give them a number of advantages over more ad-hoc collection efforts. If the standards are achieved,

they allow for reproducibility and relative transparency. Survey results can be presented along with estimates of their uncertainty due to sampling error. They can be compared over time, and between different areas. Users can obtain a fairly clear idea of how the information was collected even if they were not present. Perhaps most important, a comparatively small sample can often be used to draw relatively firm conclusions about large populations. Thus, for example, if half of the households in a city, however large, burn part of their solid waste, then a random sample of 1,000 households will yield an estimate of between 45 and 55% more than 99% of the time.

However, with the well defined procedures comes inflexibility. It is difficult to cut corners without compromising the integrity of the statistics. Undertaking a survey involves a sequence of activities including: questionnaire and sample design, pre-testing, enumerator training, survey implementation, data entry, data processing. A failure at any stage can undermine the whole survey effort, and is typically difficult to rectify if not discovered very early on. There are control procedures: questionnaires can be carefully pretested and dummy results tabulated; a selection of households can be revisited to verify the enumerators work; double data entry and internal consistency checks can be used to verify the data entry. But these procedures are typically the first to be omitted when resources are scarce. Moreover, with the exception of sample size, most potential sources of error are difficult to identify once the data have been processed.<sup>8</sup>

Even if the quality control is adequate the inflexibility inherent to questionnaire surveys imposes limits on the type of information which can be gathered. A wide variety of respondents must be able to understand the questions, know the answers (or have opinions), and be willing to give them. For the information to be useful, the answers must be amenable to interpretation or presentation in aggregate, and the statistics which emerge must have implications for action. By and large, one is limited to simple questions for which the range of possible answers can more or less be predicted.

Routine questions and observations do not involve any real dialogue between researcher and respondent. People's opinions typically have a coherence and context that is not revealed in answers to preformulated questions. Environmental problems often take forms difficult to anticipate in a questionnaire. Questionnaires are far more likely to be useful when they are designed by or with people who already have a good qualitative understanding of the situations likely to be encountered. More generally, they are more appropriate to testing hypotheses, than to developing them.

Some of these limitations can be countered by using the questionnaire development and testing period to engage more directly with potential respondents. Those who are designing the questionnaire, and intend to analyze the results, can visit and interview a range of householders prior to testing any particular questions. This is not only likely to improve the questionnaire and the interpretation of results, but can lead directly to new insights.<sup>9</sup> Similarly, the direct

---

<sup>8</sup> Perhaps as a result, there is a tendency for sample surveys to devote too large a share of resources to increasing the number of households visited, and too small a share to ensuring the data are reliable.

<sup>9</sup> Questions appropriate in an interview situation, where the interviewer is attempting to understand a particular household's circumstances, may be completely inappropriate in a sample survey, where the responses of a large number of households must

involvement of motivated researchers at all stages of a survey can improve the moral of the survey team, and simultaneously reduce the distance a survey otherwise imposes between the researchers and the respondents.

Overall, the strengths of a sample survey of households are particularly evident when:

- 1) The goal is to assess known problems rather than identify new ones
- 2) Relatively simple and pertinent indicators exist
- 3) Changes over time, space or type of household are critical to ascertain.

***Box 2-1***  
***Common Survey Pitfalls***

1. **Large but Poorly Selected Samples** - too much effort and expense is often given to increasing sample sizes, and too little to improving sampling procedures. Also, despite widespread awareness of the problem, the urban poor remain underrepresented in many household surveys.
2. **Insufficient Pretesting and Training** - often, too little attention is given to pretesting the survey instrument, and training supervisors and enumerators in the field. Fifty more pretests can be worth far more than increasing sample size by 50, and poorly filled in survey forms are far more damaging than smaller samples.
3. **Too Many Questions** - many questionnaires include questions whose answers are never analyzed, and which should never have been included. It is not uncommon for questions to be included when a little thought would have shown that their answers cannot really be interpreted.
4. **Too Little Quality Control** - problems with questionnaire design, implementation and data entry are often recognized too late. The cost of not correcting mistakes as they occur can be extremely high.

Note: These pitfalls are in reference to the goals implicit in the same survey approach. Critics of sample surveys would identify a different list of pitfalls.

---

be analyzed simultaneously. Thus, shifting from open interviews to designing a questionnaire it is important to consider precisely how the results from each question are to be used and presented.

*Box 2-2*

**Some Problems to Keep in Mind when Developing Broad Spectrum Survey Instruments for Local Environmental Assessment**

- 1. Households can be hard to define:** It is notoriously difficult to define a household precisely, and to determine exactly who should be included as members. Generally, it is more important to be consistent with common practice in household surveys in the country and ensure that the enumerators have a definition they can work with, than to achieve conceptual clarity.
- 2. In many cultures men are not very knowledgeable about the household and neighborhood environment:** In surveys on the household environment it will often be appropriate to accept only the principal women of the house as the respondent, and this in itself may require female enumerators.
- 3. Respondents tend to underestimate their household income and expenditure:** Attempts to obtain quick estimates of total household income or expenditures often leads to severe underestimation. For most purposes it is preferable to employ other indicators of affluence.
- 4. Poor households often use a variety of water sources:** Even in cities where published statistics neatly sort households according to their water source, it common for many households to use different sources for different purposes or at different times.
- 5. Children's sanitary habits are often the most important, and may be different from adults:** Even if adults regularly use a specified toilet, children may not. Outdoor defecation may be accepted practice, for example, even in areas where adults always use toilet facilities.
- 6. Crowding of sanitary facilities is often more important to identify than their technological details:** Even private toilet facilities are often shared, and this sharing may affect the manner in which they are used, and their cleanliness.
- 7. People often do not want to reveal details of their hygiene behavior:** What people say they do may be what they think they ought to do rather than what they actually do. More generally, questions on hygiene behavior are often considered intrusive.
- 8. Environmental conditions and health typically vary a great deal with the seasons:** Seasonal variation is difficult to capture in a one-time survey, though it is possible to at least ask questions which indicate whether such variation is important.
- 9. People may cook (and heat) in different locations and with different fuels, depending on the season, the weather or the chance availability of certain fuels:** Multiple fuel use and outdoor cooking are common, especially in low-income communities, and can affect indoor air pollution considerably.
- 10. Survey instruments are not easily transferred from one setting to another:** Variation in both physical conditions and cultures mean that example survey instruments, such as that provided as Annex 2 to this report, are very site specific.



## **2.4 *An Application of a Broad Spectrum Household Survey to an Upgraded and an Un- Upgraded Neighborhood of Jakarta***

The following case study is an adaptation on a small scale of the survey approach developed for a larger scale Stockholm Environment Institute / Atma Jaya University study of household environmental problems in Jakarta. A description of the larger study and its results is available from the Stockholm Environment Institute (Surjadi et al., 1994). While the larger study included a survey of about 1,000 representative households sampled from the whole city of Jakarta, this subsequent application only covered two hundred households spread out over two neighborhoods. However, the survey instrument used in the smaller study, and included in this report as Annex 2, was designed as if it were a city-wide survey, with little attempt to adjust it to the specificities of the two neighborhoods being surveyed.

### **2.4.1 The Context**

Indonesia's economy has been growing rapidly in recent years. The average annual growth in GNP per capita between 1980 and 1993 was 4.6%, compared to 0.9% for low and middle income countries globally (World Bank, 1995). Jakarta has been at the center of this economic development, and has been physically transformed. The economic growth has been uneven, however. Not only have some groups benefited less than others, but not all aspects of life in Jakarta have advanced, and many environmental conditions have deteriorated.

There has long been concern that unless special steps are taken urban kampungs<sup>10</sup> tend to be bypassed by economic developments (Silas, 1984). To help prevent kampungs from becoming degraded low-income enclaves, Jakarta has had a kampung improvement program (KIP) since the 1960's. This government-led program is intended to improve many of the environmental conditions of concern to this report. Thus, one might expect that even a small scale survey would be able to detect significant differences between a kampung that had not participated the upgrading and one that had. Furthermore, given otherwise similar kampungs, one might expect the survey to provide revealing information about the KIP. With these expectations in mind, and with the collaboration of officials in the Ministry of Housing, a "pre-KIP" neighborhood and a nearby "post-KIP" neighborhood were selected for study. The results are illustrative of the sort of comparisons with could be made by surveying a single neighborhood before and after upgrading. **The results should not be taken to reflect upon the KIP program generally.**

As described below, the environmental conditions of the two neighborhoods are indeed very different, with considerably better conditions in the upgraded neighborhood. The survey results not only document the differences in the household environmental conditions in detail, but also indicate that the private wealth of the households in the two neighborhoods is appreciably different. It seems likely that the upgraded neighborhood has long been wealthier, and that this

---

<sup>10</sup> In Jakarta, kampung is used to refer to comparatively informal settlements consisting of traditional one or two story dwellings. The term has rural connotations even when applied to urban settlements, and is sometimes translated as "village". In international literature, kampung is sometimes taken to mean squatter settlement or slum. This is a misrepresentation.

accounts for some of the environmental differences. However, neither neighborhood is particularly poor by Jakarta's standards, and several appliance ownership percentages are higher in both neighborhoods than they were in 1991/92 for Jakarta as a whole.

Especially in the un-upgraded neighborhood, but also in the upgraded neighborhood, the results illustrate a level of private asset ownership that only a few decades ago would have been interpreted as clear evidence of considerable wealth, combined with environmental conditions that have long been associated with poverty. Thus, for example, combining the results of both neighborhoods, an estimated 78% of households have color televisions, 44% have refrigerators and 18% have telephones. On the other hand, 83% buy their drinking water from itinerant vendors, 75% use undrinkable, brackish well water for bathing, 34% use helicopter toilets sited above a local canal, 75% have had floods entering their homes in the past year, 27% do not have their waste collected from their homes, and 72% have seen a rat in their home in the past two days. At first glance, it would appear that households probably could afford better services if they were available.

#### **2.4.2. Procedures and Implementation**

Before presenting a selection of results in detail, some comments are warranted on the survey instrument and how it was applied. Annex 2 provides a translation of the survey instrument. It consists of questions to be asked of the principal woman of the household, combined with some observation by the enumerator. The questionnaire is made up of a series of modules, including:

- Household Members
- Health
- Water
- Sanitation
- Pests
- Food
- Air Pollution and Housing
- House Observation

The survey instrument was not developed for this application, but was adapted from the larger scale survey undertaken in Jakarta two years before (Surjadi and others, 1994). It is not intended to be an ideal questionnaire, but an illustrative one. Nevertheless, a number of weaknesses in the original questionnaire were corrected, and despite many remaining flaws it is a relatively carefully developed survey instrument.

Since this type of survey is more relevant to large scale applications, the manner in which the samples were selected in the two neighborhoods is not of great relevance. With only two neighborhoods of less than 1,000 households the sampling problems are minimal in comparison with sampling from a city of several million. The difficulties encountered even on this small scale are illustrative however. Having obtained permission for the survey, statistics were collected from the district (kelurahan) and neighborhood (RW) offices on the population and number of households living in the two neighborhoods. The intention was to verify these

statistics, plot routes through the neighborhoods passing by every household, and then sample every nth household, where n is slightly less than the number of households in the neighborhood divided by 100.<sup>11</sup> However, for the first neighborhood the district statistics stated there were 487 households and the neighborhood office stated there were 739 households. It was, therefore, necessary to go through the very laborious process of reconstructing household lists, and selecting from these.

Nine applicants, mostly students in a health field, were trained in administering the survey at the university, and simulation interviews were undertaken. Seven of the applicants were accepted for applying the pre-test, with each interviewer conducting two interviews. After reviewing and revising the questionnaire, the actual survey was undertaken within a four day period. To validate the results, 20% of respondents were revisited by a supervisor, and asked a selection of "check" questions. To confirm interview results on diseases suffered by mothers and children, all such interviews were carried out twice by different interviewers. Given the small scale of the survey, it was comparatively easy to revisit households, and only bring back fully completed questionnaires to be entered in the computer. While for the large scale survey, double data-entry had been employed, given the small number of questionnaires it was not considered necessary for this case study, and a more ad hoc means of quality control was employed.

### **2.4.3. Results**

One of the oft-mentioned strengths of the sample survey is the comparability of the results, across time and space. The central comparison employed here is between the un-upgraded neighborhood and the upgraded. Though this is a spatial comparison, there is an implicit time dimension, and it is easy to imagine the same sort of comparison being made of a single neighborhood before and after the upgrading. For both temporal and spatial comparisons, it would be preferable if the differences between the un-upgraded and upgraded situations all derived, directly or indirectly, from the program itself. In practice, other factors are also important, and can be more important than the program or policy under discussion. As described below, this could well be the case with the survey being described here.

To simplify the presentations, the summary tables only present the percentages or averages for the two neighborhoods, generally without any reference to the numbers of households involved. Since there were 100 households sampled in each neighborhood, the neighborhood percentages are in any case equal to the number of households, except where there are missing values (in which case the actual sample size is provided as a note). The statistical significance of the difference in percentages is noted with one, two or three stars, depending on whether the probability of getting such a difference by chance is less than 10%, 5% or 1%.

#### **2.4.3.1. *Comparing Economic and Social Status***

Ideally, one would hope that the upgrading would create better conditions for economic development within the neighborhood, improving the economic status of the residents. One

---

<sup>11</sup> A luxury housing estate situated in one of the neighborhoods was excluded as it clearly did not qualify as part of the "kampung".

might also expect an increase in the economic status of the residents due to turnover, as a house prices and rents increase, and poorer households leave to make way for wealthier. Finally, one might expect wealthier, but still eligible, neighborhoods to be better able to take advantage of the upgrading. Some combination of these factors may be at work here. However, since the intention was to purposefully select neighborhoods of similar economic status, the economic differences between the two neighborhoods should probably be ascribed to chance, and the fact that it is difficult to judge economic status on the basis of casual observation.<sup>12</sup>

Despite the virtually complete electrification of both neighborhoods, the ownership of electric appliances and other consumer durables is far higher in the households in the upgraded neighborhood, indicating a considerably higher level of private wealth. Indeed, while kampungs are not inherently poor, the level of appliance ownership in the upgraded neighborhood is exceptional. In the two neighborhoods combined, half of the households had dwellings with more than three rooms and either a motorized vehicle, air conditioning, a refrigerator or a gas cooker. Seventy one percent of these households were in the upgraded neighborhood. Further confirming the relatively high economic status of the residents of the upgraded neighborhood, the reported average expenditures were almost 50% higher.

The principal men and women of the households are also older in the upgraded neighborhood, though many other householder characteristics are quite similar. In both neighborhoods there are a small minority of female headed households, very few of the principal women work away from the home, about three quarters of the principal women have lived in the house they currently occupy for more than 5 years, and about four in five have lived more than 10 years in Jakarta. A larger share of the principal householders in the sample from the upgraded neighborhood had had some secondary education, though the difference was only statistically significant in the case of the principal women. The average household size is not significantly different between the two neighborhoods, although there are significantly more children under six in the households in the upgraded neighborhood.

Anyone working with such survey data would be well advised to look more closely at some of the general household characteristics, and their interrelations. For the purposes of this presentation, however, such summary statistics are enough to convey the principal finding - that while the neighborhoods are both quite stable and the women work predominantly at home as compared to the men who generally work away from home, the upgraded neighborhood is far more affluent, and any comparison of environmental characteristics must take this into account.

#### ***2.4.3.2. Assessing and Comparing Environmental Services and Conditions***

When using surveys, it is usually easier, and often more meaningful, to compare environmental services and conditions over time and space than to evaluate them in absolute terms. The notion that one should design a survey to determine whether existing conditions at a given time and place are adequate is attractive but usually misguided.

---

<sup>12</sup> As noted above, several areas within the un-upgraded neighborhood were omitted from the survey, as they were luxury housing complexes rather than kampung dwellings. If these areas had been included, the economic indicators might have been far closer.

There are many different reasons why a policy analyst might wish to compare environmental services and conditions across time or space. The comparisons may have narrow goals, such as to determine whether a particular program or policy has led to environmental improvements or deterioration. They may have broader goals, such as to help understand the dynamics of environmental change. The survey approach under discussion here is intended to provide data which can be used for a variety of purposes. The following discussion focuses more on the possibilities and limits of comparisons, rather where and when such comparisons are relevant. In applying such surveys, however, it is important not to let the quest for information become an end in itself.

Since only a very small share of the information collected can be presented in any given set of tables, it is important to distinguish between presenting tables as a final product and as an intermediate stage, allowing for further interrogation of the data. In a report, tables tend to be a final product. However the usefulness of the information increases greatly if a more interactive approach is taken, the presentation is adapted to the questions at hand, and the data are available for follow-up questions. Again, advances in information technology are making an interactive approach far more feasible.

It is in their nature for statistical tables to give the impression that households fall into neat categories. It is in the nature of households to resist simple classifications. Thus, while it may at first seem to be a simple matter to group households according to their environmental facilities and condition, the reality is often very complex.

### *Water*

Multiple water sourcing is common in disadvantaged urban neighborhoods, and quickly complicates the presentation of summary statistics. Drinking water sources are the most commonly portrayed, although easy access water for various washing activities is probably more important to health. In Table 2-6a, the drinking water sources are listed in what one would expect to be the order of preference. The groundwater in the neighborhoods surveyed is brackish, and generally considered undrinkable. The hydrants sell water primarily to vendors, and if a household wishes to buy directly they must carry their water home. The vendors bring water door-to-door, but are not as convenient as piped water connection. Both the piped water and the well water are polluted, and must be boiled before drinking, making mineral water the choice for a growing number of wealthy households. As illustrated in Table 2-6a, while vendors are the most common water source in both neighborhoods, there is a clear shift towards the more desirable sources in the upgraded neighborhood.

The extent of double sourcing is illustrated in Table 2-6b. If vendor water dominates the drinking water sources, well water dominates the bathing water. Almost all of the households that use a single source have piped water connections which they use for both purposes. While similar statistics could be presented for the other uses of water, with a few exceptions (mostly mineral water users) the drinking water sources were the same as the cooking water sources, and the bathing water sources were identical to the sources used for washing clothes.

Table 2-6c provides an indication of the extent of interruptions. Interruptions are often seasonal, and can mean quite different things depending upon the type of source that is being interrupted (the statistics being presented here are based on questions far more appropriate to a piped water connection which breaks down intermittently than to a well which dries up for part of the year). While the differences are not statistically significant, it may seem somewhat surprising that the share of respondents who had encountered a day-long water supply interruption in the past year was higher in the upgraded neighborhood. However, an examination of interruptions by drinking water source would reveal that among piped water two thirds had had a day-long interruption in the past year, as compared with one third among households without piped water connections. As with many survey results, this comparison is revealing, but can easily be misinterpreted. Thus, rather than reflecting poorly on the upgraded neighborhood, the results tend to confirm the view that the hydrants used by the vendors are comparatively reliable, and that the vendors themselves provide a reliable, if not very convenient, service. On the other hand, given the scale of the survey, it could well be the same interruptions that the different households experienced, making attempts to compare the interruption statistics potentially misleading.

Table 2-6d displays the extent of well sharing, which is greater in the un-upgraded neighborhood, even if only well users are compared. Well sharing is likely to be more of a health risk when the water is being used for drinking, and is probably best seen as an inconvenience among these households. Knowing the extent of well sharing could also be useful for other purposes, however. Thus for example, there has been some discussion of implementing a well tax. These results illustrate two possible dangers. Firstly, the tax is likely to be regressive. Secondly, a well tax might easily lead to well sharing rather than shifts to piped water.

**Table 2-6 Water Supply and Storage in an Un-Upgraded and an Upgraded Neighborhood**

	Un-upgraded (N=100)	Upgraded (N=100)
<b>a. Drinking water source***</b>		
Private well	5	0
Hydrant	5	0
Vendor water	89	77
Piped water	1	17
Mineral water	0	6
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>b. Bathing water source***</b>		
Private well	84	71
Piped water	1	20
Vendor water	3	5
Public well	12	4
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>c. Most recent supply interruption (&gt;1day)</b>		
Within last week	9	13
Within last year	17	25
None within last year	74	62
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>d. Private well sharing***</b>		
Unshared well	49	55
Shared between 2-4hh	28	14
Share between >4hh	11	3
No private well	12	28
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>e. Opinion of current water quality*</b>		
Bad	4	1
Adequate	16	28
Good	80	71
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>f. Types of water containers</b>		
Drinking water "Panci"	sample % 100%	sample % 100%
Bathing water "Bak"***	62%	87%
Other water storage container	63%	54%

Note:

Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

People's perceptions of the quality of their water are notoriously difficult to interpret. As illustrated in Table 2-6e, three out of four of the respondents said the quality of their drinking water source was good, and almost all the rest thought it adequate. At the same time, as described below, virtually everyone found it necessary to boil the water before drinking. The fact that a somewhat lower percentage of respondents felt their water was good in the upgraded neighborhood is as likely to reflect higher standards as lower water quality. Indeed, while respondents without piped water connections were more likely to claim that their water quality was good, when asked how they thought their water quality compared with that of water from a piped connection, an appreciable share (38%) thought the water from the piped connection would be better, and almost none thought it would be worse. Thus, while such results suggest that the general acceptance of existing water quality may be an important political factor to bear

in mind when proposing improvement schemes, they should not be used as an indicator of the physical quality of the water.

The variables in Table 2-6f present the share of households with different types of water containers. All households have a drinking water container, the share of households with traditional bathing water containers is significantly higher in the upgraded neighborhood, and somewhat more than half of the households in both neighborhoods have other water containers as well. Again, this information has no obvious implications for action, but could be very relevant when particular actions are being considered. In relation to hygiene education, for example, it is useful to be aware of water storage practices. In this case, it would be possible to look further into water storage by examining the variables indicating whether the containers were closed or open, and by looking more closely at which households tend to have which kinds of containers.

### *Sanitation and hygiene*

A selection of sanitation and hygiene statistics are compared across the two neighborhoods in Table 2-7. Again, the survey has picked up very significant differences between the two neighborhoods. As indicated in Table 2-7a, the mix of sanitation technology (again ordered at least roughly in order of preference) clearly reflects better average conditions in the upgraded neighborhood. The un-upgraded neighborhood is dominated by "helicopter" toilets, which are drop-toilets situated above canals. Drop toilets are probably less of a health risk to the users than to those who are exposed to the effluent in the canals, but reflect poor neighborhood sanitation. The aqua privies vary in quality. They are generally considered an improvement over the drop toilets, but nevertheless may be contributing significantly to groundwater pollution. The "sewered" toilets also drain into canals.

Sharing toilets can be inconvenient and unhealthy. In Table 2-7b, the proportion of households having unshared private toilets drops from 74% in the un-upgraded neighborhood to 24% in the upgraded neighborhood. While not evident from the table, the shift in technologies is related to the shift in levels of sharing, with most of the private toilets being aqua privies, and most of the public toilets being "helicopter" toilets. This same shift is reflected in Table 2-7c, since it is the public toilets that tend to be located further from the home, adding to their inconvenience and possibly increasing health risks (by, for example, leading children to defecate in the drains along the roads). The shift is reflected yet again in the handwashing facilities at the toilet sites (Table 2-7d).

As indicated in Table 2-7e, handwashing behavior is significantly better in the upgraded neighborhood, at least judging from the responses of the principal women on being asked whether and with what they wash their hands after defecation. Given the differences already recorded in toilets and washing facilities, one might suspect that the difference in handwashing reflects the lack of facilities in the un-upgraded neighborhood rather than, for example, the relatively minor differences recorded in the education of the principal homemaker. Given a larger sample size, one could develop hypotheses to test statistically, but with only 200 households and 2 neighborhoods it is very difficult to distinguish between the various factors which vary across the neighborhoods. It is worth noting that there are also appreciable, though



statistically insignificant, differences in the responses regarding handwashing before food preparation, although in this case one would not expect the practice to depend so heavily upon having handwashing facilities at the toilets.

**Table 2-7 Sanitation and Hygiene in an Un-Upgraded and Upgraded Neighborhood**

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>a. Type of toilet facility used</b>	%	%
No toilet (drains, etc.)	6	3
Bucket	0	1
"Helicopter"	59	8
"Sewered"	17	11
Aquaprivie	18	77
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>b. Sharing of toilet facility used most***</b>	%	%
Unshared private toilet	24	74
Shared private toilet	19	13
Public toilet	51	10
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>c. Distance to toilet facility used most***</b>	%	%
In residence	37	83
1 - <10 meters	13	5
10 - <100 meters	38	3
100+meters	6	6
No toilet (drains, etc.)	6	3
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>d. Handwashing facilities at toilet***</b>	%	%
No soap or water	43	10
Soap or water, not both	7	6
Soap and water	44	81
No toilet (drains, etc.)	6	3
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>e. Principal female's handwashing after defecation***</b>	%	%
No handwashing	2	0
With just water	15	4
With soap and water	83	96
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>f. Principal female's handwashing before food preparation</b>	%	%
No handwashing	2	3
Sometimes	33	21
Always	65	76
<b>Total</b>	<b>100%</b>	<b>100%</b>

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

### ***Flooding and drainage***

Flooding and drainage problems are common in Jakarta, including the neighborhoods surveyed, though they are typically beyond the scope of the KIP. Even more than most of the other problem areas, the ability of the survey to collect pertinent information to compare across two

neighborhoods is constrained by the fact that these problems tend to affect groups of neighbors simultaneously. The state of the drains in a given neighborhood, for example, may depend more on recent weather than on the character of the neighborhood or the households in it. Alternatively, flooding is clearly not an independent event in the different households of the neighborhood. Most households are likely to have been affected by the same floods, and a bad year for floods in one household is likely to have been a bad year for floods for a neighboring household. It would be bad statistics to compare the share of households affected by flooding in two neighborhoods, find a "significant" difference upon applying a standard difference of proportions (or difference of the means) test, and reject the possibility that the two neighborhoods face the same future risk of flooding.

As it happens, the surveys were done in rapid succession, with no appreciable changes in the weather. On the other hand, the surveyors assessments of the water flows in the drains<sup>13</sup> were not significantly different. Similarly, the number of floods entering the grounds of the residences were not significantly different. There was a significantly higher proportion of households with floods entering the home in the un-upgraded neighborhood, but the need for caution in interpreting this finding is underlined by the fact that the same share of households had flood lines at least half a meter high in their homes. More compelling than any evidence of differences between the neighborhoods is the evidence that flooding is a serious problem for both.

**Table 2-8 Drainage and Flooding in an Un-Upgraded and Upgraded Neighborhood**

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>a. Flow of graywater in drains</b>		
	%	%
Steady flow	71	57
Slow flow	22	31
Stagnates	6	12
Seeps into earth	1	0
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>b. Floods entering grounds in last year</b>		
	%	%
None	4	4
1-2 times	30	36
3-4 times	31	32
5-9 times	17	19
10+ times	18	9
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>c. Extent of flooding in last year</b>		
	%	%
None	4	4
Only in yard	15	28
Inside home	81	68
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>d. Level of flooding</b>		
	sample%	sample%
Share of homes with evidence of >50cm floods	25	25

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>13</sup> The residences surveyed, like most residences in Jakarta, all had observable drains running along the nearest road. In many other situations, one could not expect to observe drainage flow.

## ***Solid Waste***

The solid waste statistics summarized in Table 2-9 illustrate very appreciable differences in the handling and disposal of waste, that again favor the upgraded neighborhood. Even within the home some significant differences emerge, with plastic bags more commonly used to store waste in the un-upgraded neighborhood, and closed containers more common in the upgraded neighborhood. Outdoors the principal difference would seem to stem from the high share of households without any outdoor waste storage in the un-upgraded neighborhood, though there are also a high share of households storing waste outside in plastic bags.

***Table 2-9 Solid Waste Handling in an Un-Upgraded and an Upgraded Neighborhood***

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>a. Main indoor waste storage container**</b>	%	%
No indoor storage	29	27
Open container	29	34
Closed container	5	15
Plastic bag	37	24
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>b. Main outdoor waste storage container ***</b>	%	%
No outdoor storage	26	8
Open container	47	71
Closed container	4	11
Plastic bag	18	7
Other	5	3
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>c. Waste collection frequency***</b>	%	%
No collection at house	47	7
Once or twice a week	26	34
Every day	27	59
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>d. Dumping behavior</b>	%	%
Dump most waste in fields or streams***	34	3
<b>e. Burning of waste</b>	sample %	sample %
Burn some waste**	18	8
<b>f. Location of most serious sw problem*</b>	%	%
No serious problem	39	48
Streets	29	24
Marginal areas	24	27
Own land	8	1
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>g. Householders waste separation**</b>	%	%
Do not separate out paper or metal/bottles**	60	42
Separate out just paper	20	37
Separate out just metal/bottles	5	5
Separate out just and metal/bottles	15	16
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>h. Destination of separated materials</b>	sample %	sample %
Separate out paper or metal/bottles**	40	58

Sell at least some***	19	36
Exchange at least some	25	20
Give away at least some	12	17

<b>i. Waste picking at households<sup>a</sup></b>	<b>sample %</b>	<b>sample %</b>
Waste pickers sort through household's solid waste	63	67
Waste pickers take paper	42	33
Waste pickers take metal	42	36
Waste pickers take bottles	37	40
Waste pickers take other materials**	52	32

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup> For some rows up to 11% of respondents did not know the waste pickers behavior and have been omitted.

At least some of the differences in waste storage are related to the fact that a far higher share of households in the upgraded neighborhood have their waste collected at least once or twice a week if not every day. An important correlate of the lack of waste collection in the un-upgraded neighborhood is that, as illustrated in Table 2-9, 33% of the households in the un-upgraded neighborhood dumped at least some of their waste in a nearby field or stream, as compared to only 3% in the upgraded neighborhood. These is also a significant difference in the share of households which burn some of their waste, which fall from 18% in the un-upgraded neighborhood to 8% in the upgraded neighborhood.

Another significant difference between the two neighborhoods is that a higher share of households in the upgraded neighborhood separate their own waste (and in particular separate out the paper) and then sell some of the recycled materials. These differences, illustrated in Table 2-9, could reflect an unrecorded aspect of the waste collection service in the upgraded neighborhood. In both neighborhoods it is common for informal waste pickers to pick garbage dumps and household waste containers. Despite the lack of outdoor waste containers in the un-upgraded neighborhood, the picking patterns are not discernibly different across the two neighborhoods (except that more respondents in the upgraded neighborhood said they picked through the waste for materials other than those mentioned).

### ***Pests and Pesticides***

While the mosquito may still be the most irritating pest in Jakarta, and is implicated in a number of serious health problems including dengue fever, relevant information on mosquito problems are difficult to collect with a questionnaire. Health problems are linked to particular species, which respondents are rarely able to discern. Quantifiable measures of the inconvenience they cause are hard to come by. The indicators of fly, cockroach and rat problems provided in Table 2-10 are crude, but during field testing the respondents found the underlying questions meaningful.

**Table 2-10 Pests and Pest Control in an Un-Upgraded and an Upgraded Neighborhood**

	Un-Upgraded (N=100) sample %	Upgraded (N=100) sample %
<b>a. Presence of pests</b>		
Flies usually in kitchen	6	7
Flies usually in toilet***	<sup>a</sup>	<sup>b</sup>
Cockroach seen in last 2 days***	75	55
Rat/mouse seen in last 2 days	74	70
<b>b. Pest control (used regularly)</b>		
Screening***	56	84
Mosquito nets***	53	18
Mosquito coils	11	7
Repellant***	23	9
Aerosol spray insecticide***	3	14
Pump spray insecticide***	41	69
(Pump or aerosol)***	42	78
Rat glue (at least 2-3 times/mo)***	5	24
Rat trap (at least 2-3 times/mo)	20	25

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup>N.B. N = 94 in this case.

<sup>b</sup>N.B. N = 97 in this case.

In both neighborhoods, less than one in ten households reported that flies were usually in the kitchen, while more than two in three reported having seen rats (or large mice) in their homes within the past 2 days. Significant differences arose, however, with respect to flies in the toilet and cockroaches in the home, both of which were more prevalent in the un-upgraded neighborhood.

There are possible, though unquantifiable, health risks associated with flies and cockroaches, and these results again weigh in favor of the up-graded neighborhood. The pest control methods employed are also significantly different in the two neighborhoods, which residents in the un-upgraded neighborhood generally using the simpler, less costly methods. Thus, households in the un-upgraded neighborhood had screening less frequently, but more often had bed nets, more often used mosquito repellents, but less often used spray insecticides or rat glue.

### **Food Contamination**

As indicated in Chapter 1, food contamination is a potentially important infection route, and one of the most often identified by householders themselves. Indeed, in this survey when asked to identify the principal cause of diarrhea, 42% selected contaminated ("dirty") food, and a further 18% named other food problems. This compares with a mere 1.5% that selected contaminated water. Unfortunately, it is very difficult to develop pertinent questions relating to food contamination.

Street foods and leftovers are often considered higher risk foods. Cold street goods containing meat or dairy products, are often considered a potentially important route for fecal-oral disease. Other snack foods are often of medical concern more because of their lack of nutritional value.

As indicated in Table 2-11a, street snack food is popular in both of these neighborhoods, with women eating somewhat more snack foods in the upgraded neighborhood. There is a significant difference in the storage of leftovers, with the upgraded neighborhood having more refrigerators. This need not mean less food borne disease, however, since while refrigeration slows down bacterial growth, it can lead users to delay consumption as well. With both the street food statistics and the refrigeration, it is best to view such indicators as providing information on the context within which food contamination risks may arise, rather than as indicators of increased risk *per se*.

**Table 2-11 Eating Habits and Food Storage in an Un-Upgraded and Upgraded Neighborhood**

	Un-Upgraded (N=100) sample %	Upgraded (N=100) sample %
<b>a. Food</b>		
Children ate street snacks in last 24 hrs	63 <sup>a</sup>	59 <sup>b</sup>
Female respondent ate street snacks 7tms in wk**	84	95
<b>b. Storage of evening leftovers***</b>	%	%
None	52	54
Refrigerator	5	20
Warm storage	43	26
<b>Total</b>	<b>100%</b>	<b>100%</b>

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup>N.B. N = 54 in this case.

<sup>b</sup>N.B. N = 39 in this case.

### **Indoor Air**

In many cities, the most obvious indicator of indoor air pollution is fuel choice, with the worst pollution coming from biofuel or coal combustion in poorly vented kitchens. While fuelwood is a common fuel in many of Java's smaller urban centers, it is comparatively rare in Jakarta (World Bank, 1990). Kerosene remains the dominant cooking fuel, with LPG growing in importance among the wealthy. This is reflected in Table 2-12a, with 40% of the respondents in the upgraded neighborhood using LPG, compared with 5% in the un-upgraded neighborhood. While not as polluting as fuelwood, kerosene burned in the standard wick stoves used in Indonesia is more polluting than LPG.

**Table 2-12 Air Indicators in an Un-Upgraded and an Upgraded Neighborhood**

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>a. Principal cooking fuel***</b>		
	%	%
Wood	1	1
Kerosene	94	59
LPG	5	40
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>b. Cooking location</b>		
	%	%
Separate kitchen	52	62
Kitchen with family room	46	35
Verandah	2	3
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>c. Ventilation of kitchen***</b>		
	%	%
Bad	39	19 <sup>a</sup>
Standard	33	40 <sup>a</sup>
Good	28	40 <sup>a</sup>
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>d. Ventilation of living area*</b>		
	%	%
Bad	24	11
Standard	39	38
Good	37	51
<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>e. Hours/day stove is lit</b>		
	mean	mean
(95% confidence level)	3.7 (3.3-4.0)	3.7 (3.4-3.9)
<b>f. Small children with cook while Cooking**</b>		
	44 <sup>b</sup>	21 <sup>c</sup>
<b>g. Smoking habits</b>		
	sample %	sample %
Respondent smokes	2	5
Other householder smokes in house*	70	58
	mean	mean
<b>h. Cigarettes smoked per day in house</b>		
	10 (7-12)	8 (6-10)
(95% confidence level)		
<b>i. House is humid</b>		
	sample %	sample %
	25	10

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup>N.B. N = 99 in this case.

<sup>b</sup>N.B. N = 54 in this case.

<sup>c</sup>N.B. N = 39 in this case.

There were somewhat more separate kitchens among the respondents in the upgraded neighborhood, but the difference was not statistically significant. On the other hand, the perceived quality of the ventilation was considerably worse in the un-upgraded neighborhood. Moreover, as indicated in Table 2-12e, while the hours the stoves were on were not very different across the two neighborhoods, the women in the un-upgraded neighborhood were more likely to say they had small children with them when they were cooking.

Indoor smoking is also a potential source of air pollution. As indicated in Table 2-12g, in both neighborhoods the principal women rarely smoked, while some other household member usually did smoke within the home. On average, the respondents estimated that slightly less than ten cigarettes a day were smoked in the homes.

Eighteen percent of all respondents felt that they had a humidity problem, and there was a significant difference between the un-upgraded neighborhood and the upgraded neighborhood. Whether one perceives a humidity problem is likely to depend very much on expectations. Nevertheless, the difference between the two neighborhoods is striking, with one in four respondents in the un-upgraded neighborhood perceiving a humidity problem as opposed to one in ten in the upgraded neighborhood.

### 2.4.3.3. Comparing Health Statistics

While many of the environmental problems described above can constitute health risks, it is difficult to link particular risk factors with health problems in a broad spectrum survey, and especially one covering only a small area. There are statistical problems arising from the large number of risk factors, and the fact that they tend to be closely interrelated. Also, there are a very limited set of health problems which can be even tentatively diagnosed in a broad spectrum survey. But for infectious diseases, there is a particular problem which arises in the case of clustered samples, where some groups of respondents or their co-householders may be infecting each other. This is certainly the case in this instance, where responses from one neighborhood are being compared with those of another.

As indicated in Table 2-13a, the reported levels of diarrhea among small children were far higher in the un-upgraded neighborhood than in the upgraded neighborhood, with somewhat less significant differences for stomach aches and loose stools (diarrhea being defined as at least three loose stools in a day). However, it is quite possible that the children in the un-upgraded neighborhood are suffering from a local epidemic, and that if this epidemic had chanced to be current in the upgraded neighborhood instead, the percentages would have been reversed. Much the same holds for the fever, the wet cough and runny nose. Were such differences recorded among households scattered across a wide area, the statistical significance of the difference would be more meaningful.

**Table 2-13** *Reported Prevalence of Health Problems during the Preceding Two Weeks in an Un-Upgraded and an Upgraded Neighborhood*

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>a. Among children under six<sup>a</sup></b>	<b>sample %</b>	<b>sample %</b>
Diarrhea (>3x/day)***	28	5
Stomach Ache*	37	21
Loose stools**	39	16
Fever***	59	26
Dry Cough	19	26
Wet Cough***	63	33
Runny Nose*	13	3



	(N=100) sample %	(N=100) sample %
<b>a. Among principal females</b>		
Diarrhea (>3x/day)	6	2
Stomach ache*	29	19
Fever**	32	16
Dry Cough	13	11
Wet Cough*	33	12
Runny Nose**	3	10

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup>Households without children under six have not been included.

#### 2.4.3.4. Comparing Expenditures and Priorities

While the focus of the broad spectrum survey is on physical conditions, some information was collected on how much people are currently paying for environmental services and related goods in some of the different areas, and which of a selection of possible government interventions residents feel is most important.

Some relevant expenditure patterns are summarized in Table 2-14. Food expenditures are displayed first, and while they do not target a local environmental problem, they do provide a benchmark against which to compare the other expenditures. Given the proximity of the neighborhoods, it is probably safe to assume that the food prices which residents face are similar. Thus, the fact that food expenditures are 57% higher in the upgraded neighborhood can be assumed to reflect their greater private affluence. The imputed (or in some cases actual) rents are also higher in the upgraded neighborhood. Indeed, in this case they are about double that of the un-upgraded neighborhood. Water and solid waste disposal payments are even more than double in the upgraded neighborhood. Only expenditures for insect control, which also involve more private purchases, increase less than food expenditures.

**Table 2-14 Expenditure Averages in an Un-Upgraded and an Upgraded Neighborhood**

	Un-Upgraded (N=100) 1,000 Rp/mo mean	Upgraded (N=100) 1,000 Rp/mo mean
Food expenditure***	151	237
Imputed rent***	84 <sup>a</sup>	172 <sup>b</sup>
Water expenditure***	10	25
Insect control expenditure***	4.2	5.8
Garbage collection expenditure***	1.2	2.7

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01.

<sup>a</sup>N.B. N = 83 in this case.

<sup>b</sup>N.B. N = 89 in this case.

Turning from the expenditures the households make to their opinions about what the government ought to do, efforts to improve drainage took first place in both neighborhoods, scoring somewhat higher in the upgraded neighborhood. Second place in the un-upgraded neighborhood went to improving the piped water system, believed to be the most important government

intervention by 28% of the respondents, followed by interventions to clear up the solid waste with 17%. This ranking was reversed in the upgraded neighborhood, where 20% selected solid-waste and only 10% drinking water supply. None of the other interventions received more than 10% in either neighborhood. While the differences in the ranking are statistically significant, in both neighborhoods the residents generally seem to favor the same sorts of intervention. If these results were replicated in other parts of the city, there would be a strong argument in favor of a major Jakarta-wide effort to improve drainage.<sup>14</sup>

**Table 2-15 Respondents Opinion on the Most Desired Government Intervention in an Un-Upgraded and an Upgraded Neighborhood**

	Un-Upgraded (N=100)	Upgraded (N=100)
<b>Most important Gvt. Intervention**</b>	<b>%</b>	<b>%</b>
Improve drains	40	54
Improve drinking water supply	28	10
Clear up solid waste	17	20
Control pests	4	7
Improve supply of public toilets	6	2
Other - air pollution or food contamination	3	5
<b>Total</b>	<b>100%</b>	<b>100%</b>

Note: Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01

## 2.5 Conclusions

A broad spectrum sample survey can provide a useful base for policy analysis, a set of data of interest to researchers, and set of statistics of relevance to public debate. Currently, sample surveys are widely used, and often abused. The notion that a survey should be conducted simply because information is lacking must be resisted.

There are often other, preferable means of gathering information, and there are many types of information which a sample survey, however good, cannot be expected to provide. New developments in information technology are greatly increasing the potential accessibility of survey data, but with greater accessibility comes a need for more rigorous standards. Ideally, greater accessibility should be accompanied by a decline rather than an increase in the actual number of surveys conducted.

The broad spectrum sample survey of environmental problems in and around the home has two main niches, which will only sometimes overlap. The first lies in conjunction with attempts to develop integrated urban environmental strategies, and overcome the strong sectoralization so prevalent in urban environmental management. The second niche lies in conjunction with particular upgrading programs, helping to identify priorities and to monitor the success of the program..

<sup>14</sup> It should be noted that there were severe floods in Jakarta in the years following this survey.

To support integrated urban environmental management, surveys need to be capable of representing whole cities, or at least large and spatially well defined subpopulations. They need to be able to provide information relevant to strategic analysis and debate involving, simultaneously, the range of ministries and other organizations involved in environmental management. In addition, they should be able to provide information relevant to the specific sectoral actors in the course of their work. The sort of data presented in the previous sections can fulfil such a role, though imperfectly. Even the best survey only provides indications of the prevailing environmental conditions, and the obstacles which must be overcome. Good survey data can help keep the policy discussions on track, but cannot identify the right policies. Other information will have to be gathered for particular purposes, perhaps using some of the other techniques discussed in this report.

In some cities, developing a broad spectrum survey would only require minor adjustments in existing survey procedures. In Jakarta, for example, the Central Bureau of Statistics (BPS) conducts large scale surveys regularly, and their procedures can easily accommodate a broad spectrum survey of the type discussed here. In other cities, household surveys tend to be more ad hoc, and implementing a large scale broad spectrum survey would require a great deal more groundwork. However, it is precisely where surveys are uncommon that they are most likely to provide important new insights, and counter old prejudices.

The most important factor in determining whether such a survey is worth conducting lies in the extent and interest of the audiences. If a survey provides information that contributes constructively to environmental management, and is appreciated by one or more of the major audiences (policy makers, politicians, researchers, non governmental organizations (NGO's), grass roots organizations (GRO's), (public/media), its benefits probably outweigh its costs. While it is important to find the most cost effective means of providing relevant and useful information, the pivotal question is whether the information provided really will be found relevant and used. It is very difficult to make unambiguous judgements on what constitutes a positive contribution to political debate, unless one is prepared to take a political position. But it is usually reasonable to assume that good information will improve debate if it is made available and used widely. The more serious problem is that many surveys on seemingly important topics generate little interest.

It is important to assess the potential interest in new survey data with some skepticism, and not to accept statements of interest or disinterest at face value. On the one hand, it is far easier for a potential user to agree in principle to the need for better information than it is for them to devote the time and resources necessary to put the information to use. On the other hand, the impact of survey results depend as much on how they are presented and disseminated as on any inherent information value. A well conceived dissemination procedure, taking into account the interests, capacities and interrelations of the different audiences, can make a large difference.

Assessing the audience is far less critical when surveys are designed to contribute to the implementation and monitoring of urban improvement programs. Under such circumstances, there is an almost assured audience in the implementing agency and those concerned with its performance. Broad spectrum surveys can undoubtedly be usefully employed in this context. On the other hand, surveys should not be the principal means through which the views and

situations of residents in program areas are conveyed to "decision-makers". Residents deserve and will often demand a far more effective means of expressing their needs and influencing upgrading programs than surveys could ever possibly provide. An effective broad-spectrum sample survey complements rather than substitutes for good relations between local residents and the government or NGO staff involved in upgrading.

The broad spectrum survey is not the only of the three techniques described in this report which could be applied in conjunction with an improvement program. Indeed, a variation of Participatory Rapid Appraisal known as Participatory Learning Method (PALM) has been applied in slum improvement projects in India (Francis, 1994). The two are not mutually exclusive. However, as indicated in the following chapter, they do take different and at times conflictive approaches to local appraisal.

### **Short Annotated Bibliography for Broad Spectrum Sample Surveys**

#### **Manuals on sample survey methods:**

Nichols, P. 1991. *Social Survey Methods: A Fieldguide for Development Workers*. Oxford, Oxfam. 131p.

As its title suggests, this small manual is designed for use in small scale survey efforts. Many of the examples involve household environmental issues. It is clearly written, and like many good manuals, it tends to make things seem more straightforward than they are.

Fink, A. Kosecoff, J. 1985. *How to Conduct Surveys: A Step-by-Step Guide*. Beverly Hills, CA, Sage Publications. 119p.

A revised and supplemented edition of this guide is now available as part of a multi-volume set. While aimed primarily at a Western audience, the set covers many aspects of sample surveys of general relevance.

Casley, D.J. and Lury, D.A. 1989. *Data Collection in Developing Countries*. Oxford, Oxford University Press. 225p.

First published in 1981, this is not so much a "how to" book as a thoughtful text book. It provides a good indication of the sort of problems which are likely to arise in the field, and should be required reading for anyone who thinks that administering a household survey is simple and unlikely to go wrong.

#### **Reports on broad spectrum sample surveys of household environmental problems:**

Benneh, G., Songso, Nabila, J.S., Amuzu, A.T., Tutu, K.A., Yangyuoru, Y. and McGranahan, G. 1993. *Environmental Problems and the Urban Household in the Greater Accra Metropolitan Area (GAMA) - Ghana*. Stockholm Environment Institute (Stockholm).

Jacobi, P. 1995. *Environmental Problems Facing the Urban Household in the City of São Paulo, Brazil*. Stockholm Environment Institute (Stockholm).

Surjadi, C., Padhmasutra, L., Wahyuningsih, D., McGranahan, G. and Kjellén, M. 1994. *Household Environmental Problems in Jakarta*. Stockholm Environment Institute (Stockholm).

These three reports are the outcome of a comparative study of household environmental problems in Accra, Jakarta and São Paulo, coordinated by the Stockholm Environment Institute.

Articles based on each of the city studies have been published in the journal: *Environment and Urbanization* (see bibliography).

**Collections displaying relevant data analysis methods:**

Schell, L.M., Smith, M.T. and Bilsborough, A., (eds). 1993. *Urban Ecology and Health in the Third World*. Cambridge, Cambridge University Press. 187p.

This book contains a range of research papers based primarily on survey data, and illustrating a very diverse set of statistical techniques. They are of varying quality, and demonstrate the limits as well as the advantages of the different techniques.

**Textbooks on Statistical Methods:**

Armitage, P. and Berry, G. 1994. *Statistical Methods in Medical Research* Oxford, Blackwell Scientific Publications. 620p.

Most researchers like to use statistical text books from their own discipline, even when engaged in multidisciplinary work. Armitage and Berry is oriented towards epidemiology, and covers logistic regression which provided the basis for **Table 4-10** and **Table 4-11**. The manuals for some statistical software, including SPSS, also attempt to cover statistical theory.

**Statistical Software for Personal Computers:**

**SPSS - Statistical Package for the Social Sciences**

SPSS is one of the more widely used statistical packages for PCs. It covers a wide range of statistical techniques and is now very user friendly. It has a data entry program that can help systematize and provide some quality control during data entry process. Unfortunately, it can be expensive, and must be purchased in modules, which is especially unfortunate for those whose needs happen to span a range of modules.

**Stata**

Stata is a less common, less expensive statistical package for PRCs. While not as immediately user friendly as SPSS, it does have good statistical capabilities. Users planning to import data from other systems should also purchase Stat/transfer.

Statistical software is periodically reviewed in several of the major PC magazines. Users who do not have the time or access to such reviews would probably be advised to use the statistical package most popular among their colleagues.

## *References for Chapter 2*

- Adair, L.S., Vanderslice, J. and Zohoori, N. 1993. Urban-rural differences in growth and Diarrhoeal morbidity of Filipino infants. In: Schell L.M., Smith M.T., Bilsborough A., (eds). *Urban Ecology and Health in the Third World*. Cambridge University Press. P75-98.
- Armitage, O. and Berry, G. 1994. *Statistical Methods in Medical Research*. Oxford, Blackwell Scientific Publications. 620p.
- Bateman, O.M., Smith, S. and Roark, P. 1993. *A Comparison of the Health Effects of Water Supply and Sanitation in Urban and Rural Areas of Five African Countries*. WASH Field Report no. 398. Water and Sanitation for Health Project, WASH Operations Center (Arlington, VA).
- Benneh, G., Songsore, J. et al. 1993. *Environmental Problems and the Urban Household in the Greater Accra Metropolitan Area (GAMA) - Ghana*. Stockholm Environment Institute (Stockholm).
- Casley, D.J. and Lury, D.A. 1989. *Data Collection in Developing Countries*. Oxford University Press. 225p.
- Chadwick, E. 1965. *Report on The Sanitary Condition of the Labouring Population of Gt. Britain*. Edinburgh University Press. 443p.
- Chudy, J.P. 1993. *Constraints to Producing and Collecting Urban Environmental Health Data in Central America*. WASH Field Report no. 429. Water and Sanitation for Health Project, WASH Operations Center (Arlington, VA).
- Esrey, S.A. 1994. *Multi-Country Study to Examine Relationships Between the Health of Children and the Level of Water and Sanitation Service, Distance to Water, and Type of Water Used*. Final Report. McGill University (Ste. Anne de Bellevue, Quebec).
- Fink, A. and Kosecoff, J. 1985. *How to Conduct Surveys: A Step-by-Step Guide*. Beverly Hills, CA, Sage Publications. 119p.
- Francis, S. 1994. *PALM in Slum Improvement Projects: A Training Experience from India*. RRA Notes no. 21. International Institute for Environment and Development, London.
- Kolsky, P.J. and Blumenthal, U.J. *Environmental Health Indicators and Sanitation-Related Diseases in Developing Countries: Limitations to the Use of Routine Data Sources*.
- Nichols, P. 1991. *Social Survey Methods: A Fieldguide for Development Workers*. Pratt B., (ed.). Oxford, Oxfam. 131p.
- Rothe, G. and Perez, E. 1993. *Planning for Urban Environmental Health Programs in Central America: The Development of Water and Sanitation-related Environmental Health*

*Indicators and the Survey of Existing Data in Three Countries*. WASH Field Report no. 420. Water and Sanitation for Health Project, WASH Operations Center (Arlington, VA)

Silas, J. 1984. The Kampung improvement programme of Indonesia: A comparative case study of Jakarta and Surabaya. In: Payne G.K., (ed.). *Low-income Housing in the Developing World*. Chichester, John Wiley & Sons. P69-87.

Songsore, J. and Goldstein, G. 1995. Health and environment analysis for decision-making (HEADLAMP): Field study in Accra, Ghana. *World Health Statistics Quarterly*. 48(2):108-117.

Stephens, C., Akerman, M. and Borlima Maia, P. 1995. Health and environment in São Paulo, Brazil: Methods of data linkage and questions of policy. *World Health Statistics Quarterly*. 48(2):95-107.

Stephens, C., Timaeus, I. Et al. 1994. *Environment and Health in Developing Countries: An Analysis of Intra-Urban Differentials Using Existing Data*. London School of Hygiene & Tropical Medicine (London)

Surjadi, C., Padhmasutra, L., Wahyuningsih, D., McGranahan, g. and Kjellén, M. 1994. *Household Environmental Problems in Jakarta*. Stockholm Environment Institute (Stockholm).

United Nations Environment Programme and World Health Organization. 1987. *Improving Environmental Health Conditions in Low-Income Settlements: A Community-Based Approach to Identifying Needs and Priorities*. WHO Offset Publication no. 100. World Health Organization (Geneva).

VanDerslice, J. and Briscoe, J. 1993. All coliforms are not created equal: A comparison of the effects of water source and in-house water contamination of infantile diarrheal disease. *Water Resources Research*. 29(7):1983-1995.

World Bank. 1990. *Indonesia: Urban Household Energy Strategy* no. 107A/90. World Bank.

World Bank. 1995. *World Development Report 1995: Workers in an Integrating World*. New York, Oxford University Press. 251p.

Zajac, V., Mertodiningrat, S., Soewasti Susanto, H. and Ludwig, H.F. 1984. *Urban Sanitation Planning Manual Based on the Jakarta Case Study*. World Bank Technical Paper no.18. World Bank (Washington, DC).

### 3. PARTICIPATORY RAPID APPRAISAL

#### 3.1 Background

In the field of rural development, "rapid" appraisal procedures became popular in the 1980s, as a sort of compromise between academic research and policy consultancies; between lengthy research studies on the one hand, and quick unstructured appraisals by experts on the other. The results of studies conforming to traditional academic criteria of acceptability are often too delayed or qualified to be of much use in policy making or project selection. The recommendations arising from short visits by experts, rarely more than superficially familiar with local conditions, are often timely and to-the-point, but ill informed. Rapid appraisal techniques attempt to draw on resident's own understanding of local conditions, and yet provide a systematic analysis and structured presentation of information. Many of the techniques associated with the participatory appraisal approach, which have gained popularity in the 1990s, developed out of the Rapid Rural Appraisal techniques (Chambers, 1994a).

"Participatory" is at once a more ambiguous and a more emotive qualifier than "rapid". "Participant observation" has long been used by anthropologists and others to refer to an approach wherein a researcher participates in the activities of those being studied. In participatory rapid appraisal, however, **it is the local residents who become active participants in the research**. In principle, the participation of local residents should help overcome the common tendency to neglect local knowledge and priorities. Simultaneously, there is an implicit assumption, or in some cases explicit goal, that local participation in research will increase direct local control over the development process - that, for example, having played an active part in studying their water and sanitation problems, residents will be in a better position to determine what is done to resolve them.

Depending on the importance one attaches to the more political aspects of PRA, it can be seen as either a set of techniques or an approach to development research. The use of participatory **techniques** can be defended as simply a means of collecting information. It is often argued that development programs and projects typically fail to take sufficient account of the knowledge and priorities of the intended beneficiaries. Just as economic corporations need to listen to their customers, so project and program managers need to listen to their clients. Methods of participatory rapid appraisal can provide information on clients' subjective preferences and attitudes, as well as tapping local knowledge of existing conditions. They can be seen, in effect, as means of "systematic client consultation," other options being participant observation, contingent valuation, sentinel surveys, and beneficiary assessment. From this perspective, the critical issue is the type and quality of the information provided, not whether the role of the local population in providing the information is active or passive.

For many advocates of participatory research, these priorities are reversed, and it is the direct benefits of participation that are emphasized. In a recent three part series on PRA in *World Development* (Chambers, 1994a; Chambers, 1994b; Chambers, 1994c), Chambers presents the case for PRA as a radically new approach. Participatory research is portrayed as inherently less



extractive than traditional research. Rather than simply taking information out of the community, PRA allows local people to retain more control over the research process and its findings. Ideally, this makes PRA more empowering than, for example, survey research. Given an emphasis on local control and empowerment, rapidity is less critical and may even be an obstacle, while the relation between locals and outsiders is becoming central.

The R in PRA most often refers to rural, and indeed participatory research has been primarily a rural phenomenon and the emphasis on rapidity is declining and indeed being reversed (Chambers, 1994a; Mitlin and Thompson, 1995). The urban context is sufficiently different to raise doubts about applying participatory techniques. Many of the best known PRA techniques focus on agriculture, which is less prevalent in urban areas. But the important differences go deeper. Urban and rural populations typically relate differently to their local communities and ecologies. Rural dwellers are more likely to know about their neighbors' holdings and habits than are urban dwellers. Similarly, rural dwellers typically work more closely with natural resources than their urban counterparts, and often have a more profound, if not always articulate, understanding of local natural processes and problems. In short, urban dwellers are a less obvious source of local social and environmental expertise.

Since urban dwellers are typically not so closely tied to their neighborhood as rural dwellers are to their village, the potential benefits of participation are also less in urban areas. For many urban dwellers, working together with their neighbors is an unlikely route to solving their priority problems, which may originate in their place of work, their school or some other institution in which few of their neighbors are involved. Responsibility for managing the local "public" environment often lies with the municipality, or more directly with the paid staff of public utilities. For some urban dwellers, the neighborhood is a socially irrelevant construct.

Nevertheless, there is growing interest in urban applications of PRA, especially as regards poverty and environmental management. Indeed, it is in poor neighborhoods, where local environments are degraded, the municipality provides little support, and private services are largely absent, that urban PRA is most likely to be appropriate. As described above, many of the most serious environmental problems afflicting poor urban dwellers have a neighborhood dimension, and require an organized response. Bad local sanitation, drainage, garbage problems, pest infestation, hazardous play areas: these are all problems which organized residents are likely to be able to respond to better, whether by taking measures directly themselves or demanding that, for example, government services are delivered more widely or effectively. Indeed, while well publicized PRA exercises may be almost exclusively rural, a recent review found that a great deal of urban PRA-style activity in low income areas (Mitlin and Thompson, 1995). Moreover, some practitioners have found that a great deal of urban PRA-style activity in low income areas (Mitlin and Thompson, 1995). Moreover, some practitioners have found that urban dwellers are more willing to talk and to challenge and explore convention than their rural counterparts.

Section 3.2 below, reviews some of the PRA procedures and techniques (many of which are also employed outside PRA). For some users, PRA is primarily a methodological tool kit, and the purpose of this section is to give readers unfamiliar with PRA an indication of what these tools are like. This is followed by a brief review of radical participatory philosophy, and the more ambitious claim that PRA empowers local residents. While both of these sections emphasize

urban applications where possible, several issues specific to urban PRA are addressed in Section 3.4, which also reviews some examples of urban PRA. Finally, this chapter on PRA finishes with an account of the application of PRA in Jakarta.

### ***3.2 PRA Methodological Principles and Techniques***

None of the techniques described in this section are exclusive to PRA, and a great many are common to one or other of the rapid appraisal techniques which have emerged in the past two decades (for a comparison of rapid rural appraisal and participatory rural appraisal see (Chambers, 1994b)). Alternatively, some of the techniques mentioned and publications referenced describe what purists would view as distinctly non-participatory procedures. Generally, this section adopts a rather broad definition of PRA, and ignores its more radical claims.

Historically, PRA techniques have developed largely in two sectors: agriculture and rural development, and public health (Mitlin and Thompson, 1995). A number of manuals have been developed on particular PRA techniques (Dawson et al., 1993), on applying PRA in particular sectors (Narayan, 1993) and on more general PRA procedures in rural areas (Theis and Grady, 1991). The International Institute for Environment and Development (IIED) has a regular publication (once named RRA Notes but recently renamed PLA Notes, in reference to Participatory Learning and Action). Several compendia on PRA and related techniques are available (Scrimshaw and Gleason, 1992). Despite a plethora of publications, PRA is not a theory driven or text-centered approach, and is far more easily conveyed through active training and practice. Chambers (Chambers, 1994c) (p.1440) suggests that videos have a popular means of spreading PRA, in part because of their visual nature.<sup>15</sup> Kits with folders containing activities to be used in participatory assessment are also starting to be made available. The World Bank sells a "Participatory Development Tool Kit" with an emphasis on water and sanitation (Narayan and Srinivasan, 1994).

Many scientific methods emphasize reproducibility, and clearly definable procedures. In one scientist produces a certain finding, a second scientist should be able to undertake the same study, employ the same techniques, and reproduce this finding (within certain preferably quantifiable, limits). Whether or not a given study actually is reproduced, the possibility that it might be discourages purposeful deception (and by reinforcing professional norms, it also discourages inadvertent deception). Generally, this advocates a reliance on carefully prescribed techniques. The insights of science often come from far less controlled empirical or theoretical explorations. However, these insights only become part of formal scientific discourse once more conventional and controlled procedures have been applied.

Just as PRA emphasizes local knowledge over the knowledge of experts, it has tended to emphasize common sense over scientific method. Indeed, it has been said that PRA techniques embody "systematized common sense." Other forms of action-oriented appraisal have never

---

<sup>15</sup> The videos Chambers cites are MYRANDA's *Garuda-Kempanahalli: A Participant's Diary of a PRA Exercise (1990)*, Michel Pimbet's *Participatory Research with Women Farmers (1991)*, and the Sri Lanka Self-Help Support Program's *We Could Do What We Never Thought We Could*.

come very close to meeting the traditional requirements of the scientific cannon. Nevertheless, with science so dominant in the intellectual arena, most appraisal methods have at least tried to mimic the scientific ideal. In recent years, the ascendancy of traditional (Cartesian) science has been challenged on a number of fronts. From the perspective of the philosophy of science, Toulman has argued that with the decline of scientific modernism a more humanistic practical philosophy is emerging, accompanied by a return to the "oral", the "particular," the "local" and the "timely" (Toulmin, 1992). PRA reflects this trend, and its common sense is in many ways postmodern. However, with PRA becoming increasingly professional in nature, "common sense" is being displaced by "good practice."

### **3.2.1 Characteristic PRA Principals:**

A few common sense principles which can guide the application of PRA techniques are given below.<sup>16</sup> Most of these principles are more compelling when the issues at hand are relatively well understood by local residents, the problems are specific to the locality, and where local initiatives can make a difference. To the extent that local residents are deciding what issues to address, these conditions are likely to hold (though less perceptible problems could easily be missed altogether). The principles are also more compelling if the audience itself is local. For an outside audience receiving PRA results, it can be difficult to determine what it really means to apply these principles. Unlike more conventional assessment procedures, the process is more transparent to local participants than to distant audiences.

#### ***Respect Local Knowledge:***

A cornerstone of PRA is that local knowledge deserves respect. Someone living in a community is likely to know more about its problems than an outsider. If local residents do not typically express themselves in a form immediately accessible to outside analysts, this more likely to be a translation problem, or a reflection of ignorance on the part of the outsider, than of ignorance on the part of the local. This principle is reflected in much of what follows.

#### ***Triangulation:***

Triangulation is cross-checking plus a bit more. It means using several (often three) sources, perspectives or techniques to answer a single question. If seemingly independent sources, or different perspectives and techniques, give the same results, then they are considered more likely correct. If they give different results, understanding why the differences arise can provide new insights.

#### ***Learning though seeing the doing:***

Where possible, PRA relies on visual and practical methods of learning, for both insiders and outsiders. In part this is simply to improve communications. As expressed in a popular PRA handbook (Theis and Grady, 1991), people learn 20% of what they hear, 40% of what they hear

---

<sup>16</sup> This listing draws on the references listed at the end of this chapter, including especially the work of Chambers and publications from IIED.

and see, 80% of what they hear, see and do, and nearly 100% of what they discover for themselves. Also, visual cues can be less intrusive and demanding than verbal prompts, and less threatening to the illiterate.

***Flexibility:***

PRA employs flexibility as a means of ensuring that unanticipated findings and new perspectives can be incorporated directly into the appraisal. The form a PRA takes, and the particular techniques applied, is more "path dependent" than most rapid assessment techniques. Implicitly, this means favoring local relevance over comparability, when choices must be made.

***Appropriate imprecision:***

Chambers cites a dictum attributed to Keynes, that it is better to be approximately right than precisely wrong. Rather than adopting standards of accuracy, or more generally standard operating procedures, PRA emphasizes the need to accept trade-offs and relate the need for accuracy with the relevance of the information.

***Exploring irregularities:***

PRA often involves identifying and following-up on odd cases, dissenting opinions, and peculiar situations. Such irregularities can provide insights that may not be available from analyzing averages, norms, and typical cases. Thus, for example, analyzing an exceptional newly wealthy family may indicate the barriers to economic success more clearly than analyzing the experience of a more typical poor family.

***Offsetting bias:***

Rather than attempting to achieve objectivity through carefully controlled procedures, PRA practitioners are more likely to advocate self-criticism, and taking measures to offset bias. The bias of most concern in PRA is that of the outsider, imposing preconceptions on local situations. Thus an emphasis is placed on techniques which do not require the outsiders to lead the PRA process. In addition, attempts can be to seek out less articulate groups in order to ensure that their views are represented.

***Resident review is peer review:***

The conventional scientific means of quality control is peer review. Typically this means that other researchers judge the approach and the validity and relevance of the results. Since other scientific researchers are unlikely to be know local specificities, this in itself places the burden on methodological rigor. In PRA, it is residents who, in effect, provide the peer review. As among scientists, disagreements are common. Local reviewers are less likely to miss significant errors in describing the local conditions, and their contextual knowledge can help screen out empirical errors and naïve recommendations. On the other hand, their conceptual and methodological review is likely to be less rigorous.

### 3.2.2 Characteristic PRA Techniques:

While the PRA principles are not manifestly rural or urban, a rural emphasis is evident in the techniques typically associated with PRA. Many focus on agriculture, and though urban agriculture can be very important, it is clearly less central to urban livelihoods. Drawing on both urban and rural experiences. Mitlin and Thompson (1995) developed the following list of tools and techniques used in urban areas. As with almost any techniques, the way they are applied is critical.

**Participatory mapping of the settlement** including the plotting of important landmarks such as rivers, roads, religious centers (mosques, churches, temples, etc.), and public services plus indications of features such as topography. Such maps may be drawn in any open space within the settlement by a group of inhabitants and local informants.

Community members undertaking **household surveys** of the settlement to collect socio-economic data such as numbers of children or resources such as skills of household members.

**Collective modeling of new housing designs** that will better meet the needs of residents. House models can be made from any easily available plastic and cardboard. Models can then be discussed and revised with different groups in the community in order to identify the preferred model.

**Collective planning of new settlement designs** that will better meet the needs of residents. Once a plan of the existing settlement has been made, residents can discuss how to change buildings, reblock and/or improve services. Once done, residents can explore how they can move from where they are presently to where they want to be.

**Collective identification of resources** including access, management and control, and including sources of income, health and links to rural areas. For example, small groups can draw pie charts to indicate the share of the community working in different jobs.

**Transect walks**, group walks through a settlement - for example, to identify the different informal sector activities taking place or to identify housing conditions and informally interview local people about issues of concern.

**Seasonal calendars** to identify seasonally occurring events such as illness, availability of employment, dietary patterns and income and expenditure.

**Wealth-ranking and well-being analysis** of all households in the settlement either through households being ranked from first to last or using relative colors to indicate different levels of wealth and well-being based on locally defined criteria.

An historical understanding can be developed either through **trend analysis or life histories**. In trend analysis, discussions with old people are used to plot the provision of basic services in the settlement or to consider how factors such as population and social customs have changed

over time. Through small group discussions with accounts of individual life histories, critical events in people's lives and in the life of the settlement can be identified.

**Institutional analysis** of relations with other local and external groups and organizations can be identified through **Venn diagramming**. Different sized circles are given to small groups of participants who then use the circles to illustrate the relative importance of other groups (e.g., local government departments, NGOs, church groups, self-help groups, etc.) to the community. The size indicates the importance; the distance on the ground indicates their closeness, or not, to the community. Different symbols (squares, triangles etc.) and colors may be used to indicate different kinds of groups or individuals.

**Matrix scoring and ranking** methods are used to identify, analyze and compare various resources (e.g., public services) and development options (e.g. latrine design, water supplies), and identify priorities.

**Social dramas and role plays** are acted out by local people to provoke discussion about opportunities and constraints facing community members.

Establishment of **formal and informal groups** in the community that can provide a focus for and maintain the momentum of community driven development.

Source: Excerpted from Mitlin and Thompson, 1995.

### ***3.3. Participatory as an End or a Means:***

PRA, in its more radical versions, advocates a reversal of the relationship between outside researchers and local residents. Traditional assessment procedures, such as surveys, are portrayed as extractive and domineering. The "expert" assesses the situation, treats local residents as at best just a source of information, passes judgement, and provides information and/or recommendations to a government organization. With PRA, some advocates contend, it is the local residents that obtain the knowledge. "The aim is to enable people to present, share, analyze and augment their knowledge as the start of a process. The ultimate output is enhanced knowledge and competence, and ability to make demands, and to sustain action. Instead of imposing and extracting, PRA is then designed to empower." (Chambers, 1994b (p 1266). In the extreme, non-participatory assessments are characterized as providing poor quality information to the wrong people, while PRA, correctly applied, provides good quality information to the right people.

If the emphasis on the "local." The "relevant" and the "timely," is characteristic of the sort of tolerant postmodernism advocated by Stephen Toulman, the emphasis on the power of knowledge, and micro-strategies to combat dominance, is characteristic of the more radical postmodernism associated with such thinkers as Michel Foucault. This report is not the place to debate such positions. The stance taken here, however, is that while the personal politics characteristic of PRA deserves to be taken seriously, they should not become the dominant theme. It is very important to consider the personal politics of research, particularly with

approaches such as PRA which put few formal constraints on the researchers. But not to the point where the benefits of action-oriented research is reduced to the political, and the political aspects of research are reduced to the personal.

The techniques of PRA are not inherently empowering, except in a very superficial sense. They can be used to collect information for decision makers who have no intention of letting the "participant" researchers have any direct control over how new projects or programs are implemented. There is no evidence that people generally place much value on participating in research for its own sake, or are necessarily empowered as a result.<sup>17</sup> When participatory techniques are being used to gather information for use by outsiders, they should be judged as such. The Development Administration Group at the University of Birmingham, for example, has adapted some of the techniques of PRA (or more accurately RRA) in their urban Indian training program, while consciously taking a largely unfounded official statements. This could well yield benefits for people who provided information, and others in similar situations. However, under such conditions it would not be appropriate to adopt the attitude that PRA is fostering participatory development at the grass roots, and is more politically correct than a standard survey. And it is very appropriate that Amis should conclude that "the *skills* of listening, critical thinking and rigor (however defined), which we have tried to use RRA tools to improve, are more important than the *method*" (Amis, 1994).

The personal-political aspect of participatory research becomes far more relevant if the increased participation extends to the decisions which flow from the findings. If a government or utility is giving residents more control over local program implementation or service provision, the benefits of having residents actively participating in the appraisal will be compounded. Similarly, if a non-governmental organization is working with a local community to improve environmental conditions, participatory research can at once provide needed information and the basis for active involvement of local residents in the projects and programs which emerge in later stages. And finally, if PRA is intended to provide a means for residents to analyze, understand, and act to improve their situation without outside assistance, then the personal-political is critical. (It is doubtful whether many current PRAs could really be justified in terms of the improved knowledge and capacity to act provided to local residents. After all, as PRA manuals never fail to emphasize, residents are usually knowledgeable of local circumstances and, given the very real constraints they face, very capable of acting even before the PRA.)

Especially under conditions when the participation is intended to contain a significant political element, it is relevant to note certain additional principles which Chambers associates with participatory rural appraisal (PRA), but not rapid rural appraisal (RRA):

- *They do it*: expressed as "handing over the stick" (or pen or chalk). Often the facilitator initiates a process of participatory analysis and then sits back or walks away, taking care not to interview or interrupt.

---

<sup>17</sup> For the poor as for the rich, collecting, organizing and analyzing information is laborious. Unless the advantages of participating outweigh the costs, it can be an added burden, more akin to a voluntary contribution of labor than an empowering process. By and large, research results are intermediate goods, only of practical use to those who are in a position to make relevant decisions. As such, it should not be assumed *a priori* that participatory research is more empowering and equitable than conventional research.

- *Self-critical awareness*: meaning that facilitators continuously and critically examine their own behavior and correct dominant behavior.
- *Personal responsibility*: PRA practitioners tend to take personal responsibility for what is done rather than relying on the authority of manuals or of a rigid set of rules.
- *Sharing*: of information and ideas between local people, between them and outsider facilitators, and between different practitioners.

Source: abridged from Chambers, 1994b.

These principles are, like so many, easier to state than to live up to. The flexibility of PRA makes it all the more important that facilitators take their responsibility seriously. A standard survey may be inherently extractive, but as a device it can also constrain somewhat the domineering impulses of the enumerator. For the social bully, the tools of PRA can become devices for "keeping the stick." Thus, even when significant grassroots activities are not expected to follow a PRA, it is important that the facilitators act professionally and be truly committed to facilitating participation.

### ***3.4. Urban Experience with PRA***

Since publications are not the principal means through which PRA conveys information, and since generalizable findings are not a goal, it is hard to summarize urban PRA experience. There is a growing, often somewhat informal, literature on urban PRA. As of early 1996, there were forty entries in the urban PRA bibliography maintained on internet ([http://www.ids.ac.uk/eldis/pr/pr\\_urb.html](http://www.ids.ac.uk/eldis/pr/pr_urb.html)). However, the actual and even more the potential scope of urban PRA is far greater than such figures would suggest. Urban grass roots organizations (GROs) and community-government relations are often critical to local environmental management, and the same process which has fostered PRA internationally has also influenced how participation is perceived and practiced in urban communities. PRA, with its label, its articulate advocates, its adoption by key NGOs and its donor support is undoubtedly having an influence in urban as well as rural areas. One might ask whether it is necessary or even appropriate to label, and hence give greater legitimacy, to one particular approach.<sup>18</sup> But the narrower question being addressed here is how that particular approach does, or does not, work. For that purpose, it is useful to look at some examples. Before turning to the example of Jakarta, it is worth considering some examples which, while they may not fit the label quite so well, provide an indication of the issues involved.

The following three cases have been taken from Mitlin, D. and Thompson, J. 1995. Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization*. 7(1):231-250.

---

<sup>18</sup> It is one of the many paradoxes of PRA that the very label that helped create PRAs popularity and is at times jealously guarded, can also take the process out of the hands of those it is meant to empower by creating a standard of participatory appraisal against which their own may be found lacking.



## Case 1: Planning for Real

SOURCE: Gibson, Tony (1994), "Showing what you mean (not just talking about it)", RRA Notes 21: Special Issue on Participatory Tools and Methods in Urban Areas, IIED, London, as summarized in Mitlin, D. and Thompson, J. 1995. Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization*. 8(1):231-250.

"I think it made people realize just how much they themselves have got to offer, and that nobody is actually ordinary."

Planning for Real is the label for a cluster of techniques and materials. In one sense, they are a tool-kit that allows people to explore possibilities, sort out options, rank priorities, share out responsibilities, set out a plan of action - all without having to endure talking shops which drive everyone up the wall and eventually out of the door. In another, they are a strategy designed to establish common ground between 'us and them' as a basis for a combined operation to create a working neighborhood. This common ground is the neighborhood which everyone knows.

*The model:* The first step is to use this common knowledge to make a three-dimensional model of the neighborhood. The model is made in sections each about a meter square, so that it can be taken around to attract attention. It is put together by a handful of people who have not yet given up hope for their neighborhood. Because of its size - anything up to 60 one-meter squares - it attracts attention and plenty of curious people gather round to discuss the reality, the problems and the potential. Part of the tool-kit is a range of suggestion cut-outs, visual representations, roughly to scale, of what could be done to turn this anonymous dwelling area into a working neighborhood. There are many possibilities for improvement - pedestrian crossings, play areas, workshops, trees, bus routs, improved housing. Many informal and formal discussions about the model take place; anyone can put any item anywhere, so long as they move no-one else's suggestion.

Residents are not the only people involved. Local officials are invited along to a formal meeting as long as they are willing to agree to a "house rule" to keep their mouths shut until spoken to. In practice they are soon being questioned. In this way, the process of consultation is being turned upside down. Instead of the professionals graciously presenting their own plans for residents' comment, the residents are consulting the professionals, to establish the range of options, the limitations, the possibilities - so that they can reach their own informed conclusions.

*Priorities:* The next step is to make out cards corresponding to all the items on the model. Each card has a note of the location and the subject. The cards are then transferred to another table where they are laid out beside a giant chart separated into three horizontal sections, NOW, SOON, LATER. With the same freedom of maneuver, the same anonymity if they choose, people can then transfer the cards to what seem the most realistic priorities for action. At once it becomes obvious, usually to people's considerable surprise, that there are comparatively few disagreements, and those there are can often be resolved by experiment on the model, and informal conversation which leads to an acceptable compromise. The NOW, SOON, LATER

chart allows both for long-term vision and for identifying what could and should be tackled here and now.

*Resource surveys:* The residents who promoted the model go round, house-to-house, face-to-face, with a cartoon questionnaire (looking as unlike a government form as possible) to find out from each family who is good at what. Back they come, and even the first sample of 50 households reveals a treasure trove of talent - hobby skills and work skills - which no-one, outsiders, realized was there. In parallel with this, some of the "moving spirits" among officials and politicians are digging out resource information from within the local authority and other outside bodies - tracking down people who could help with advice, materials and equipment which might become available, loans or grants that might grease the wheels of local effort.

Use of the model shows roughly where innovations might take shape. The resource surveys begin to show who might become involved within the community. The giant NOW, SOON, LATER chart sets out the when. This knowledge fuels real decision-making to produce an immediately practicable action plan.

## **Case 2: Community Action Planning**

SOURCE: "The Million Houses Programme in Sri Lanka" (1994), RRA Notes 21: Special Issue on Participatory Tools and Methods in Urban Areas, IIED, London, as summarized in Mitlin, D. and Thompson, J. 1995. Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization*. 7(1):231-250.

The approach: The vehicle for community action planning and management is the interaction/partnership workshop. At such workshops, community members interact as partners with the staff of the National Housing Development Authority (NHDA), the local authority and the non-governmental organizations. They discuss the problems of the community, identify solutions and formulate plans of action. The community takes responsibility for implementing these action plans in collaboration with the NHDA and other organizations, and to maintain and manage the built environment after the completion of the project.

The first step is a two-day community action planning workshop with participation from all relevant groups. It provides an opportunity for the community to obtain a comprehensive view of its socio economic situation and to identify its main concerns and priorities. It also exposes the community to the opportunities available for the improvement of its living conditions, as well as the constraints and obstacles that need to be overcome. The participants at the workshop first identify community problems and consider their causes. Possible solutions are then explored and strategies identified. The next stages involve developing concrete action plans and systems to monitor their implementation. Finally, the workshop considers how to ensure that everyone concerned is aware of the plan. Further half-day workshops then consider specific problems and issues. Settlement regularization: In the community action planning approach, the individuals and community play a central role in settlement regularization. A community workshop determines the broad principles within which the regularization process should take place, such as the width of roads and footpaths. The workshop participants are divided into three groups: a women's team, an officials' team and a team of community members and builders. The groups

meet separately to identify the needs for land in the settlement for residential plots, roads and footpaths, amenities, a community center, a playground, a clinic and any other needs. Each group presents its findings in a plenary session and the presentations are discussed until consensus is reached. Next, the three groups meet again separately to find locations for the land uses and to allocate land. Once this has been agreed, participants consider the logistics for the on-site blocking-out exercise.

The decision of the workshop on the principles and guidelines for re-blocking are distributed to all households in the settlement. Community leaders inform clusters of households of the day the blocking-out exercise will be conducted in their cluster and request the households to be at home on that day. The action planning team visits the cluster to discuss the plot boundaries with each of the households. The team meets with the families in each block to discuss the size of the area and whether or not it can accommodate all the households and, if not, how the problem will be dealt with. As soon as there is agreement, plot markers are placed to allow all involved to see the implications of the decisions. This will often lead to objections and further negotiations by the affected families. The process of negotiation between the families is the most important part of the exercise. The role of the officials is to ensure that no household can grab more land than has been agreed on by the workshop (which establishes a maximum size for plots in the settlement). In the process, all land disputes are settled on the spot and finally consensus is reached about the re-blocking of the land in the settlement.

Community-building Guidelines: Once land tenure has been regularized, the residents of the low-income settlement are usually eager to start the construction or improvement of their houses. The Urban Development Authority has made a provision in its laws concerning planning and building standards to allow reduced standards in these settlements. In the community action planning approach, representatives of the various interest groups in the settlement work together with health and planning professionals to formulate building codes specific to that settlement. Ideally there are some 20-25 participants; three to five resource people and 15-20 community members (with at least seven women). The workshop addresses a range of questions related to what the building regulations should be and how they should be enforced.

### **Case 3: The India-South Africa Community Exchange**

SOURCE: Bolnick, Joel and Sheela Patel (1994). "Regaining knowledge: an appeal to abandon illusions", RRA Notes 21: Special Issue on Participatory Tools and Methods in Urban Areas, IIED, London, as summarized in Mitlin, D. and Thompson, J. 1995. Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization*. 7(1):231-250.

The experience-based learning of the training process has two separate but inter-related purposes. First it enables low-income people to evolve their own understanding of their social and economic environment not just on a micro-level but via exchange in regional and global arenas. Second, it equips the participants, impoverished residents of informal settlements, with the ability to carry out and drive their own experiential learning programs.

Shack counting: Once the community leadership is ready to undertake the training, a start date is arranged with the training team. Normally, the training begins with the physical counting and mapping of all houses and other structures in the settlement and this shack counting exercise always starts with a huge celebration which might be a concert, community-based drama, or visiting dignitaries or other homeless communities. The training team prepares for the activities of the next day by completing a few practical tasks. A rough map of the settlement, drawn a few days before, and a series of photographs of the settlement are displayed. Everybody should be ready at the start of the day to begin the counting. One member of the "training team" is assigned to each section. They become the leaders of groups of people who will assist in counting all the structures in the sections. By counting the shacks with training team members these people receive a thorough experience-based training.

The informal exchanges that take place during this process are the very soul of the process. This simple process of dialogue and exchange only occurs when the people from communities do the counting. The informal discussions that accompany community-driven enumerations are both an outstanding method of mobilization and an exceptionally accurate way of identifying issues that people in the community regard as relevant. Community-driven enumerations, where they are backed up by a strong but loosely structured federation of informal settlements, achieve what professional enumerators are unable to do. The process helps identify and release the real feelings, frustrations and expectations of oppressed people. The way a squatter responds to the inquiries of a fellow squatter is very different from, and more relevant than, the way that same squatter responds to the social scientist or researcher. In tandem with the shack count and numbering, the training groups draw rough maps of the settlement.

Mapping: As the groups progress through the settlement numbering and counting shacks, shops, crèches, churches and so on, they draw a simple two-dimensional map of the streets and structures. Key landmarks are included, such as drains, sewers, electric lights, rivers and other major features. Once the shack counting and mapping have been completed, the sections are combined into one by a community member who draws well. The result is that the community members have produced their own physical map of the settlement in which they live: a concrete example of how the attainment of the knowledge through practice generates energy and power. Once people have demarcated their settlement themselves, they go on to examine land ownership and related matters in terms of the own needs and experience. When professionals undertake this exercise, it is often referred to as a cadastral survey. Once the mapping exercise has been completed, it is possible to learn to read the cadastral survey.

Surveys: Although this training program does not follow any set formula, a survey usually follows a shack counting exercise to collect a range of data needed for the development process. Once the information generated by the shack count has been reflected back to the community via a mass meeting accompanied by the graphical display of all the information gathered, the survey is started.

House models: Like everything else in the training, the house modeling exercise begins with a dream. Members of the host community are encouraged by the training team to imagine the house they would like to live in and to put that dream on paper. This expression of a desire is the starting point of a sustained system of concrete learning. By drawing the house of their dreams,

people begin to visualize possibilities in terms of their abilities and their levels of affordability. Invariably these dreams are extravagant. The houses of people's imaginings are usually too elaborate and costly for their resources. In the steps that follow, aspirations are realigned by the participants themselves. Once individuals have drawn their dream houses, they discuss and revise their houses in groups. The group builds a cardboard model of the chosen house and costs their design. A house modeling competition is held in the community. The chosen design(s) is/are built using cloth or paper as material. People get together to officially open and view the model house(s).

Housing savings groups: Housing savings groups are loosely structured organizations which enable homeless people to develop financial systems that they control and manage themselves. The shack counting and the start of the survey will have generated much discussion on the land and shelter needs of the community. Without fail, the discussions will focus on money. People will point out that they are homeless and landless because they cannot afford formal housing, they will start to think of how they can harness resources so that formal housing is possible. One arrangement is housing savings groups. By actually starting these groups, the training process creates the momentum that will help to drive a people's based housing movement in the "trained" community.

***Box 3-1***  
***Common PRA Pitfalls***

- 1. Participation only in name** - Participatory rhetoric often exceeds the practice. It is sometimes incorrectly assumed that by using the techniques of PRA, participation will automatically be ensured. Alternatively, meeting the goals of a project may be inconsistent with high levels of local participation, and this is often not openly discussed at the outset.
- 2. Conflicting or ambiguous objectives** - Participatory appraisals can fall into the trap of trying to be all things to all people. This can result in confusion and general disillusionment.
- 3. Inadequate training and preparation**, especially for larger scale applications - A good PRA practitioner can make the process seem almost too easy, giving the false impression that it out to come naturally. While the PRA can be very informal, the facilitators must have their own professionalism, which can be difficult to acquire.
- 4. Inadequate follow-up** - A rapid participatory exercise can raise expectations without fulfilling them. Also, good participatory research can be difficult to initiate but not so hard to maintain. Often it may be work sacrificing rapidity to sustainability.

Note: These pitfalls are in reference to the goals implicit in the PRA approach. Critics of PRA would identify a different list of pitfalls.

**Box 3-2**

***Problems to keep in mind when initiating PRA for environmental appraisal in disadvantaged neighborhoods***

- 1. Communities may not be harmonious** - Urban neighborhoods are often deeply divided. Unless dealt with diplomatically, but without silencing the disadvantaged, such conflicts can easily undermine a PRA.
- 2. Environmental problems may not be a high priority** - Even when conditions very inadequate, residents may face non-environmental problems they consider more pressing. A concern for environmental issues on the part of the facilitators should not be allowed to distort local priorities.
- 3. Sanitary and hygiene issues can be sensitive topics.** In many cultures discussing private sanitation and hygiene matters with strangers is improper, and in some discussing such issues with neighbors is even more awkward. Also, environmental problems among neighbors can be associated with long-standing grievances.
- 4. Medical/scientific and local understandings of environmental problems may conflict.** Situations may arise where local practices seem, on the bases of conventional medical understanding, to be putting local residents at risk, and vice-versa.

### ***3.5 An Application of Participatory Rapid Appraisal in Jakarta***

#### **3.5.1 The Context**

Jakarta is the quintessential city of contrasts. Skyscrapers rise like mechanical sculptures, competing to display ever more (post-)modern shapes, textures and colors, and signaling Jakarta as a global city. Nearby *kampungs* hark back to a rural Indonesia, even though, often crowded and stressful, with televisions muttering, they are clearly an integral part of the global city. The wealthy neighborhoods, houses separated by high walls often topped with shards of glass, have few of the qualities necessary for effective PRA. Many of the poorer *kampungs*, on the other hand, seem quite appropriate.

Throughout the city the government and the state environmental utilities play an important part in the environmental management. In wealthier residential areas, environmental management is largely the responsibility of individual households, the state, or the environmental service industry. In many of the poor *kampungs*, however, the environmental services provided to individual households in the wealthy areas are only available to groups. Toilets, wells and water connection are more likely shared among households, and are often public. Households are more likely to have to take their waste to a collection point, and to contribute time to local clean up efforts. The cramped dwellings, often intermingled with informal and sometimes formal industries, can easily create another layer of collective environmental problems. Simultaneously, residents are more knowledgeable of the conditions of the neighborhood and the lives of their neighbors. Aspects of the "face-to-face" community of rural isolation is recreated in the city by way of crowding and a lack of facilities. One would expect there to be, therefore, both good

reasons for local residents to work together to solve their environmental problems, and the sort of local knowledge upon which PRAs can be based.

In Indonesia, as elsewhere, participatory rapid appraisal is more often undertaken in rural than urban areas. Many of the small scale urban appraisals which have been undertaken have not been documented with published materials. Whereas publications are the principal means through which the results of contingent valuation and standard surveys are communicated, the same need not hold for participatory assessments - the principal audience is often the participants themselves, for whom formal publications are of limited relevance (especially in areas of high illiteracy). Indeed, published and widely disseminated appraisals may well be exceptional, and unrepresentative.

The participatory appraisal presented here was undertaken in four neighborhoods of the *kelurahan* of Angke, Jakarta. Save the Children Indonesia, the local branch of an international NGO, provided the outside facilitators and trainer. Internationally, Save the Children has contributed significantly to the development of participatory assessment techniques. In collaboration with the International Institute for Environment and Development they helped to develop one of the better known handbooks on PRA (Theis and Grady, 1991). The staff of Save the Children in Jakarta are committed to a participatory approach to community development. Indeed, as with many NGOs, the PRA techniques have become part of a less rapid strategy for facilitating participatory development. A PRA can be a means of initiating a relationship with a community which may take years to develop. In this context, the level of trust and ease of communication at the end of the appraisal process are as important as the quality of the information generated.

The areas selected were neighborhoods where Save the Children was considering initiating new activities. They were already engaged in a variety of activities in a nearby neighborhood and were in the process of developing a proposal of expanding their work. It was considered important for there to be a likelihood of continued support for local environmental initiatives, after the PRA concluded. Ideally, residents would benefit from the PRA alone. However, in practice a rapid and demanding assessment without any follow up can easily be perceived as disruptive and unhelpful, no matter how participatory.

While the participatory appraisal focused on local environmental problems, the scope was not so predefined as with the other two techniques. A narrow problem definition restricts the residents' control over the research, and in effect makes the process less participatory. On the other hand, the less clearly defined the scope of the appraisal, the less likely the results will be comparable across different PRA neighborhoods, let alone between the PRA and the broad spectrum survey or the contingent valuation. As a compromise, it was agreed beforehand that local environment and health problems would be the topic of the appraisal, but that the participants could expand or modify the definition of what this covered if they chose. Previous experience indicated that such neighborhoods were likely to face some very serious environment and health problems, and that the topic provided a suitable entry point for Save the Children, even if it should not be allowed to determine the long term direction of their community support.

It was also agreed that, while additional problems could be introduced and definitions altered, the following problems would be put to the participants in the course of the course of the appraisal: water and sanitation, drainage and flooding, waste disposal, pests and pesticides, food contamination and air pollution. It was envisaged that the appraisal would explore some of the possible reasons environmental problems arise (e.g. economic pressures, lack of concern and responsibility of community members, insecure land ownership) as well as perceived relations between environment and health.

Overall, the practical purpose of the PRA was to initiate locally led improvement efforts which Save the Children could support over the coming years. Thus the participatory appraisal was intended to go beyond describing the situation, and help the participants explore how the situation could be improved, and develop a plan of action.

### **3.5.2 Procedures and Implementation**

The overall approach followed that described by Theis and Grady (Theis and Grady, 1991). At the core of this approach is the formation of PRA teams of between three and seven people, some from outside and some from inside the community. The teams are trained in participatory techniques, though the participatory philosophy advocates that the trainees take an active role in their own training. An Indonesian manual similar to that developed by Theis and Grady (Theis and Grady, 1991) was prepared for the PRA, but also eventually for other appraisals.<sup>19</sup>

*Angke kelurahan* consists of ten *ruangan warga* (RWs) and 129 *ruangan tetanga* (RTs). The RWs and RTs are administrative areas, with populations of roughly three thousand in an RW and up to three hundred in an RT. Two of the poorest RW were selected, with a view towards assigning one PRA team to each RW. Within each of these RW most of the PRA activities were concentrated in two RT. (In referring to specific RWs and RTs, the official numbering system will be employed, in which the four chosen RTs are designated: RW7-RT3; RW7-RT4; RW8-RT3; RW8-RT5. In the more general discussion, the RWs will be referred to as communities and the RTs as neighborhoods, though a more direct translation would be citizen association and neighborhood association). This spatial concentration was intended to ensure that at least one member of the PRA team be intimately familiar with the area being appraised. It was felt that an individual could only be expected to be familiar with one or two contiguous RTs.

The PRA activities were scheduled to be completed within a two week period after the preparations were complete, employing approximately 8 active days. The activities involved three stages: 1) Reconnaissance; 2) Formulation and training of PRA teams; 3) Implementation. The first two stages took a day, the second three days, and the implementation took place over 4 days.

---

<sup>19</sup> Currently, although PRA is growing in popularity, and many of those interested are not fluent in English, there is very little material available in Indonesian. The manual is primarily for the use of the PRA trainers, but sections are also helpful for trainees and for outsiders attempting to understand the nature of the PRA process, and the quality of the results.



### ***3.5.2.1. Reconnaissance***

The initial field preparation involved visits to the Head of Angke *kelurahan*, and the heads of the communities being appraised. These officials were informed of the PRA process, and their assistance in obtaining secondary source data was solicited. Following these meetings, photographs were taken of the environmental situation in Angke, and particularly the areas to be appraised. These photographs were intended for later use during the PRA, in part to help illustrate some of the problems the participants might want to consider.

### ***3.5.2.2. Formation and Training***

The PRA training was held in the Angke village meeting room over three days, June 20-23, 1994 (9:00 A.M. - 3.30 PM). The participants included **six local residents** and four staff members of Save the Children and an observer. The purposes of the training were to:

- a) create a sense of cooperation among the teams
- b) introduce and familiarize the participants with the PRA approach and techniques
- c) schedule the PRA activities up to the final village-level presentations of results

During the training, the participatory philosophy was made explicit. The differences between PRA and standard survey research were discussed at the start. The role of the team as facilitators, working with rather than on the local residents, was emphasized. PRA techniques were introduced as tools which the participants could control and use, rather than rules which the participants must follow. The training introduced the teams to more techniques than they ultimately chose to employ. More emphasis was placed on employing the variety of approaches available to complement and cross-check each other, than on reducing statistical uncertainty.

In addition to introducing the participants to the participatory approach, the training covered several different sources of information, the use of various techniques to solicit and synthesize information from these sources, and the use of this information to help construct action plans with local residents. The many different techniques available, along with example activities, described in the various PRA handbooks. As noted above, the ones employed here draw heavily on Theis and Grady's manual (Theis and Grady, 1991), where they are all described in more detail.

#### *Sources of Information*

In the Angke appraisal, as in most PRA, a variety of information sources were used, often to provide different perspectives on the same problems.

#### a) Direct observation

Direct observation is part of any PRA. Both outsiders and insiders can learn through careful observation. Within PRA direct observation is typically treated as a means for verifying, challenging, complementing or extending local knowledge and opinion, rather than a technique to be used in isolation.

b) Secondary source data collection

Especially in urban areas, information is collected by a wide variety of institutions that operate at a local level. These sources can be tapped in the PRA. Prior to the training some preliminary information had already been collected from the kelurahan office. During the training, it was agreed that secondary source material on morbidity would be collected from the community health center and that relevant data would be solicited from key informants.

c) Semi-structured interviews (SSI)

Semi-structured interview typically combine some predetermined questions or activities with more open ended discussion. They can include interviews with individuals, selected to provide a representative cross section of the community or key informants, with a specialized knowledge of some aspect of the topic of interest.

d) Focus Group Discussions

In focus group discussions, a small group of interested people are brought together to discuss a particular topic. A facilitator can help maintain a focused discussion, and assist the group in synthesizing the issues covered and any conclusions reached.

*Soliciting and Structuring Information*

During the interviews and discussions, PRA facilitators are intended to elicit information and analysis without overly influencing the course of discussion. The following easily learned techniques for gathering and synthesizing information were presented and tried out during the training:

a) Ranking

*Preference ranking:* Simple ranking activities can elicit preferences from both individuals and groups. The training covered both individual ranking and combining of individual preference rankings to provide a group ranking. Diagrams were employed to portray environmental problem areas, with additional diagrams made during the discussion if and when new problems were brought to light.

*Wealth ranking:* Procedures can also be employed to score or rank, for example, different households according to their wealth, different dwellings according to their quality, or different locations according to their desirability. Wealth was used as the example through which to demonstrate such procedures.

b) Diagrammatic representation.

*Mapping:* Simple mapping can be employed to represent environment problem locations, and, for example, the spatial extent of the problems. The facilitators can both help initiate the mapping process, and be responsible for creating a copy of the map for later consultation.

*Historical profile:* A historical profile is a summary account of the critical events in the community's history, possibly complemented by, for example, life histories of some of the older residences. (The historical profile was not developed in detail during the PRA, though for one of the neighborhoods it was found that the area had been a swamp for dumping scrap iron, and this was given as a reason for the poor water quality, and one of the reasons a factory gave for not being concerned about pollution was that the area was originally industrial).

*Seasonal calendar:* A seasonal calendar is a summary of how activities or conditions vary over the year. Often developed as simple graphs, a seasonal calendar might cover, for example, the prevalence of diseases, flooding, insects, rainfall, water interruptions or any number of other phenomenon which vary over the course of the year.

### *Analyzing and Acting upon the results*

As the PRA proceeds, the team must react to new developments, and, at least in the PRA under discussion, shift from an emphasis on information and analysis to discussing what ought to be done. The training covered several aspects of this later stage of PRA, including:

a) Team Discussion/Analysis

At the end of each day of the PRA the teams meet to share experiences, discuss the results to date, decide how to respond to any problems that have arisen, and develop new approaches. (The training outlined the purpose and format of these meetings.)

b) Activity Planning

In designing a response to environmental planning, there are simple techniques which help structure the planned activities, ensure that they are coherent, and that all participants have a common understanding of who is committing what.

### **3.5.2.3. Implementation**

The major PRA activities selected involved semi-structured interviews and focus group discussions. The plan developed during the training session, modified slightly during the course of the activities, involved three phases:

a) *Semi-structured interviews* with key informants, identified as:

- \*Health Centre Officials
- \*RW Head and staff
- \*RT Head and staff
- \*Religious figures
- \*Women's leaders
- \*Other informal leaders

Some of these key informants were officials who would in any case have to be visited, informed of the purposes of the PRA, and asked for permission to proceed. The interviews included a discussion and ranking of environmental problems affecting the communities and

neighborhoods. In addition, during the meetings with key informants a map of the RWs and RTs was developed, socio-economic distinctions relevant to environmental management were ascertained, in part so as to help design the second and third phases.

b) *Semi-structured interviews* with individual community members from different social groups, and additional key informants engaged in environmental management, such as the managers of the public bathrooms and toilets.

In this phase, the emphasis was on collecting information about the physical aspects of the environmental problems. Besides conducting semi-structured interviews, observations were made of the garbage disposal situation, environmental cleanliness, public bathrooms and toilets, the PAM system, ground water sources and population density.

c) *Focus Group Discussions* with representatives of:

- \*Permanent resident women
- \*Permanent resident men
- \*Seasonal residents
- \*Teenagers

In addition to ascertaining the environmental priorities of these groups, during the final phase the intent was also to discuss the overall findings, the reasons the environmental problems arise, and develop a plan or strategy for responding.

### **3.5.3 Results**

The following summary highlights results that are distinctive to the PRA approach. The wealth of detail that is itself characteristic of PRA is lost, however. During the course of a PRA, a great deal of information of varying quality is encountered. Some is qualitative information that is difficult to present out of context - anecdotes about neighborly disputes, visual and olfactory evidence of environmental distress, detailed but incomplete accounts of particular environmental management efforts, very strongly or very obliquely expressed opinions. Some is quantitative information that is potentially useful as background, but not sufficiently pertinent (or in some cases reliable) to include in this summary: figures on mortality from dengue fever and estimates of the share of water containers containing *Aedes Aegypti* larvae; the number of doctors, midwives and other health workers; uncorroborated estimates of the share of expenses typically devoted to food, rent, and bathing; estimates of the number of permanent, semi-permanent and emergency homes in the area. For a participant, both the qualitative and quantitative detail contributes to the PRA process, and helps avert incorrect conclusions, even if it does not allow clear conclusions to be drawn.

#### ***3.5.3.1. General description of Angke drawing on PRA results:***

Angke lies in the Northwest of Jakarta-DKI, near the old harbor. There are about 32,000 registered inhabitants in Angke, living in an area of about .8 square kilometers, mostly in one or two story structures. Angke's population density is a very high: 40,000 people per square

kilometer, or about three times the 1990 average for Jakarta-DKI. A number of the statistics available at the Angke Office indicate that Angke is also considerably poorer than most of Jakarta. Almost half of the dwellings are listed as temporary, and most of the remainder are only considered semi-permanent. Of the 12 thousand residents classified as "productive", 76% are temporary workers. However, even a very superficial visit to Angke indicates considerable variety in the condition of the residences and the lifestyles of the inhabitants. Like much of residential Jakarta, for example, the homes on the larger roads tend to be more substantial and self-contained, while in the small alleyways behind, the dwellings are more cramped and lifestyles less private.

There is a health center in Angke, frequented by some residents of Angke, but also residents of neighboring villages. According to the records of this health center, the three principal illnesses of outpatient children under five are, in order of frequency, throat infections, skin diseases and diarrhea. For infants, the next most frequent illnesses were malnutrition and measles, while for toddlers (1-4) they were asthma and mouth and gum diseases. Most of these health problems are likely to be related to environmental conditions, though the fact that malnutrition appears as a recorded health problem reflects the poverty of the area more directly. (Source: Report of May 1994, by Pusekesmas of Angke Village).

Formal attempts to engage local residents in environmental improvement center on garbage and gutters. Resident households are expected to contribute Rps 1,500 per month for garbage collection and cleanliness efforts coordinated by the Institution of Village-Community Resilience (LKMDK) and organized by neighborhood and citizen associations (RT/RW). In addition, they are meant to contribute to collective efforts (*Kerja Bakti* or *working together*) to clear the drains and clean-up litter every Sunday, though actual efforts are intermittent. (Source: observation and interviews).

Within Angke village, three of the ten wards were designated poor on the basis of data collected through the Village Office (RW2, RW7, and RW8). Along with many other low income neighborhoods in Jakarta, these neighborhoods were also considered to have: 1) a high share of semi-permanent or poor quality housing, 2) a high population density; 3) a high level of informal sector employment; 4) a low health status; and 5) a high level of violence and crime. Two of these three wards, RW7 and RW8, were selected for the PRA (within each ward, the PRA activities were largely restricted to two neighborhoods (RTs)).

The two wards chosen are on opposite sides of a dual carriageway passing through Angke. Within RW7, the same roads are asphalted, but narrow and potholed. In the neighborhoods selected, the roads are made of dirt, strengthened with gravel, and the houses are separated by small alleyways, about 1 meter in width. The narrow, dark alleyways are used for drying laundry, cooking, washing dishes, keeping chicken coops, and of course for chatting and as a play area for children. In RW8 the roads and alleyways are somewhat wider and more often asphalted, but otherwise similar. In both wards, there are sites where garbage accumulates and decomposes, and problems with garbage blocking the drains. In both wards, waste water is intended to flow through shallow open drains to the large open drains which then flow into a nearby river. The wastewater is visibly contaminated. Children under five years old often

defecate in the drains. Wastes from a paint factory and a soap factory in RW8 are released into drains that then flow alongside people's homes.

Within both wards are a wide variety of water sources and qualities. For cooking and drinking, most residents buy water from vendors who resell PAM water (in RW7, there is a resident who manages a hydrant, where the vendors can buy water). In general, the residents store water for every day needs in buckets and plastic containers, the water being changed every 2-3 days.

There are some public wells used for bathing, and many households have wells that are shared among a few neighbors. In some of the more congested areas, residents have no private toilets or wells, and rely on the public baths and toilets. The public toilet in RW7 which serves the PRA neighborhoods, has seven toilets and three bathing rooms. The water for the public toilet comes from a deep well, and while salty, it never dries up. The water from private wells, on the other hand even where it is considered of good quality, can dry-up in the dry season. Thus the public toilets are more heavily used in the dry season.

In all seasons, the quality of the ground water varies considerably depending on the location of the well. Ground water near the old fish-pond and swamp in RW7 is yellow in color, has an offensive odor, and feels sticky if used for bathing; the swamp was reportedly once used for dumping waste from a tannery, as well as old machinery. In parts of RW8/RT5, the water is dark, oily, has a metallic smell and reportedly irritates the skin if used for washing. Some residents blame the paint factory wastes for these water problems.

In addition to the paint and soap factories already mentioned, RW8 has a "galvanizing" home industry, and a specialist furniture factory, working with materials such as plywood. RW7 has a candle factory, garment factories and a bakery. Given the close proximity of the residential and industrial areas, it is almost inevitable that environmental problems arise. The neighborhoods selected for the PRA activities are especially close to the industrial activity, but also face their own congestion problems.

RW7/RT3 is actually located on what was once the swamp used for waste dumping. There are 13 dwellings of less than 27 m<sup>2</sup>, containing 20 families with permanent residence status. In five of the dwellings, there are small (about 2.5 by 2.5 meters) rooms rented to "temporary" residents, most of whom are not on the official lists. The only ventilation is at the front of the dwellings. Only two of the dwellings have their own toilet, and seven have wells. The other RTs selected are structurally similar, though as will become evident below, their environmental problems differ.

### ***3.5.3.2. Local priorities:***

In the PRA activities, including especially the focus group discussions, considerable attention was devoted to ranking environmental problems. Even with the best facilitators, mixed group discussions tend to be dominated by a minority of participants, often the more influential adult men. While the ranking procedures employed incorporate the stated priorities of all participants, the direction of discussion can easily swayed, and some participants may feel obliged to agree

with the views of others. To help counteract this tendency, men, women, teenagers, and temporary residents were grouped into separate focus groups.

Table 3-1 and Table 3-2 summarize the problem ranking for various groups in each ward. The problems listed include some portrayed in diagrams or photographs pre-prepared by the facilitator (air pollution, water, garbage, insects) as well as problems identified and drawn during the discussions. Like many quantitative results from PRA methods, these rankings are more useful as part of the process, and embedded in a discussion of the whys and wherefores, than analyzed in isolation. Nevertheless, before discussing some of the problem areas in more depth, and attempting to draw out some conclusions which would have been missed by the other two techniques, it is worth providing a caveat to the rankings themselves.

For a number of reasons, the level of consensus about what constitutes an environmental problem, and which are the most important within neighborhood, may be exaggerated. The problems anticipated by the facilitators have a larger chance of being ranked than other problems, which the participants may forget, or not consider environmental. Moreover, since the neighborhoods are small, the people from the different focus groups interact, and the early discussions can influence later discussions: problems brought up in early group discussions have a larger chance of being considered by other groups. Reinforcing these tendencies, some of the trained facilitators were from the neighborhood, and participated in all of the focus group discussions in their neighborhoods. While the training is intended to ensure that the facilitators do not unduly influence the course of the discussion, this is not an easy skill, and unintentionally the facilitators were undoubtedly influencing the results. These factors probably help explain why the differences among groups within each ward was so much less than the differences between the wards.

**Table 3-1 Ranking of Environmental Problems by Selected Groups in Community RW7**

<b>Problem</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>Total</b>	<b>RANK</b>
Lack of clean water	5	2	5	5	5	5	5	4	36	I
Insects	4	4	4	4	1	3	3	5	26	II
Blocked gutters	1	1	4	3	4	2		1	16	III
Garbage				2	2	4	4	2	14	IV
Fire		5			3				8	V
Lack of ventilation							2	3	5	VI
Mud		3							3	VII
Crowding	3								3	VII
Washing facilities	2						1		3	VII
Feces in drains			3						3	VII
Flooding				1					1	XI
Unhealthy food						1			1	XII

Note:

**Groups A-H:**

- A-Public figures (RW head, RW secretary, heads of RTs, religious leaders, community figures)
- B-Permanent female residents - neighborhood RT3
- C-Permanent female residents - neighborhood RT4
- D-Permanent male residents - neighborhood RT3
- E-Permanent male residents - neighborhood RT4
- F-Season female residents - neighborhood RT3
- G-Seasonal female residents - neighborhood RT4
- H-Teenagers - neighborhoods RT3 and RT4

**Table 3-2 Ranking of Environmental Problems by Different Groups in RW8**

<b>Problem</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>Total</b>	<b>RANK</b>
Air pollution	4	5	5	5	4	4	27	I
Lack of clean water	3	4	4	3	5		19	II
Garbage	5	1	2	4		5	17	III
Industrial waste	6		3			3	12	IV
Blocked gutters	2	2		2			6	IV
Flooding	3	3					6	V
Vibrations	1		1	1			3	VII
Gambling						2	2	VIII
Alcohol abuse						1	1	IX

*Note:*

**Groups A-H:**

A-Public figures

B-Permanent female or male residents - neighborhood RT3

C-Permanent female residents - neighborhood RT5

D-Permanent male residents - neighborhood RT5

E-Seasonally present female residents - neighborhoods RT3 and RT5

F-Teenagers - neighborhood RT5

***Water (and sanitation):***

Water was the top priority problem in RW7 and the second ranked problem in RW8. Some of the water problems were described above. The shallow well water is saline, and hence undrinkable, in this part of Jakarta. That is accepted as an inevitable problem. Good ground water is considered to be water that can be used for washing and other less demanding uses. However, there are various localized water quality problems - the yellow water near the old swamp, the blackish, oily water in RW8RT5 - that make even washing problematic. The well water is sometimes smelly, sticky or irritating to the skin. Also, in the more congested areas, it is hard to find the space for a well.

These water problems create a combination of physical, financial and convenience burdens. Clean PAM water from a vendor costs 200 Rp/container, and at least one container is needed every day, even if well water is used for most purposes. In the neighborhood in which the MCK has bathing rooms, it was estimated that a family with four children would have to spend between 800 and 1,000 Rupiah per day for cooking, bathing and paying for the toilet, if they used PAM water for drinking and cooking and the MCK for bathing and for the toilet. In another neighborhood, an expenditure analysis was done, and it was concluded that at least 5.8% of a household's income would have to be spent on water for cooking, drinking, bathing and washing. In an attempt to save money, people can use the bad water and children can defecate in the drains, even if this behavior is not really condoned. Many men can use the bathing facilities and toilets at their place of work.

Household connections to PAM are considered too expensive: in one neighborhood a PAM official said installation would cost between 300 and 700 thousand Rupiah, depending on the distance between the house and the PAM water pipes. The residents have not had difficulties with PAM officials, and fears of eviction are not preventing them from investing in their homes. The barrier to household connections is that the connection costs are too high, and there are as yet no groups in the community prepared to coordinate the installation and thereby lower the



individual costs (though there were indications during the PRA that this might change). As indicated below, there are also drainage problems which would have to be dealt with.

From many of the residents' perspective, piped water connections would be an improvement, but so would somewhat better ground water. However, without a better knowledge of how and why the groundwater is polluted, it is hard for the residents to take action. They can blame the factories for releasing liquid wastes, but past complaints have had no effect, and they cannot even be sure where the pollutants are actually from.

In attempting to develop a plan of action in RW7, the water problems received most of the attention. Following a detailed discussion based on hearsay concerning PAM costs, it was agreed that someone would approach PAM (the water utility) and request estimates for connection costs. This information would then be presented to a meeting of residents in order to determine how to proceed. One suggestion was a collective installation for interested residents via the mosque, so as to avoid high individual installation costs.

In RW8, one of the actions agreed upon during a planning discussion was to try to get dispensation from the MCK for children, so that they would not have to use the drains. If the toilets were free, adults could also put more pressure on children to use them.

### ***Air Pollution:***

Air pollution is the top ranked problem in RW8, but does not even appear in the list of RW7. As noted above, the level of consensus within the neighborhoods may be exaggerated by the manner in which the discussions took place. On the other hand, the residents of RW8 live near a paint factory, a leather factory, a temporary garbage dump and a woodworking shop. The smells and fumes, especially from the paint factory, are very disturbing, and quite different from the problems of RW7. While the residents do not perceive the pollution to be a threat to their health, it affects the quality of their lives, especially for the women and children who spend more of their time near home.

It was difficult for participants to see what could be done except putting pressure on the factories to change. In this case, it was easy to identify the polluters, but complaints have been lodged right up to the district level to no avail.

### ***Pests and Pesticides:***

Pests, on the other hand, were the second ranking problem in RW7, and did not appear in the RW8 list. Rats were felt to be of particular concern, since a recent case of a rat biting sleeping baby. The rats eat people's food, and even toothpaste and soap. In RW7RT3 the rats were reported to come from a plot used to dump garbage, along with many flies and cockroaches, while RW7RT4 they were reported to come from the gutters.

Mosquitoes are abundant and reportedly breed in the gutters. Generally, mosquitoes are not felt to be a serious problem because a repellent, such as "Sari Puspa," can be rubbed into the skin, or an aerosol insecticide can be used. Some residents try not to use pesticides as it irritates their

respiratory tract. Mosquito coils are disliked because they are smoky and could cause a fire. The residents are aware of the dangers of Dengue fever, but in RW7 the residents said there had been no cases of Dengue, though some of the public figures said otherwise. According to some residents, the mosquitoes are most bothersome during holidays when many people return to their hometowns, and there is less human flesh to go around.

Those pest problems which can be dealt with locally are related to the garbage and gutters, which are already the target of community activities, though the regularity and levels of participation could be improved. During a planning discussion in RW7, it was agreed that some of the unoccupied land where they believe rats breed in the garbage be cleared, and used as sports area.

### ***Garbage, Industrial waste and Blocked Drains:***

Most of the remaining top five problems involve a set of interrelated waste issues. Small children sometimes defecate in the drains, and in RW8 the liquid wastes from factories are released into the drains, making the liquid unpleasant and potentially hazardous. Children often play in the vicinity of the drains. Moreover, household waste often finds its way into the open drains, which easily become blocked, particularly at the start of the rainy season. The liquid waste from the paint factory forms white sediments that can also block the drains. Factory employees sometimes remove the sediment, placing it on the edge of the drains, where it creates a dust problem. The blocked drains can lead to flooding which, though typically not deep, causes problems for the residents. The rain also washes waste from disposal sites onto the streets to mix with the waste in the overflow of the drains. In some areas where water is used for washing, there is no connection to the drainage system, and the water quickly accumulates. Some residents also complained of a nearby dump and scrap yard, that smells, has many flies, and is unsightly.

As noted above, cleaning up solid waste and clearing the drains are activities that community members are expected to do voluntarily through self-help activities such as *kerja bakti*. In addition neighborhoods have different commercial household waste collection services, and there are different levels of personnel assigned to collecting and managing garbage within the RW.

One of the obstacles to improvement are the conflicting opinions about whose responsibility these problems are. Some of the permanent residents feel that the temporary residents cause a disproportionate share of the waste problems, and that wealthier households tend not to get involved in the clean-up efforts. Alternatively, while many residents believe the factory owners need to take more responsibility for their pollution, some of the factory owners feel that if the residents find the factory waste unacceptable they should not have moved to the area – several factories predate most of the residents.

RW8, there was considerable discussion of involving teenagers in keeping the environment clean. They could post warnings at strategic places indicating that people should not throw away their waste except in the designated places, and attempt to trace the source of some of the regular waste problems. It was also agreed that the community they organize a “*kerja bakti*” to clean

and deepen the main drains. The RT official said he would try to obtain a garbage cart and tools for cleaning and picking up the garbage.

### ***Other Problems Identified:***

Aside from fire, none of the other environmental problems were ranked among the top two by any group. Fire was not brought up in any of the groups except the women of RT7. However, some of the other groups may have considered kitchen fires a potentially important problem, but not sufficiently environmental to rank in the PRA exercise. Somewhat similarly, gambling and alcohol abuse were only seriously considered by the teenagers of RW8, and crowding was only considered by the public figures in RW7. Alternatively, a few of the problems are very localized. The vibrations of the paint factory, for example, are only an issue to those living in RW8RT5.

### ***3.5.3.3. Lessons for the Residents and the NGO:***

Of the three techniques being evaluated in this report, the PRA is the only one which seriously attempts to engage residents and local activists as well as the researchers and their traditional, highly educated, audiences. At very least, the PRA acted as a device through which the participants could meet and systematically combine their individual knowledge and preferences. But it clearly provided more than that. It was well received, and some actions had already been taken before the end of this very rapid appraisal. More specific to the aim of the PRA, it provided information in a form appropriate to any attempt to develop the basis for a longer term collaboration between Save the Children and the local residents.

One of the advantages PRA has over some of the more conventional evaluation techniques that it can easily be adapted to the particular characteristics of locality, and the interconnected character of the local environmental problems. Consider, for example, the information on the liquid waste from the paint factory summarized above. In a relatively short time, the PRA collected information from a wide variety of sources that provided an account of a problem with liquid waste released from the paint factory creating a sediment that could block the drains or, when removed by factory workers and left to dry, creating a dust problem. Moreover, the PRA indicates that some of the factory representatives defend their pollution, saying that they were polluting before the residents built their homes. It would be extremely difficult to obtain this sort of information through a survey. Clearly, this is critical information the search for local solutions. It would not have been picked up by a questionnaire survey.

The same holds for the findings in most of the other areas. At the neighborhood level, and especially in the context of what Save the Children can do to improve conditions in the neighborhood, the problems are not best portrayed in terms of the percentage of households with garbage collection, the percentage with wells, and so on. The PRA process provides far more relevant information when it indicates where the solid waste accumulates, what problems it causes, who cares about it, and why. Or where there are “bad” wells still used for washing (water from one of the wells was tested following the PRA exercise). While this very textured information would be difficult to combine with information from other neighborhoods to provide a summary of conditions in a whole district, it is the right level for guiding local initiatives.

It would be unrealistic to expect the local residents to take direct action to improve all of their environmental problems (which would in some cases be illegal in any case). Many of the problems require collaboration, and in some cases confrontation, with other urban actors, such as the water utility, the local government, the polluters, and so on. Indeed, the PRA results suggest that improving relations between local residents and these other actors could be as important as assisting in direct improvement efforts. Uncovering such problems through a survey would be very difficult. But any number of insights can be gleaned from the PRA results.

Some of the suggested measures illustrate more direct advantages of building on local knowledge, and facilitating participation. Consider, for example, the suggestion that the public toilet caretaker be asked to allow children to use the public toilets for free. This has the *ex post* obviousness of most good suggestions. Children rarely carry money, and if they do are unlikely to want to spend it on a toilet. Yet children's feces are at least as hazardous as adult's. Free public toilets are unlikely to stop all children from defecating in the drains, but it could help. An individual making a suggestion like this is unlikely to convince a caretaker, but an organized group might. Again, it is doubtful that this type of suggestion could be derived directly from survey results: one would have to have asked whether children currently have to pay, implying that the suggestion was already under consideration. And if a survey did lead to such a suggestion, the route to action would be longer and more circuitous.

Equally important, the PRA set the stage for a particular type of relationship between Save the Children and the local residents. Had Save the Children staff surveyed these neighborhoods, they would have signaled that their own decisions, even if they involved attempts to improve local conditions, were being made at a distance, without the direct involvement of local residents. Save the Children wished to signal that they would like to act as facilitators, and refused to consider applying a standard survey for purposes of comparison. They wished to establish a rapport on that basis. That made PRA more appropriate.

#### **3.5.3.4. Lessons for Outsiders:**

It would be foolish to expect a two week PRA exercise in one sub-district of Jakarta to yield profound new insights into the general nature of urban environmental problems which have been the object of study for many years. The principal purpose of the appraisal is to provide a base for local action, not to inform city-wide policy making. Nevertheless, it is useful to consider which findings might have relevance outside of the neighborhoods studies, and which probably would not have been uncovered using the survey techniques described in other sections of this report.

Some of the insights from the PRA are relevant to the application of standard surveys and CVM. It is always useful for researchers designing questionnaires to have first-hand knowledge of the environmental problems being studied, and how people are currently attempting to cope with them. Even a researcher who believes strongly that only controlled survey methods provide an adequate base for testing hypotheses to test. In some cases the hypothesis might be that a problem encountered in one or more PRA exercises is common to most of urban Jakarta, or even urban Indonesia. Thus, for example, in the PRA it was found that the households were favorable to piped water, and that land tenure was not considered an issue, but that the connection cost was

too high for high for households to bear. As described in Chapter 5, this was a hypothesis which, in a slightly different form, was examined and confirmed for the areas surveyed using CVM.

The PRA assessment also provides indications of potential weaknesses with survey techniques, some of which could be corrected if researchers were aware of them. For example, the PRA indicated that there were households not listed by the local authorities, and that these households typically rented single rooms often on the second floor of dwellings owned by listed households. Such households could easily be missed by a standard survey. This would lead to biased results, since these households are poorer than most. Moreover, there are indications that environmental management is complicated by the presence of these seasonal or temporary residents. Few surveys even consider this possibility.

The PRA also provides a perspective on the nature of household and neighborhood environmental problems which is easily lost in standard surveys. The PRA portrays a complex of interconnected problems, which can take very different forms even in similar neighborhoods. It portrays residents having difficulties both getting assistance from utilities and government regulations, and also cooperating with each other. In short, it provides the basis for a comparatively holistic understanding of local environmental problems. Governments may need to use statistical indicators to monitor their progress. Utilities may need to make some decisions based on narrowly economic assessments. But neither governments nor utilities should be allowed to forget that behind these statistics and economic figures are the complex variegated communities that their staffs are interacting with on a daily basis.

More generally, through the PRA the role of the government and state utilities at the local level comes into focus more clearly than in the survey-based approaches. During the PRA, there was relatively little general discussion of who ought to be responsible for improving the environment. The emphasis was on what the residents could achieve, though in some cases this might involve engaging with the factory owners, the public toilet owners, the utilities or the government. The results clearly indicate that this engagement involves more than simply asking for specific services or actions. It seems likely that governmental measures to improve the manner in which their representatives respond to the community-specific needs of low income residents could be as important as improvements in the manner in which the residents relate to the government.

## **Short Annotated Bibliography on PRA: Handbooks:**

Dawson, S., Manderson, L. and Tallo, V.L. (1993). *A Manual for the Use of Focus Groups: Methods for Social Research in Disease*, Boston, M.A. International Nutrition Foundation for Developing Countries, 96p.

Focus group discussion are a commonly used method in participatory research, and the health focus is useful in the context of urban environmental problems. This publication is less concerned with participation itself than most of the others noted below.

Mikkelsen, B (1995) *Methods for Development Work and Research: A Guide for Practitioners*, New Delhi, Sage Publications, 296p.

Despite its title, this book is primarily about participatory and rapid appraisal techniques. The presentation and tone are somewhat closer to a textbook than a handbook. It covers a wide range of topics and methods, and should be very useful to development professionals.

Narayan, D and Srinivasan, L (1994) *Participatory Development Tool Kit: Training Materials for Agencies and Communities*, World Bank (Washington, DC), 68p.

This tool kit, oriented towards water and sanitation issues, comes with its own ethnic briefcase, and contains an instruction book and 25 folders with materials for different activities, many game-like in character. It is not intended to provide general guidance on participatory research, but only on the particular activities.

Pretty, J.N. Guijt, I. Scoones, I and Thompson, J (1995) *A Trainer's Guide for Participatory learning and Action*, International Institute for Environment and Development (London) 2670.

One of a new IIED Participatory Methodology Series, this guide provides an overview of participatory learning (a new variant on PRA) and over one hundred (i.e.101) activities. While the emphasis is on practical tips, there is a liberal helping of participatory philosophy. Despite a rural orientation, the experience summarized here is very relevant to the urban context.

Theis, J. and Grady, H.M. (1991) *Participatory Rapid Appraisal for Community Development: A Training Manual Based on Experiences in the Middle East and North Africa*, International Institute for Environment and Development (London).

Somewhat dated, this manual still provides one of the clearest and most practical introductions to PRA. It provides first an overview of the PRA approach, a review of some of the most common techniques, and a discussion of how the results can be used.

## **Source Book:**

World Bank (1995) *World Bank Participation Sourcebook*, Environment Department Papers, World Bank (Washington, DC).

This sourcebook was prepared for World Bank Task Managers, and is more concerned with mainstreaming participation in projects and programs than with participatory assessment techniques.

## **Bibliography/World Wide Web Site:**

[http://www.ids.ac.uk/eldis/pr/pr\\_bib.html](http://www.ids.ac.uk/eldis/pr/pr_bib.html)

This site is part of the development information services online from the Institute of Development Studies and the British Library for Development Studies, Sussex, UK. At the address given, one can access an annotated bibliography of urban PRA material, as well as a short overview on urban PRA. As early as 1996 about 40 urban PRA publications were referenced. Similar information is available for other PRA topics.

### **Journals:**

*PLA Notes (previously RRA Notes)*

Relatively unpolished and non-academic to be termed a journal, this publication from IIED is a good way to keep up to date on PLA. Number 21 (November 1994) was a *Special Issue on Participatory Tools and Methods in Urban Areas*, most of the contents of which are referenced in the unannotated bibliography.

### **Urbanization and Environment**

Also from IIED, this journal has included a number of articles based on urban PRA, though the emphasis is usually on issues rather than methods.

### **Conceptual Articles:**

Chambers, R. (1994). The origins and practice of participatory rural appraisal, *World Development*, 22(7):953-969.

Chambers, R. (1994). Participatory rural appraisal (PRA): Analysis of experience, *World Development*, 22(9):1253-1268.

Chambers, R. (1994). Participatory rural appraisal (PRA): challenges, potentials and paradigm, *World Development*, 22(10):1437-1454.

This sequence of three articles by a well known participatory research advocate and practitioner, takes the reader through both the historical, conceptual and practical experience in the development of this rapidly changing field.

Mitlin, D. and Thompson, J. (1995). Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization* 7(1):231-250.

A rare and very useful attempt to review and evaluate experience in the use of participatory approaches in urban areas. Includes an assessment of which methods are likely to be appropriate in an urban context, as well as a discussion of the limits of PRA.

### **References of Chapter 3**

- Amis, P. 1994. *Urban Management Training, Action Learning and Rapid Analysis Methods*. RRA Notes. International Institute for Environment and Development, London.
- Chambers, R.. 1994a. The origins and practice of participatory rural appraisal. *World Development*. 22(7):953-969.
- Chambers, R. 1994b. Participatory rural appraisal (PRA): Analysis of experience. *World Development*. 22(9):1253-1268.
- Chambers, R. 1994c. Participatory rural appraisal (PRA): Challenges, potentials and paradigm. *World Development*. 22(10):1437-1454.
- Dawson, S., Manderson, L. and Tallo, V.L. 1993. *A Manual for the Use of Focus Groups: Methods for Social Research in Disease*. Boston, MA, International Nutrition Foundation for Developing Countries, 96p.
- Mitlin, D. and Thompson, J. 1995. Participatory approaches in urban areas: Strengthening civil society or reinforcing the status quo? *Environment and Urbanization*. 7(1):231-250.
- Narayan, D. 1993. *Participatory Evaluation: Tools for Managing Change in Water and Sanitation*. World Bank Technical Paper no. 207. World Bank (Washington, DC).
- Narayan, D. and Srinivasan, L. 1994. *Participatory Development Tool Kit: Training Materials for Agencies and Communities*. World Bank (Washington, DC)
- Scrimshaw, N.S. and Gleason, G.R., (eds.). 1992. *Rapid Assessment Procedures: Qualitative Methodologies for Planning and Evaluation of Health Related Programmes*. Boston, International Nutrition Foundation for Development Countries, 528p.
- Theis, J. and Grady, H.M. 1991. *Participatory Rapid Appraisal for Community Development: A Training Manual Based on Experiences in the Middle East and North Africa*. International Institute for Environment and Development (London).
- Toulmin, S. 1992. *Cosmopolis: The Hidden Agenda of Modernity*. Chicago, The University of Chicago Press. 228p.
- World Health Organization and United Nations Environment Programme. 1991. *Insect and Rodent Control through Environmental Management: A Community Action Programme*. World Health Organization. 107p.



## 4. CONTINGENT VALUATION OF ENVIRONMENTAL “GOODS:

### 4.1 Introduction

Contingent valuation takes an unmistakably economic perspective. It originated as a tool of environmental economics – a means of assigning monetary values to environmental amenities. Economists often diagnose environmental problems as symptoms of market failure. In crude terms, the orthodox economic explanation for why pollution and other environmental disamenities are often excessive is that there are no efficient markets for them. If polluters had to go out and buy the right to pollute from those affected, they would not pollute unless they valued polluting more than the people exposed valued not being polluted. Many of the more damaging forms of pollution would become too expensive to afford. Even if a market cannot be set up, it is commonly argued by economists that the polluters should be made to pay the equivalent price through, for example, pollution taxes. But since there is no market price for the pollution, how can the amount they should pay be calculated? One possible way is to ask those affected (at least in the present generation) what price they would agree to if there was market for the pollution.<sup>20</sup> This is essentially what the CVM attempts.<sup>21</sup>

As described by Mitchell and Carson (Mitchell and Carson, 1989), a contingent valuation interview typically consists of three parts:

“1. A detailed description of the good(s) being valued and the hypothetical circumstances under which it is made available to the respondent.”

This could be, for example, a description a pollution control program and the changes which would result if it were implemented. Or it could be a public standpipe that would be installed a little ways from someone’s house. Whatever the good being valued, the description is intended to provide the respondent with as clear an idea as possible of the good she or he is expected to value.

“2. Questions which elicit the respondents’ willingness to pay for the good(s) being valued.”

These questions are asked on the presumption that without the respondents payment, the good would not be provided. They could be reduced to a single direct question as to the maximum the respondent would be willing to pay for the good in question. They could involve a “bidding game,” wherein a series of offers are made to the respondent in an attempt to help guide them to their maximum willingness to pay. Or they could be a simple yes or no question, referring to a single value. (In this latter case, by proffering different values to different respondents, it may still be possible to estimate the overall population’s willingness to pay.)

---

<sup>20</sup> For many public goods, those “affected” should be extended to include anyone who cares about the good in question. CVM is often employed to estimate *existence value* – the value people attach to goods simply because they exist.

<sup>21</sup> In the pollution example, it is more logical to consider the payment people would require to allow the pollution rather than how much they would be willing to pay to prevent it (Knetsch, 1994). This difference is commonly expressed as the difference between “willingness to accept” and “willingness to pay.” Generally willingness to accept is higher, and in some cases far higher. Most CVM studies estimate willingness to pay, and this is sometimes portrayed as a means of counteracting a tendency for respondents to overvalue how much they would have to be paid to accept a new environmental problem.

“3. Questions about the respondents’ characteristics (for example, age, income) their preference relevant to the good(s) being valued, and their use of the good(s).”

While not an inherent part of the CVM, most surveys collect background information either simply in order to understand what influences the values people place on the good, or with a more specific purpose in mind. A more specific purpose might be, for example, to determine whether a particular target group will benefit.

The survey should ideally provide a statistically representative sample of those people who might place a value on the environmental good in question. Since future generations, for example, cannot be questioned, this is often not strictly possible. Also, the relevant population depends very much on the nature of the good, and whether it is a private good, a public good, or what is sometimes termed a quasi public good.

Most often, contingent valuation is applied because some physical aspect of the environmental amenity in question prevents efficient markets from developing in the private sector. Many environmental benefits, such as clean air, are public goods. A public good cannot be sold because it can only be supplied simultaneously to large numbers of beneficiaries: provision cannot be restricted to those who pay. Since benefits received cannot be linked to individual payments made, potential beneficiaries have little incentive to pay anything. Yet they may well value the good highly, and might have been willing to pay a high price for the good if the supply actually did depend on their payment. At least in Europe and America, valuing public goods has been the principal object of the contingent valuation method. The now classic text of contingent valuation is entitled *Using Surveys to Value Public Goods; The Contingent Valuation Method* (Mitchell and Carson, 1989). CVM is not the only means of valuing public goods. In some cases, the loss of a public good is reflected in lost income (e.g. lower fish catches) or other changes in market behavior. But in cases where the public good provides what has been termed a “passive-use” or “existence” value, CVM may be the only means available to estimate the value.

Somewhat surprisingly, the principal uses to which contingent valuation has been put in the urban Third World have had little to do with valuing public goods. Rather than being concerned with the failure of private entrepreneurs to respond to public demands, they have tended to be concerned with the failure of public sector to respond to private demands. This is in part a reflection of the times: with the resurgence of market liberalism, public failures have become more likely to attract attention. But the failures have been very real. In many urban areas, environmental services, such as water and sanitation, are priced below (marginal) cost. One traditional justification has been that the lower prices allow households to receive the service who could not otherwise afford it. However, state run utilities have been more successful at keeping prices down than at meeting demand. Indeed, keeping prices down can prevent the utility from being able to finance the extension of the piped water system. As a result, it is often only the relatively wealthy households who benefit from the subsidies. Poor households may actually suffer as a result of the subsidy. They may, for example, be willing to pay the full cost of a water connection, but not be given the option of having piped water at all. Much the same sometimes arises with other services.

Many of the methodological problems encountered in a contingent valuation survey are the same as those of any other sample survey. The population of relevance and the particular questions asked may be different, but the sampling theory and the qualities of a good survey instrument are similar. Indeed, many background questions are likely to be identical to those posed in a broad spectrum survey. A challenge particular to a contingent valuation survey is the emphasis on hypothetical questions which the respondent may never have pondered before, and may have little incentive to answer accurately. This applies whether the CVM is being applied to value hypothetical public or private goods. However, the market for public goods is in a sense doubly hypothetical: a private good may be marketed in the future, but a public good will not be.<sup>22</sup> Moreover, there are a number of important methodological differences. Parts of the literature on CVM are largely irrelevant, if not positively misleading, to attempts to assess the benefits of extending the supply of the more private environmental services.<sup>23</sup>

#### **4.2 CVM and Public Goods**

For many years after it was first applied in the early 1960s, contingent valuation stayed in the backwaters of economics. But things have changed. By the late 1980s a textbook on CVM had been published (Mitchell and Carson, 1989). In 1994, *A Bibliography of Contingent Valuation Studies and Papers* published contained 1,672 entries (Carson et al., 1994), mostly concerned with the valuation of public goods.

Economists are still divided over the usefulness of CVM. Few would claim that CV surveys are easy to conduct, but many claim they are difficult to apply, but invaluable nevertheless. A recent exchange in the *Journal of Economic Perspectives* illustrates the range of opinion well. One of the two opposing papers, sub-titled “Is Some Number Better Than None?” suggests that CVM is worthless, if not positively harmful (Diamond and Hausman, 1994). The other paper presents a carefully argued case in support of CVM (Hanemann, 1994).

Before turning to questions that economists have raised about CVM, it is worth noting a few doubts that non-economists are more likely to voice. First some values may not be possible to translate into monetary units. Second, even if public goods do have a monetary value, this value need not be equal to the sum of the individual values people attach to the public good. People who recognize an intrinsic value in a good may feel that others **ought** to recognize this value too, whether they do or not. A value may even be held to exist independently of people’s perception of it. It is doubtful, for example, whether people who claim that “the spotted owl is worth saving” are making an empirical statement about the sum of people’s willingness to pay for the saving the spotted owl, even implicitly.

Economists usually accept that individual preferences hold the key to valuing public goods. Their doubts typically center on whether CVM results reflect these preferences. Some of the problems often cited could result, however, from the fact that respondents react from a

---

<sup>22</sup> Many CVM surveys for public goods employ a hypothetical referendum, which would lead to a specified tax increase. By posing the question in this way, the question becomes more realistic.

<sup>23</sup> Some environmental services, including household water connections evaluated in the case study below, are really quasi-public goods. While individual connections may provide water privately, there can be local public health benefits in the form of a lower prevalence of infectious diseases. The public benefits of improved sanitation and waste removal are even more evident. However, as described below, most CVM studies of such environmental services ignore the public dimension.

perspective of public morality, and have difficulty translating beliefs about what public preferences ought to be into statements about what their own individual preferences are (Diamond and Hausman, 1994). Many of the other problems encountered in CV studies are of a more technical nature. Mitchell and Carson (Mitchell and Carson, 1989), though clearly favorable to CVM, describe a large range of possible pitfalls. More recently, there have been a number of publications examining particular problems, and suggesting solutions. Among the researched topics are the manner in which the value questions should be asked (Prince et al., 1992), how the values proffered should be distributed (Cooper, 1993), the role of question order (Boyle et al., 1993), the importance of giving respondents time to think (Whittington et al., 1990b), whether there is a trade-off between efficiency and bias (Alberini, 1995), and what thoughts come to mind when people are answering contingent valuation questions (Schkade and Payne, 1994). Generally, CVM is gaining more acceptance, but a conditional nature.

The growing importance of CVM outside of academia has been particularly striking in the U.S.A. In 1992, a panel of economists, chaired by two Nobel Prize winners (Kenneth Arrow and Robert Solow), was convened to advise on the use of CVM to provide estimates of "passive use" values. The reason they were convened was that CVM was becoming a tool employed in the courts to award damages for the loss of passive-use values, but economic opinion on the use of CVM was deeply divided (Portney, 1994). The panel published a report indicating qualified acceptance in 1993 (National Oceanic and Atmospheric Administration, 1993). It concluded that "CV studies can produce estimates reliable enough to be a starting point of a judicial process of damage assessment, including lost passive-use values." However, it also provided guidelines for CV studies, and indicated that these should be followed as closely as possible.

In a contribution to a recent set of articles on the CV debates, one of the panel members summarized seven of the most important (several of these are not very relevant in low-income countries).

“First, applications of the contingent valuation method should rely upon personal interviews rather than telephone surveys where possible, and on the telephone surveys in preference to mail surveys.

Second, applications of the contingent valuation method should elicit willingness to pay to prevent a future incident rather than minimum compensation required for an incident that has already occurred. (Note that the latter would be the theoretically correct measure of damages for an accident that has already taken place.)

Third, applications of the contingent valuation method should utilize the referendum format; that is, the respondents should be asked how they would vote if faced with a program that would produce some kind of environmental benefit in exchange for higher taxes or product prices. The panel reasoned that because individuals are often asked to make such choices in the real world, their answers would be more likely to reflect actual valuations than if confronted with, say, open ended questions eliciting maximum willingness to pay for the program.

Fourth, applications of the contingent valuation method must begin with a scenario that accurately and understandably describes the expected effects of the program under consideration.

Fifth, applications of the contingent valuation method must contain reminders to respondents that a willingness to pay for the program to policy in question would reduce the amount they would have available to spend on other things.

Sixth, applications of the contingent valuation methods must include reminders to respondents of the substitutes for the “commodity” in question. For example, if respondents are being asked how they would vote on a measure to protect a wilderness area, they should be reminded of the other areas that already exist or are being created independent of the one in question.

Seventh, applications of the contingent valuation methods should include one or more follow-up questions to ensure that respondents understood the choice they were being asked to make and to discover the reasons for their answers.

(Portney, 1994)

#### ***4.3 CVM and "Private" Goods***

Much of the debate about CVM and how it should be applied, at least implicitly assumes that the goods being valued are public goods. Typically the justification for needing the CVM is that the good is public. Issues such as whether the choice should be framed in terms of a referendum, whether people receive moral satisfaction from answering in a certain way, and whether people were inclined to give biased responses because they know they will never have to pay for their own use of the good; all these derive in large part from the assumed public nature of the goods. Even discussions of sampling procedures and the manner in which people’s responses are aggregated are often only relevant to public goods.<sup>24</sup> As noted above, however, many recent applications in the low income countries have been attempts to value private goods (or at least the private benefits of quasi public goods). Not only are some of the methodological issues very different, but whereas it is in the nature of public goods that the government cannot charge for their provision, pricing decisions are often critical in the provision of more private environmental services.

Until recently, it was generally assumed that CVM could not be usefully applied in low income countries. The first published study to challenge this view was a contingent valuation of water services in rural Haiti (Whittington et al., 1990a). The study seemed to indicate that CVM was not only feasible, but that problems often associated with CVM were perhaps not as serious as people had thought. There did not appear to be a major problem with starting point bias (when peoples stated willingness to pay is influenced by the first price prompt provided by the

---

<sup>24</sup> For a public good the value of provision is the sum of everyone’s valuation, however small. For a private good the value of provision is only from those who will purchase the good, and hence depends on the price which will be charged. Since values below the price to be charged are not realized, the appropriate sampling procedure and bid selection also no longer follows recommendations designed for public goods (as described in Cooper, 1993).

interviewer) or strategic bias (when people misstate their true willingness to pay in the hope that they can thereby influence to their advantage either the supply or the price they will have to pay). Moreover, the responses seemed to follow the sort patterns one would expect of consumer preferences for a good like water supply (e.g. wealthier households were willing to pay more).

Like many of the later CVM studies of local environmental problems, the Haiti study was concerned not only with how much value new water services would provide, but also with whether the cost for supplying the water could be recovered. The most unambiguous result would be a high willingness to pay: “If people are willing to pay for the full cost of a particular service, then it is a clear indication that the service is valued (and therefore will most likely be used and maintained) and that it will be possible to generate the funds to sustain and even replicate the project.”

A number of similar CVM studies have since been conducted, many in rural areas (Altaf et al., 1992; World Bank Water Demand Research Team, 1993) but a few also in urban areas (McPhail, 1993; Whittington et al., 1991). Some of the conclusions drawn by the World Bank Water Demand Research Team involved in most of these studies (along with related studies using other techniques) were that many more people are willing to pay the cost of private connections than generally assumed, that in most communities it is appropriate to charge the full cost for water services, and that tools such as contingent valuation can be used to assess people’s willingness to pay and hence determine what water service improvements, if any, should be offered. These contingent valuation studies have also been an integral part of the development of a new strategy of water and sanitation improvement emphasizing cost recovery (Briscoe and Garn, 1995; Serageldin, 1994).

While CVM studies have undoubtedly contributed to the debates on improving water and sanitation in low income cities, two interrelated weaknesses should be kept in mind, the first empirical and the second more conceptual. On the empirical side, there has been no substantial verification that if the service is actually provided people will pay what they say they would in the CV surveys. Some of the conceptual difficulties stem from in the public nature of some of the benefits from water, and most of the benefits of better sanitation, waste disposal, pest control, drainage, and other local environmental conditions.

It is not evident that respondents distinguish clearly the public and private benefits of an environmental service in responding to CVM questions. In interpreting the results from an economic perspective, however, the distinction is critical. If the public benefits are being included in the valuation, then one should not expect the respondents to pay the full value for the service if it is offered for sale, any more than one would expect them to pay for clean air. Under such conditions, there is a danger that a high contingent valuation will lend false support to an ambitious program of cost recovery. On the other hand, if the public benefits are not being included, then the responses do not reflect the full value of the service. Under such conditions, there is a danger that a low contingent valuation will lend false support to the notion that people do not care about their environment.

When the valuations are high and can be assumed to reflect the private benefits to the respondent, this conceptual problem does not arise. Perhaps more often, as in the case below, the

actual price of the service within a realistic range does not appear to matter, and the CVM is more important for the insights it provides into what changes would make low income households more attracted to the water service than in providing an average willingness to pay.

#### ***4.4 CVM application in Jakarta***

##### **4.4.1. The Context**

Despite rapidly increasing ownership of consumer durables, access to piped water is low in Jakarta. Thus, whereas some 60% of households in Jakarta have color televisions, less than 20% have piped water connections (Surjadi et al., 1994). Moreover, even households that do have piped water connections must boil their water before drinking it. Indeed, there is some evidence that water in households' piped water containers may be more (fecally) contaminated than the water in their wells. The government intends to 1) expand access to piped water rapidly; 2) upgrade its quality; and 3) improve the economic efficiency of the water utility (PAM). The existing connection rates are low even in areas where piped water is already offered, despite a tariff which sets water prices well below the market price.<sup>25</sup> Superficially at least, there would seem to be a contradiction between the goal of expanding the piped water connections and improving the economic efficiency of the water utility: it might seem that improved efficiency requires higher prices, whereas attracting households to connect requires lowering prices. However, there is evidence, including some from CVM studies, that it may be possible to achieve these objectives simultaneously if the right steps are taken.

The CV survey undertaken for this report drew upon the experience of previous CVM studies of Jakarta (e.g. IWACO, 1992). The survey was undertaken by the Atma Jaya Urban Health Study Group. It is a case study of two neighborhoods in an areas where the water utility is intending to offer piped water in the near future. The same size was set at 200 to enable at least some statistical comparisons to be made. The survey was designed not only to provide material illustrating the policy relevance of CVM results, but also to provide the water utility with information directly relevant to these local initiatives. The issues are somewhat different at the local level. The utility is not permitted to adjust tariffs and connection costs to local conditions. While the quality of the service to different neighborhoods does vary, this variation does not reflect official policy. For overall water sector policy on the other hand, tariffs, connection costs and procedures, and service quality are central issues. It is these issues that we attempt to discuss here. **It should be kept in mind, however, that given the small scale and unrepresentative nature of the case study, the results are only illustrative.**

In common with a number of the CVM surveys of water supply reviewed above, this case study focuses on three aspects to the water connections: 1) the price of the water; 2) the connection fee; 3) the service quality. Also like most of these other surveys, the results indicate that subsidizing the price of water is not likely to be an economically efficient means of improving the water supplies for the more disadvantaged households. Instead, the results suggest that improving

---

<sup>25</sup> Itinerant vendors sell the water from public hydrants at prices an order of magnitude higher than the normal household water tariff. Part of the mark-up may reflect distribution costs, but it is clear that the reason for the high vendor prices lies in the lack of water being made available for sale.

connection procedures (including lower connection costs) would be both economically efficient and equitable.

Unlike most other surveys the results do not indicate that most unserved households would value a water connection highly if it was offered. Rather, many households, both poor and wealthy, are not very interested in obtaining connections, particularly under existing conditions. There may be a suppressed demand for water connections, but it is not just the physical limits of the piped water system that are suppressing demand. Connection procedures and the service quality are also very important factors. It may be possible to achieve a great deal through a demand driven program, but only if the options available to households are more carefully tailored to their economic as well as physical needs, and attention is paid to what sorts of households are likely to want connections most. Moreover, by emphasizing improvements in the connection procedures and charges, it may be possible to make the water system far more equitable.

#### **4.4.2. Procedures**

##### ***4.4.2.1. The Survey Instrument***

As in any CVM survey, the survey instrument included a description of what is being (hypothetically) offered, questions on the respondent's willingness to pay, and questions on relevant household characteristics. Two versions of the survey instrument were developed to enable a possible bias in the survey to be tested. At the start of the interview, the nature and purpose of the survey was briefly described, and it was stated that the survey was not a formal offer from PAM. At the end of the survey, the actual PAM water prices and connection costs were described, again so that respondents would not confuse the hypothetical values with an actual offer.

##### ***The "goods" described:***

The CVM survey was designed to evaluate what were treated as four different options:

- A) A standard water connection with a substantial connection fee, to be paid in a lump sum.
- B) An improved water connection, providing potable water with full reliability, with the same lump sum connection fee as A.
- C) A standard water connection, but with the possibility of paying the connection fee in monthly installments over a three year period (designed to cover interest payments equivalent to 1% a month).
- D) An improved connection with the connection fee to be paid in monthly installments.



A more detailed description of the options is provided in the questionnaire attached as Annex 3. As noted above, there were two versions of the survey. In the first version the least attractive option (A) was offered first, and in the second version the most attractive option (D) was offered first. The structure of survey was such as to treat the procedure for paying the connection fee as a quality of the service provided, rather than an aspect of the price. Indeed, applying the market rate of interest, the price of water (including connection costs) is roughly the same in all four options.

***The questions eliciting values:***

Each household was asked about all of the options described above. The price of water was represented to the households as approximate monthly bills, rather than a price per liter. The price per liter was too difficult for the householders to interpret. Also to facilitate the interview (as well as to avoid bias) dichotomous choice questions were employed. Households were assigned monthly bills, and then asked whether they would be interested in the option at the that price. The distribution of bids is presented in Table 4-1 below. The original design was to have at 20 households at each bid level, with some extras in case of refusals. The previous CVM surveys and the pre-test indicated that few households would be willing to pay 38,000 Rupiah a month, at least for the existing service.

***Table 4-1 Distribution of Bids***

<b>Monthly bill Rupiah</b>	<b>Households sampled<sup>a</sup></b>
Free of charge	23
6,000	22
10,000	21
13,000	21
15,000	21
17,000	20
20,000	20
24,000	20
30,000	19
38,000	20

*Note:*

<sup>a</sup> Total number of households = 207

***The background questions:***

Following the contingent valuation questions, the respondents were asked a series of questions about the characteristics of the household and the conditions in which they currently live (see questionnaire). The topics and some of the reasons for including them are given below:

*1) The economic status of the household.*

The questions pertaining to wealth are similar to those employed in the broad spectrum survey, and would provide the basis for constructing a similar wealth indicator.<sup>26</sup> There are a number of reasons for collecting some information on wealth in the course of a CV survey. Wealth influences willingness to pay for environmental amenities, just as it does for other goods.

<sup>26</sup> For a discussion of wealth indicators, see Surjadi et al., 1994.

Moreover, the relative equity of different policies is, or should be, important. As described below, for example, it should make a difference that poor households seem to care more about avoiding large lump-sum payments in contrast to wealthy households who care more about the quality of the water. Also, in many urban areas it is the health of the poor that is threatened by inadequate water supplies, and which is a public health problem.

#### *2) Land tenure.*

The questions on land tenure reflect the tenure forms in Jakarta, and are unlikely to be transferable. Generally, however, questions on tenure are very pertinent if the respondent is expected to state whether they are, in effect, willing to invest in improvements to their property. In the case of a water connection, the connection cost is a form of investment. If insecure tenure is inhibiting such investments, then this has important policy implications, and may even suggest that tenure security is a prerequisite to certain types of environmental improvement. Moreover, renters may not be in a position to answer questions on investments which involve changing the structure and value of the house.

#### *3) Existing water sources, practices and perceptions.*

The questions on the households existing water sources and practices are again similar to the broad spectrum survey. It would seem safe to assume that the value someone attaches to achieving an environmental amenity depends on the conditions they now face. In the case of a piped water connection, for example, one might expect households who use their own wells for drinking water to respond differently from households who purchase their water from itinerant vendors. In addition to providing insights into how households form their preference, the relation between existing water sources and the desire to have a water connection may have implications for where extension efforts should be targeted. In this example, the well users are far less interested in obtaining water connections than vendor users. This reinforces the notion that areas where vendors are common deserve priority. A larger survey covering areas with different water prices might have found, for example, that vendor prices are a good indication that the residents would value piped water connections highly.

#### *4) Household size and composition, and education of principal householders.*

Education, household size and composition are relatively standard items in household surveys, and often serve the purpose of verifying that the same is representative (i.e. the results can be compared with other surveys). A household's size and composition may influence its demand and hence willingness to pay for water.<sup>27</sup> The education of the principal woman of the households is often held to enable households to use water and sanitary improvements. Moreover, it can be useful to examine particular types of households (e.g. female headed households or households with small children) to see if their valuation of different goods differs from other households. By and large, however, this would require a larger sample than 200.

#### **4.2.2.2. Sampling**

---

<sup>27</sup> Given the way in which the water payments are presented in this survey, however, care would have to be taken in interpreting the results. The same monthly payment for a large household would mean a lower price.

The appropriate sample frame depends on the purpose of a survey. The CVM survey being discussed here was designed for areas where piped water is not yet available. As indicated above, the case study is of an area where the water utility soon plans to offer piped water. Generally, the most appropriate sampling procedure would be one which provides a near-random sample of a clearly defined population of households residing in areas without access to piped water. For the purposes of this case study, however, a more systematic procedure was chosen. The selection of households within each neighborhood followed standard household survey practice. However, the two different neighborhoods were selected purposefully. One was known to have predominantly well users and other to have predominantly vendor users.<sup>28</sup> This allows the results to be compared between well users and vendor users, though as noted below this procedure is not generally appropriate. Statistically, it is not possible to discern whether the differences observed between the neighborhoods are the result of the different water sources or reflect other inter-neighborhood differences.

The CVM survey instrument comes in two versions and there are 10 different price levels. This implies 20 different possible combinations of questions, each of which can be applied to an average of 10 households, given an overall sample size of 200. By design, the questionnaires were to be distributed equally between the two neighborhoods, so 5 of each of the 20 possible combinations were administered in each neighborhood. The questionnaires were ordered so that the versions alternated, and every two households there was a random shift in the bid level to one of the remaining bid levels in that sequence.

### **4.4.3 Implementation**

#### ***4.4.3.1. Pre-test:***

In the course of developing the survey instrument, three senior researchers tested out the valuation questions (i.e. not the background questions) on a selection of households in Kaliyayar, eventually completing six questionnaires in full. It was found that some women did not want to reply without their husband being present. There was no problem getting the respondents to take the questions seriously and give considered answers, but some indications that the hypothetical nature of the survey was not always understood. Illustrations were added at this stage to facilitate the questioning. A number of common "exceptions" were observed, such as households with water piped in from a nearby household connection.

After modifying the questionnaire, the four interviewers (all with previous experience in public health surveys) and two supervisors were trained, and a further pre-test was done, applying the survey to 20 households in each of the survey neighborhoods. The average interview time was found to be 20 minutes. While some minor technical problems with the survey were uncovered, the principal obstacle to successful interviews was found to be mistrust on the part of the respondents, or misunderstanding of the purpose of the interview. In one of the two neighborhoods, there had recently been a scam, wherein people pretending to be working with the water utility collected connection fees from several residents and never returned. This

---

<sup>28</sup> Users are being distinguished here on the basis of the water source they use for drinking. Vendor users often use other sources for bathing and washing.

prevented some interviews from being successfully completed. More generally, it was difficult to convince the respondents that the questions were only hypothetical, especially those who felt a strong need of a water connection. This was not deemed to affect the results of the survey substantially, but to have a detrimental impact on the people interviewed. In response, additional sections were added, explaining the actual PAM charges, and re-emphasizing that the survey was not in any way to be interpreted as an actual offer of a PAM connection.

Since PAM is planning to expand the piped system into these neighborhoods, the possibility that people might interpret the survey as indicating that connections would soon be made available was not considered as serious a problem as it might otherwise have been. It should be noted, however, that a large scale application could raise expectations that cannot be fulfilled.

#### ***4.4.3.2. Some Typical Problem Areas***

Before discussing the results of the case study, it is worth reconsidering three questions which need to be asked in the course of almost any CVM household survey. For each issue, an actual problem which arose in the course of this case study is used to illustrate the types of difficulties which arise.

##### ***Is the right person being interviewed?***

There are some households which are not in the position to decide whether to connect to the piped water system even when it is offered. Renters, for example, may have to leave the final decision to the property owners. When the household can decide, there is still the question of who within the household decides, and how differences of opinion are resolved.

In Jakarta, one would typically expect the principal male of a household to make the final decision to connect to the piped water system. On the other hand, the principal woman of the household might well be more knowledgeable of the advantages which piped water could bring. One of the goals of the pre-test was to determine to whom the questions should be addressed. The pre-test indicated that some women were unwilling to answer the questions, and requested that their husband be asked to respond. On the other hand, husbands often confer with their wives. For the final survey, the interviewers were asked to ensure that the principal male, when there was one, be present. In Jakarta, ensuring the male household head is present generally means surveying in the late afternoon and early evening. Women are also typically at home at this time. In practice, both of the principal couple were present in more than 90% of the interviews.

The results of the survey itself indicated that four households were headed by single men, 14 households by single women, and the remaining 195 households had a principal couple, of which, by convention, the male was designated household head. As indicated in Table 4-2, the responses to a question on who would decide whether to connect to the piped water system confirm the practice of having both the principal man and woman present. The potentially difficult households are those where an absent landlord or other possibly absent person would actually make the decision. In a rapid survey, it is not possible to search out and interview

absent landlords. However, as indicated below, the fact that there are households that cannot themselves decide whether to connect does make it more difficult to interpret the results.

***Table 4-2 Who Decides About Water Connections?***

<b>Who would decide</b>	<b>Households</b>	<b>%</b>
Principal couple	75	35.2
Principal male	72	33.8
Principal female	26	12.2
Absent landlord	26	12.2
Other	14	6.6
<b>Total</b>	<b>213</b>	<b>100%</b>

***Are they being provided with the sort of information upon which they can base their decision?***

Often, this question is treated as synonymous to asking whether the information provided is sufficient to make a rational decision. However, the "right" information is often difficult to process. For many households considering whether to request a piped water connection, the price per liter of water is not meaningful. Most households do not know even roughly how much water they consume. Thus, even the more mathematically dexterous cannot be expected to convert the price of water into an estimate of how much they will have to spend on water. Interpreting actual tariffs are even more complicated, since they typically involve different prices for different levels of water consumption. For these reasons, it is common to have the enumerator provide the respondents with an estimated monthly bill for the service, as well as or instead of tariff details. Even an estimated bill can be somewhat difficult for the respondents to interpret.<sup>29</sup> Moreover, different households are likely to consume quite different quantities of water. The same monthly bill for a wealthy and a poor household would likely imply higher prices for the poor household, since the poor household would be likely to use less water.

For the purposes of the case study, the problem of varying water consumption levels could be reduced by presenting the monthly bill as one which a typical household would be likely to pay, and telling the respondent that bills vary depending on the actual consumption levels. The problem remains serious in large scale surveys, however, where the respondents' views of what constitutes a typical household will vary considerably depending on the area being surveyed. It will tend to accentuate the differences between the willingness to connect in poor and wealthy neighborhoods. Assume, for example, that for a monthly payment of 100 kopeks 90% of a wealthy neighborhood says they would be willing to connect, compared to only 45% of a poor neighborhood. One might conclude that, all other things being equal, the wealthy are far more interested in water connections. This might be used to reinforce a tendency to expand the piped system to wealthy neighborhoods first. However, assuming households in the wealthy area would use on average twice as much water, they are in effect being proffered water at half the price of the poor neighborhood.

<sup>29</sup> It is worth bearing in mind that it is sometimes possible to make a rational decision on whether to pay for a water connection without any direct knowledge of prices or costs. Thus for example, if a relative in similar economic circumstances has made a water connection, and says the service is well worth the cost, one might reasonably decide to connect without ever even attempting to work out how much the water will cost.

### *Are they likely to give biased responses?*

Since CVM is an economic technique, a great deal of the discussion of bias centers on strategic bias: the possibility that respondents will systematically adjust their answers to promote their economic interests. The economic gains to be made by lying to an interviewer in a contingent valuation survey are of doubtful significance, even for a respondent who could work out whether they will gain more by feigning interest or feigning disinterest: the respondent is just one of many, and the type of influence the results will have is far from transparent. The most obvious means to achieve an economic gain is to answer the questions as quickly as possible, and avoid wasting any more time than necessary. Strategic bias may sometimes be significant, but it is probably more important to consider other sources of bias.

An interview creates a social situation, and often a somewhat awkward one. One of the most common forms of bias described in texts of interview techniques is compliance bias; a tendency for respondents to give answers that the interviewer or sponsor seems to want to hear. In Version 1 of the questionnaire applied, if a respondent refuses to say they would accept the water connection, a better system or payment scheme is described, and they are asked again. And again. And again. This could give the respondent the impression that they ought to change their response and say they would accept the system. The reverse holds with version 2. If the respondent says they would accept the connection, some of its advantages are removed, potentially suggesting that they ought to change their response. Thus in both cases the interviewer can save time and provide what may come to seem the easy answer, by shifting their response. Should this occur, the difference between the options will come to seem more appreciable than they really are.

One way of avoiding this potential bias is to provide one dichotomous choice to each respondent. Thus, one quarter of the households could be proffered the standard water service and connection charge, another quarter could be proffered the standard water service and so on. In effect the response would be the same as the attempt to avoid the bias associated with a bidding game by asking different households about different payment levels.

A second possibility, illustrated here, is to use different question orders for different households, and then test for bias and interpret the results accordingly. If question-order bias is suspected, the first questions at least should still be valid.

Table 4-3 illustrates the order in which the options were proffered to the respondents in the two versions of the questionnaire. Table 4-4 compares the results. There is no evidence of question path bias in Version 1. The responses to the final option, better water and payment in installments, was virtually the same as in Version 2, within which this option was described first rather than last. In other words, comparing options A and D among household given Version 1 yields almost the same results as comparing option A in Version 1 with option D in Version 2. There is, on the other hand, evidence of question-path bias in Version 2. Whereas 45% of respondents said they would pay a down payment to connect to the existing piped water system when it was the first offer, the share falls to 25% for respondents answering Version 2, in which this offer comes after they have already said they would take an improved system with a special installment plan. As indicated, this difference is highly significant statistically. With 95%

confidence, one can say that the adoption rate for Option A is between 5 and 30 percentage points higher in Version 1 than in Version 2.<sup>30</sup>

**Table 4-3 Order in which Options are Presented to Respondents in Two Versions of the CVM Questionnaire**

Option	Option Characteristics		Order	
	Connection Charge	System Quality	Version 1	Version 2
A	Lump sum	Current System	1 <sup>st</sup>	4 <sup>th</sup>
B	Lump sum	Improved System	2 <sup>nd</sup>	2 <sup>nd</sup>
C	Installments	Current System	3 <sup>rd</sup>	3 <sup>rd</sup>
D	Installments	Improved System	4 <sup>th</sup>	1 <sup>st</sup>

**Table 4-4 Comparison of Contingent Connection Rates for Different CVM Versions Versions of the CVM Questionnaire**

Option	Version 1		Version 2		Significance of Difference		95% confidence of difference	
	% want	N	% want	N	P	from	to	
A	42	105	25	102	.008	5	30	
B	53	105	40	103	.051	0	27	
C	64	106	49	102	.028	2	29	
D	70	106	68	103	.774	-11	15	

There are several possible explanations for why Version 2 might result in an inordinately large number of respondents refusing Option A. The results suggest that at least some respondents were less likely to accept options C to A if they had previously agreed (hypothetically) to accept a better option (A). This could be because Version 2 goes against standard bargaining practice. Accepted bargaining procedure involves the seller providing better deals until the buyer accepts or the seller cannot improve the offer. This is akin to Version 1. Version 2 would be extremely anti-social in practice. After the buyer agrees, the seller changes the offer, making it less attractive. If this were an actual situation, the buyer might well break off negotiations, and feel cheated. Perhaps, even in this hypothetical market, the respondents were reacting to illegitimate bargaining.

This example illustrates how easily unintentional bias can insinuate itself into a CVM study which is not carefully controlled. Of even more concern, potentially, is intentional bias. Suppose that low connection rates in newly "piped" areas were considered a problem, and that a study was being designed to support the case for improvements in the piped water and/or a lower connection charge. Ignoring intellectual integrity, Version 2 would clearly be the instrument of choice. The results from Version 2 suggest that the improvements and lower connection charge would make an appreciably larger difference than do the results from Version 1. Clearly, CVM must not be allowed to become a biased means of promoting a particular type of policy. The nature of the data collected makes a CVM survey somewhat more easily amenable to subtle manipulation than more conventional surveys of conditions. This makes it particularly important

<sup>30</sup> A small sample size can make some such ranges of questionable statistical validity

that CVM be undertaken by relatively impartial researchers, and that standard practices be developed and maintained for use in policy analysis.

#### **4.4.4 Results**

As described above, CVM is primarily used as a means of assessing people's willingness to pay for environmental amenities not available on the market. Most applications in developed countries involve public goods which are available to everyone once they are available at all. This makes the average value people attach to the good of primary importance. In the case of water services, as examined here, the situation is different. While piped water will be offered to everyone in the neighborhoods in question, not everyone will choose to connect. As such, the average value is of little interest. The more policy relevant questions center on the who will connect under different conditions, why, and how much these potential connectors value the connection.<sup>31</sup>

The following sub-sections examine several of the factors which would be exposed to help determine whether people want water connections. The first three involve what the households are offered: the price of water, the connection cost, and the quality of the service. The next three are characteristics of the household or its environs: wealth, tenure and existing water supply. In the analysis of the connection costs and the quality of the service, some of the implications of the question-path bias are discussed. The principal purpose of presenting these results, however, is to illustrate how their policy implications can be explored. At times this involves treating the findings somewhat more seriously than the unrepresentative nature of the sample and the possibilities of bias warrant.

##### ***4.4.4.1. The Price of Water:***

Water price variation over the range considered in the survey was not found to be an important factor determining whether households were interested in obtaining connections. As indicated in Table 5-5, among households offered option A, only 35% of the 23 households offered the water for free (but having to pay a connection fee and invest in a water container) said they would want to connect, while 25% of the 20 households offered a monthly bill of 38,000 Rupiah said they would be interested. The differences in the adoption rates between payment levels are not statistically significant.<sup>32</sup>

---

<sup>31</sup> To estimate accurately the value that people wanting connections place on obtaining them would clearly require including a different distribution of bids. As a rule of thumb, Bateman and Turner (1992) suggest that at the lowest price offered about 95% of respondents should be willing to pay, and at the highest price only 5% should be willing. Kanninen (1995) has shown, however, that for some estimation procedures there is less bias when the bids are located only within the 30<sup>th</sup> to 70<sup>th</sup> percentiles of the distribution.

<sup>32</sup> If only Version 2 is included, there is a marginally significant ( $p=.05$ ) linear association.



**Table 4-5 Contingent Connection Rate by Monthly Bill (Option A)**

<b>Monthly bill Rupiah</b>	<b>Households sampled<sup>a</sup></b>	<b>% wanting connection</b>
Free of charge	23	35
6,000	22	50
10,000	21	19
13,000	21	19
15,000	21	48
17,000	20	35
20,000	20	50
24,000	20	25
30,000	19	26
38,000	20	25

Note:

<sup>a</sup> Total number of households = 207

These results should not, of course, be taken to suggest that the price of water makes no difference to connection rates. It is safe to assume that there is some price high enough to dissuade virtually all potential piped water users from connecting. Also, this is a small survey of a small area. Larger surveys of Jakarta have shown that price is significant. However, taken in the context of the other findings, these results do suggest that in areas such as those surveyed, subsidizing the price of water is unlikely to be an effective means of assisting needy households.

#### **4.4.4.2. Connection Fee - Lump Sum versus Monthly Installments:**

The results summarized above indicate that Version 2 of the survey is likely to exaggerate the importance of shifting from a single connection charge to a series of payments. Table 4-6 compares the adoption rates separately for each of the two versions, and finally for both versions combined. The results are also presented separately for ordinary service provision and improved service provision. In every case, there is an appreciable difference between the two forms of connection charge. Even with Version 1 and improved water supplies, by shifting the connection charge to installments, it is possible to assert with 95% confidence that the adoption rate increases by between 9 and 23 percentage points (by symmetry, it is possible to assert with 97.5% confidence that the rate increases by at least 9 percentage points).<sup>33</sup>

---

<sup>33</sup> The statistical power of these comparisons relies in part on the fact that it is possible to undertake paired comparisons (i.e. in this case comparing responses that the same households make to different questions). As a result, there is no need to take into account differences in adoption which would arise if the households asked about the lump sum payment had different characteristics from those asked about paying in installments. However, as indicated in the discussion of bias above, there are also potential contamination problems when the same respondent is asked these questions.

**Table 4-6 Comparing Contingent Connection Rate by Connection Charge**

	Lump sum connection charge		Connection charge in installments		Significance of difference P	95% confidence interval difference	
	% want	N	% want	N		from	to
<b>Version 1</b>							
Unimproved	42	105	64	105	.000	14	30
Improved	53	105	70	105	.000	9	23
<b>Version 2</b>							
Unimproved	25	100	48	100	.000	14	32
Improved	40	102	68	102	.000	18	37
<b>Combined</b>							
Unimproved	34	205	56	205	.000	16	29
Improved	47	207	69	207	.000	16	28

#### 4.4.4.3. PAM system quality:

It is possible to compare the adoption rates for the unimproved and improved systems in a similar manner to the connection charges. Indeed, the results presented in Table 4-7 contain almost the same basic data as Table 4-6, with the rows and columns switched. The minor differences in the numbers and shares are the result of how missing values are treated: if one response is missing, the pair of responses for the household is omitted. Overall, the average differences associated with improving the quality of the water system are appreciably smaller than those associated with replacing the lump sum connection charge with an additional monthly charge. Given that the improvements described were comprehensive, the shifts in Version 1 from 42 to 53% connecting with lump sum connections costs, or from 64 to 70% connecting with additional monthly charges, are modest.

**Table 4-7 Comparing Contingent Connection Rate by Quality of Piped Water Supply**

	Unimproved System		Improved System		Significance of difference P	95% confidence interval difference	
	% want	N	% want	N		from	to
<b>Version 1</b>							
Unimproved	42	105	53	105	.000	5	18
Improved	64	106	70	106	.014	1	10
<b>Version 2</b>							
Unimproved	25	102	39	102	.000	8	22
Improved	50	101	67	101	.000	10	25
<b>Combined</b>							
Unimproved	33	207	46	207	.000	8	18
Improved	57	207	69	207	.000	7	16

#### 4.4.4.4. Existing Conditions

The value a household places on a piped water connection depends in part on their current circumstances. Three of the most pertinent conditions are their water supply, their wealth and their tenure.

### *Existing Water Supply*

The CVM survey was designed to enable the responses of households using wells for their drinking water to be compared to those of households purchasing their drinking water from itinerant vendors. In one of the neighborhoods sampled, the well water was known to be saline, and hence undrinkable. In the other it was known to be used for drinking by most of the households. Given this situation, a simple comparison of responses across drinking water sources may inadvertently reflect neighborhood differences only coincidentally related to the water situation.

Table 4-8 summarizes a series of comparisons. The vendor users are consistently more interested in a piped water connection, and the differences are substantial. Quite clearly, the vendor users value water connections more than the well users. As will be illustrated below, however, the neighborhood where most households buy from itinerant vendors is somewhat wealthier than the neighborhood where most households use wells. In this particular example, the wealth difference will tend to accentuate the observed differences associated with water source.

*Table 4-8 Comparing Contingent Connection Rates by Well and Vendor Users*

Option	Well		Vendor		Significance of difference	95% confidence interval difference	
	% want	N	% want	N	P	from	to
A	21	90	48	87	.000	14	41
B	33	90	63	87	.000	16	44
C	42	89	81	88	.000	26	52
D	57	90	90	89	.000	21	45

### *Wealth*

For the purposes of this analysis, a household is defined as wealthy if it has an automobile, air conditioning, a telephone or a gas cooker. This classification divides the sample into two roughly equal groups, but is not intended to suggest that the poorer group is poor by any international or absolute criteria.

As indicated in Table 4-9, the wealthy are more interested in water connections than the poor. The differences are somewhat smaller for options C and D, which involve paying the connection charge over three years. Indeed, for option D the difference was not statistically significant. Overall, however there is a clear tendency for wealthy households to be more likely to want a water connection.

**Table 4-9 Comparing Contingent Connection Rates for Poor and Wealthy Households**

Option	Poor		Wealthy		Significance of difference	95% confidence interval difference	
	% want	N	% want	N	P	from	to
A	21	94	49	99	.000	15	41
B	37	94	62	100	.000	11	39
C	51	94	70	100	.007	5	33
D	67	79	79	101	.062	-1	24

One reason the wealthy could be expected to be more interested in water connections is that covering the connection costs, the monthly payments and the costs of indoor piping and a water storage container, is less of a sacrifice. Alternatively, easier access to water may complement other consumption patterns of the wealthier households. In economic terms, this will lead them to value the water connection more. However, in this case there is a third possibility: the water supply situation they currently face may, on average, be worse for the wealthy than the poor. The neighborhood with more wealthy households is also the one with more vendors users. This neighborhood was selected in part because the groundwater was known to be bad.

In this situation, it can be misleading to look independently at the relation between wanting a water connection and wealth (or current water source). Just how misleading is illustrated in Table 4-10 and Table 4-11. These tables display statistical estimates of how the odds that a household will connect are related to whether they use a vendor and whether they are wealthy. The Vendor Model ignores the households' wealth, and estimates that the odds that a vendor user will choose to connect are 3.5 times that of a well user (other water source users were omitted). Thus, for example, if the odds are slightly better than 1 to 4 that a well user will choose to connect then the odds should be about even for a vendor user. These are roughly the same as the odds suggested by the percentages in Table 4-8. Much the same applies to the Wealth Model. In the Combined Model, both wealth and the use of a vendor are taken into account, and the estimated odds ratios decline substantially, along with their significance levels. This is because they are now estimates that attempt to "control for" variation in the other variable. The odds ration for using a vendor, for example, is intended to apply only within a wealth group.<sup>34</sup>

Which type of odds ratio, or other statistical measure, is relevant depends on the question being addressed. By and large, in the case of Option A, the problem with presenting the single factor statistics is that an unwary audience is likely to receive an exaggerated impression of the importance of the factors displayed. In policy discussions, associations have a tendency to be interpreted as effects. Thus one might interpret the high odds ratio in the Wealth Model as implying that the demand for connections will grow very rapidly as the wealth of the area grows. However, wealth is not the reason why the groundwater is salinated, and the lower odds ratio associated with wealth in the Combined Model is more relevant.

<sup>34</sup> There is, of course, no reason to assume that using a vendor has exactly the same odds ratio within the two wealth groups. A more detailed analysis could examine possible interactions between wealth and use of a vendor. However, given the sample size, it is difficult to examine more than a small range of factors.

**Table 4-10 Logistic Regressions of Vendor Use and Wealth on Adoption of Piped Water (Option A)**

	Vendor Model (N=177)		Wealth Model (N=193)		Combined Model (N=177)	
	Odds ratio	P	Odds ratio	P	Odds ratio	P
Use vendor	3.49	.000			2.82	.003
Wealthy			3.63	.000	2.07	.038

**Table 4-11 Logistic Regressions of Vendor Use and Wealth on Adoption of Piped Water (Option C)**

	Vendor Model (N=177)		Wealth Model (N=194)		Combined Model (N=177)	
	Odds ratio	P	Odds ratio	P	Odds ratio	P
Use vendor	5.87	.000			5.84	.000
Wealthy			2.23	.007	1.02	.966

Comparing the combined results for Options A and C also illustrates how useful it can be to analyze different factors simultaneously. Option A involves a large connection charge, while option B involves the monthly payments. What is striking is that when option A is proffered, both the existing water system the household has and its wealth are closely associated with the likelihood the household will say they want to connect. However, when an installment plan is offered, it is especially attractive to poor vendor users. The odds ratio associated with using a vendor increases, while that associated with wealth falls to virtually one (an odds ratio of one implies no association at all). This suggests that adjusting the connection charge is an effective way of improving access to water for needy but poor households.

### **Tenure**

It is generally accepted that people whose tenure is insecure are less likely to invest in their homes. Why pay for a water connection if you may not be around to use the water? In Jakarta, it has been estimated that "approximately 70% of all households who own the land their residence occupies have something less than a fully legal and registered title. There are a number of implications of this pattern, but one of the more important is that such tenure is insecure and thus such land becomes an attractive target for redevelopment because it can be obtained at a lower price"(Hoffman, 1992).

Table 4-12 summarizes the house ownership patterns in the two neighborhoods surveyed. With a few exceptions, the households either rent their homes or own them. While renting is more common in N1, the poorer neighborhood, even there it only accounts for 22% of households. Renting raises a somewhat different set of obstacles to home improvement than does insecure ownership. As indicated above, several of the respondents explicitly said that they would not pay for a water connection since they were tenants. These respondents were not included in the analysis of factors influencing water connection, since the owner could still decide to connect.

**Table 4-12 House Ownership Pattern by Neighborhood**

Ownership	Neighborhood 1		Neighborhood 2		Combined	
	N	%	N	%	N	%
Own	84	76	92	89	176	83
Rent	24	22	8	8	32	15
Other	2	2	3	3	5	2
<b>Total</b>	<b>110</b>	<b>100%</b>	<b>103</b>	<b>100%</b>	<b>213</b>	<b>100%</b>

Table 4-13 summarizes the status of the land among households owning their homes. Overall about half of the households have unregistered claims to the land, a further have registered claims to own the land themselves. The remaining 17% have varying degrees of security, and to reside on land they say is owned by the government, but to which they may have some rights to use.

**Table 4-13 Land Status by Neighborhood**

Land Status	Neighborhood 1		Neighborhood 2		Combined	
	N	%	N	%	N	%
Own-registered	29	35	31	34	60	34
Own-unregistered	48	57	37	40	85	48
Government	5	6	20	28	25	14
Other	2	2	4	4	6	3
<b>Total</b>	<b>84</b>	<b>100%</b>	<b>92</b>	<b>100%</b>	<b>176</b>	<b>100%</b>

The obvious question to pose is whether land registration makes a difference to whether households are willing to invest in a water connection.<sup>35</sup> Generally, since households without registration are likely to be poorer, one would expect a univariate analysis of the association between land registration and connection to exaggerate their interrelation. Furthermore, one might expect land security to make more difference when a down payment is required for connection, as in options A and B. However, as indicated in Table 4-14, there is no evidence that registration bears any relation to adoption rates, even when down payments are required.

**Table 4-14 Comparing Contingent Connection Rates for Households with Registered and Unregistered Land Claims**

Option	% want	N	% want	N	P	from	to
A	37	84	42	59	.513	-11	22
B	53	85	54	59	.854	-18	15

As indicated, the size of the confidence interval indicates that the similarity in adoption rates could hide appreciable differences. However, if such percentages reoccurred in a large representative survey, it would be difficult to claim that registration is a prerequisite to local environmental improvement. Land tenure in Jakarta, as in many cities, involves shades of gray rather than a black and white distinction suggested by terms such as owner-occupiers and

<sup>35</sup> This question is probably better addressed on the basis of actual connections in areas where households have already been offered piped water (see Hoffman, 1992). There is no need to use hypothetical data.

squatters. Insecure tenure is not simply a function of formal land rights. While there is little doubt that insecurity can inhibit people from investing in local environmental improvement, it is quite possible that land registration does not reduce insecurity sufficiently to change investment patterns. Thus, in an earlier survey, it was found that only 55% of respondents with registered land titles felt "very certain" that they would not be forced to leave their property (Hoffman, 1992).

#### **4.4.5. Conclusions from Case Study**

Contingent valuation is not a particularly easy method to apply or to analyze. On the other hand, in the right circumstances it can provide results of clear policy relevance. In the case study presented, it was found that, as one would expect, vendor using households valued connections more than households using wells for drinking water. Also as one would expect, the wealthy valued connections more than the poor. Quantifying these differences helps one to understand the processes at work in the connection patterns of Jakarta's households, but does not yield any clear policy insights, except to reinforce the notion that salinated areas should be target.

Other findings were clearly policy relevant. The differences between the desire to connect to the existing system versus a more reliable system was striking. The difference relating to whether there was an installation fee or a higher monthly charge was even more striking. The results suggest that, if the sampled households are fairly typical, the difficulties and cost of connecting to the system are a large part of the reason why so many households choose not to connect. The alternatives offered in the contingent valuation would actually cost the utility the same, as long as defaulting on water payments could be prevented or kept to a few percent: the loss in installation fee would be made up by an increase in monthly payments. Moreover, the group most averse to high connection fees is the poor. Thus, attempts to facilitate connection, and shifting the connection costs onto the monthly bills, would seem to be an economic and ethical means of improving public health. Whether the same results apply to other parts of Jakarta is debatable.

#### **Short Annotated Bibliography on Contingent Valuation:**

##### **Textbook**

Mitchell, R.C. and Carson, R.T. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC, Resources for the Future. 463p.

This book comes a close to a textbook and to a handbook as anything in the contingent valuation field. It deserves credit for providing many newcomers with a well balanced introduction to the subject. Some of the discussion now seems somewhat dated, but it remains a very useful reference.

##### **Comprehensive Bibliography:**

Carson, R.T., Wright, J., Carson, N., Alberini, A. and Flores, N. 1994. *A Bibliography of Contingent Valuation: Studies and Papers*. La Jolla, CA, Natural Resource Damage Assessment. 142p.

As of 1994, this extensive bibliography on contingent valuation had 1,672 entries. The vast majority are either applications in wealthy countries or, most commonly, technical papers examining a particular aspect of CVM.

### **Review Papers:**

Bateman, I.J. and Turner, R.K. 1992. *Evaluation of the Environment: The Contingent Valuation Method*. CSERGE GEC Working Paper no. 92-18. Centre for Social and Economic Research on the Global Environment (London).

This paper provides an overview of the CVM for those with a minimum familiarity with economics.

### **Applications to Environmental Services in Urban Centers of Developing Countries:**

Atlaf, M.A. and Hughes, J.A. 1994. Measuring the demand for improved urban sanitation services: Results of a contingent valuation study in Ouagadougou, Burkina Faso. *Urban Studies*. 31(10):1763-1776.

McPhail, A.V. 1993. The "five percent rule" for improved water service: Can households afford more. *World Development*. 21(6):963-973.

Whittington, D., Lauria, D., Choe, K.-A and Swarna, V. 1993. Household Demand for Improved Sanitation Services in Kumasi, Ghana: a Contingent Valuation Study. *Water Resources Research*. 29(6):1539-1560.

Whittington, D., Lauria, D.T. and Mu, X. 1991. A study of water vending and willingness to pay for water in Onitsha, Nigeria. *World Development*. 19(2/3):179-198.

These examples summarize some of the urban studies conducted as part of a larger study series conducted through the UNDP-World Bank Water and Sanitation Program using CVM to evaluate water and sanitation options in developing countries. More methodological details are provided in some of the rural publications, such as Altaf, A., Jamal, H. and Whittington, D. 1992. *Willingness to Pay for Water in Rural Punjab, Pakistan*. Water and Sanitation Report no. 4. UNDP-World Bank Water and Sanitation Program, World Bank (Washington, DC). Similarly, a good example of the policy conclusions which CVM studies of environmental service delivery have been used to support are summarized in a publication on rural water: World Bank Water Demand Research Team. 1993. The demand for water in rural areas: Determinants and policy implications. *World Bank Research Observer*. 8(1):47-70.

### **Economic Opinion on CVM**

National Oceanic and Atmospheric Administration. 1993. Report of the NOAA Panel on contingent valuation. *Federal Register*. 58(10):4602-4614.

This report summarizes an intensive investigation of the contingent valuation method by a panel containing two noble prize winning economists. The panel was convened to help assess the use of contingent valuation in court cases to set compensation levels for environmental damages.

Hanemann, W.M. 1994. Valuing the environment through contingent valuation. *Journal of Economic Perspectives*. 8(4):19-43.



Portney, P.R. 1994. The contingent valuation debate: Why economists should care. *Journal of Economic Perspectives*. 8(4):3-17.

Diamond, P.A. and Hausman, J.A. 1994. Contingent valuation: Is some number better than no number? *Journal of Economic Perspectives*. 8(4):45-64.

This recent exchange in the *Journal of Economic Perspectives*, published in the wake of the NOAA panel report on contingent valuation, illustrates the range of economic opinion on the topic. The first paper, written by one of the panel members, provides a summary of some of the issues at stake. The second is generally favorable and the third unfavorable. Taken together, they provide a useful overview of the topic, especially as it applies to valuing public goods.

### **Journals**

#### *Journal of Environmental Economics and Management*

This journal regularly publishes papers examining different technical aspects of contingent valuation. Examples listed in the unannotated bibliography include: (Ajzen et al., 1996; Alberini, 1995; Boyle and others, 1993; Cameron and Quiggin, 1994; Cooper, 1993; Herriges and Shogren, 1996; Kanninen, 1995; Prince and others, 1992; Ready et al., 1995; Schkade and Payne, 1994; Whitehead et al, 1995). Readers should be aware that it is sometimes assumed, even when it is not explicitly stated, that it is public goods that are being valued.

### *References for Chapter 4*

- Ajzen, I., Brown, T.C. and Rosenthal, L.H. 1996. Information bias in contingent valuation: Effects of personal relevance, quality of information, and motivational orientation. *Journal of Environmental Economics and Management*. 30(1):43-57.
- Alberini, A. 1995. Efficiency vs bias of willingness-to-pay estimates: Bivariate and interval-data models. *Journal of Environmental Economics and Management*. 29(2):169-180.
- Atlaf, A., Jamal, H. and Whittington, D. 1992. *Willingness to Pay for Water in Rural Punjab, Pakistan*. Water and Sanitation Report no. 4. UNDP-World Bank Water and Sanitation Program, World Bank. (Washington, DC).
- Bateman, I.J. and Turner, R.K. 1992. *Evaluation of the Environment: The Contingent Valuation Method*. CSERGE GEC Working Paper no. 92-18. Centre for Social and Economic Research on the Global Environment (London).
- Boyle, K.J., Welsh, M.P. and Bishop, R.C. 1993. The role of question order and respondent experience in contingent-valuation studies. *Journal of Environmental Economics and Management*. 25:80-97.
- Briscoe, J. and Garn, H.A. 1995. Financing water supply and sanitation under Agenda 21. *Natural Resources Forum*. 19(1):59-70.
- Cameron, T.A. and Quiggin, J. 1994. Estimation using contingent valuation data from "dichotomous choice with follow-up" questionnaire. *Journal of Environmental Economics and Management*. 27:218-234.
- Carson, R.T., Wright, J., Carson, N., Alberini, A. Flores, N. 1994. *A Bibliography of Contingent Valuation: Studies and Papers*. La Jolla, CA, Natural Resource Damage Assessment. 142p.
- Cooper, J.C. 1993. Optimal bid selection for dichotomous choice contingent valuation surveys. *Journal of Environmental Economics and Management*. 24:25-40.
- Diamond, P.A. and Hausman, J.A. 1994. Contingent valuation: Is some number better than no number? *Journal of Economic Perspectives*. 8(4):45-64.
- Hanemann, W.M. 1994. Valuing the environment through contingent valuation. *Journal of Economic Perspectives*. 8(4):19-43.
- Herriges, J.A. and Shogren, J.F. 1996. Starting point bias in dichotomous choice valuation with follow-up questioning. *Journal of Environmental Economics and Management*. 30(1):112-131.

- Hoffman, M.L. 1992. Unregistered land, informal housing and the spatial development of Jakarta. In: Kim T.J., Knaap G., Azis I.J., (eds.). *Spatial Development in Indonesia*. Aldershot, Ashgate Publishing. P.429.
- IWACO. 1992. *Regulatory and Price Policies for Water Conservation and Recycling in DKI Jakarta*. Final Report. IWACO (Rotterdam).
- Kanninen, B.J. 1995. Bias in discrete response contingent valuation. *Journal of Environmental Economics and Management*. 28:115-125.
- Knetsch, J.L. 1994. Environmental valuation: Some problems of wrong questions and misleading answers. *Environmental Values*. 3:351-368.
- McPhail, A.A. 1993. The "five percent rule" for improved water service: Can households afford more. *World Development*. 21(16):963-973.
- Mitchell, R.C. and Carson, R.T. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC, Resources for the Future. 463p.
- National Oceanic and Atmospheric Administration. 1993. Report of the NOAA Panel on contingent valuation. *Federal Register*. 58(10):4602-4614.
- Portney, P.R. 1994. The contingent valuation debate: Why economists should care. *Journal of Economic Perspectives*. 8(4):3-17.
- Prince, R., McKee, M., Ben-David, s. and Bagnoli, M. 1992. Improving the contingent valuation method: Implementing the contribution game. *Journal of Environmental Economics and Management*. 23:78-90.
- Ready, R.C., Whitehead, J.C. and Blomquist, G.C. 1995. Contingent valuation when respondents are ambivalent. *Journal of Environmental Economics and Management*. 29(2):181-196.
- Schkade, D.A. and Payne, J.W. 1994. How people respond to contingent valuation questions: A verbal protocol analysis of willingness to pay for an environmental regulation. *Journal of Environmental Economics and Management*. 26:88-109.
- Serageldin, I. 1994. *Water Supply, Sanitation, and Environmental Sustainability: The Financing Challenge*. World Bank (Washington, DC).
- Surjadi, C., Padhmasutra, L. Wahyuningsih, D., McGranahan, G. and Kjellén. M. 1994. *Household Environmental Problems in Jakarta*. Stockholm Environment Institute (Stockholm).
- Whitehead, J.C., Blomquist, G.C., Hoban, T.J. and Clifford, W.B. 1995. Assessing the validity and reliability of contingent values: A comparison of on-site users, and non-users. *Journal of Environmental Economics and Management*. 29(2):238-251.

- Whittington, D., Briscoe, J., Mu, X. and Barron, W. 1990s. Estimating the willingness to pay for water services in developing countries: A case study of the use of contingent valuation surveys in southern Haiti. *Economic Development and Cultural Change*. 38:293-311.
- Whittington, D., Lauria, D.T. and Mu, X. 1991. A study of water vending and willingness to pay for water in Onitsha, Nigeria. *World Development*. 19\*2/3):179-198.
- Whittington, D., Smith, V.K. et al. 1990b. *Giving Respondents Time to Think in Contingent Valuation Studies*. Working Papers. Infrastructure and Urban Development Department, World Bank (Washington, DC).
- World Bank Water Demand Research Team. 1993. The demand for water in rural areas: Determinants and policy implications. *World Bank Research Observer*. 8(1):47-70.

## 5. COMPARING AND CONTRASTING DIFFERENT METHODS:

The three research techniques described above typically serve somewhat different purposes. They are also commonly associated with somewhat different development paradigms. Broad-spectrum household surveys are often linked to government programs and projects, and more generally a technocratic approach to development. Participatory rapid appraisal is often applied by non-governmental organizations, and associated with the advocacy of grass-roots, decentralized development efforts. Contingent valuation, as applied in the water and sanitation field, focuses on pricing decisions and could easily be seen as a tool of market-oriented economists. The applications in Jakarta fit three stereotypes, at least superficially.

The differences should not be overdrawn, however. First, reliable information can be put to a variety of uses, however, it was obtained.<sup>36</sup> Participatory research can be a vehicle for government-led intervention, the results from household surveys can support grass-roots development, and so on. Second, even supporters of a particular sector, be it the government, the private sector or what has been termed the collective action sector (Uphoff, 1993), should recognize that it is important that the other sectors also function well. One does not have to love bureaucracies to accept that in the right circumstances good statistics can improve their functioning. One does not have to love commercial enterprises to accept that better information of people's willingness to pay for basic environmental services can help improve the service delivery, even for the relatively poor. And one does not have to be a fan of the "third sector" to accept that when GROs and NGOs are better informed their work improves. Indeed, each of these tools can be effectively wielded by critics.

While the three techniques examined in this report cover a wide spectrum, there are numerous other techniques relevant to the topics at hand, some explicitly for environmental assessment and others which could easily be adapted. Various techniques have been adapted to assist in project management. In this context the primary goal is to help organizations, including those involved in environmental management, to respond better to the needs of their beneficiaries or clients. (A number of these have been summarized in the World Bank Participation Sourcebook (World Bank, 1995), developed for use by World Bank task managers). Numerous techniques are adapted to basic research, such as participant observation in anthropology and case control studies in epidemiology. These can provide critical insights, but are often difficult to apply in day-to-day environmental management problems.<sup>37</sup> But many methods, like those discussed here, are used in a wide range of circumstances, and reflect a growing methodological pluralism.

### 5.1. *A Stylized Comparison:*

Table 5-1 summarizes the three different techniques examined in this report, along with their associated approaches to development, somewhat exaggerating their differences. The purpose is

---

<sup>36</sup> While the theory-neutral facts of positivist epistemology may be elusive, it is also difficult to find empirical techniques so theory-laden that none of their results can be appropriated by competing theories or policy perspectives.

<sup>37</sup> For example, attempts to use changes in health status as an indicator of environmental improvement at the local level are unlikely to succeed, although more general findings from environmental health research should (and indeed does) inform all local improvement efforts.

to make more explicit some of the connections between the methods and presumptions about how environmental management ought ideally to take place.

**Table 5-1: Comparing Stereotypes of Three Environmental Assessment Techniques**

	<b>Broad spectrum</b>	<b>Participatory</b>	<b>Contingent</b>
	<b>Sample survey</b>	<b>Appraisal</b>	<b>Valuation survey</b>
<b>Major development</b>	1920-1950	1980 -	1960 -
<b>Dominant discipline</b>	Statistics	Anti-disciplinary	Economics
<b>Prioritised quality</b>	Empirical rigor	Political correctness	Conceptual rigor
<b>Typical research center</b>	Statistics office	NGO	University
<b>Main target audience</b>	Planners/project managers	Residents/project managers	Policy makers/utilities
<b>Look for solutions in</b>	Government programs	Grass roots initiatives	Improved markets
<b>Dominant paradigm</b>	Modernist	Post-modernist	Neo-liberal

### 5.1.1. Periods of Major Development

As indicated in the first line of Table 5-1, the sample survey is far older and more established than either contingent valuation or participatory appraisal. The sampling theory upon which sample surveys are based was developed mostly in the first half of this century, by the end of which most of the simple forms of presenting survey data had also been developed. The challenge of applying this technique to local environmental problems is a difficult one, but raises few new methodological problems. Being well established confers a certain respectability to the sample, but also reflects a somewhat out-dated approach. Certainly this applies to top-down planning, with which the sample survey is often associated. As noted in the introduction, however, improvements in information technology could create new opportunities for the sort of broad spectrum sample survey discussed here.

The more recent vintage of the contingent valuation and the participatory assessment is at once art of their attraction and a reason to be cautious in their application. Both contingent valuation and participatory appraisal are evolving rapidly, and have attracted many committed researchers who are uncovering new aspects and applications. For the new initiate, this can be both exciting and disconcerting.

For contingent valuation, the most academic of the three techniques, new methodological findings appear every month in economics journals, but their form is comparatively esoteric, and the implications for non-specialist application are often far from clear. In effect, the novelty of CV, remains somewhat of a barrier to widespread application. Even strong advocates of contingent valuation are doubtful of the possibility of developing simple protocols for applying CVM on a routine basis. It is still possible that future research will cast serious doubt on the reliability of the technique, at least in its current form. On the other hand, as the approach matures, and the lessons of experience are distilled, it may become far easier for new practitioners to apply CVM.

Participatory appraisal is also in a phase of rapid development, and if the past is anything to go by, new developments are likely to be accompanied by new labels, suggesting an ever newer genesis. Partly because of the purposefully non-specialist nature of the PRA approach, new developments in PRA often have a relatively popularized form. Unlike contingent valuation, PRA is not intended to be applied by experts, and its novelty is less of a barrier to routine

application, at least on a small scale. Experience on applying PRA through larger scale programs remains scanty, however.

### **5.1.2 Related Disciplines and Prioritized Qualities**

As indicated in lines 2 and 3 of Table 5-1, the research base for the three techniques tends to be rather different. The sample survey, and the questionnaire approach, are closely associated with statistics, which is often treated as a discipline, although it is not associated with a particular topic of study. The emphasis is put on empirical rigor, with the data very much center stage. Many other disciplines draw on statistics, but for the most part the statistical procedures remain comparable. A statistical approach is relatively easy to adopt in multidisciplinary studies combining some of the more empirically oriented disciplines. While surveys are administered by a variety of different organizations, large scale applications are often undertaken by specialized organizations, such as statistical offices.

Participatory appraisal is sometimes associated with anthropology, but this is more because of a common interest in local perceptions than because of any methodological affinity.<sup>38</sup> Generally, PRA is against expertise, and claims to be highly respectful of what local people know or can learn for themselves. Implicitly at least, this sets PRA against the established disciplines, not simply in the sense of being multi-disciplinary, but in the sense of being anti-disciplinary. Somewhat paradoxically, PRA requires its own type of expertise, though not the sort of expertise requiring long periods of formal education. The personal-political relationships between the outside researchers or facilitators and the local participants are central to PRA. Forced to choose, a PRA advocate is more likely to compromise the quality of their statistics or the rigor of their arguments than the quality of their relationship to the community. While governments and research institutions do undertake PRA, NGOs, which often adopt a self avowedly participatory approach to action, are the most common users.

While sample surveys can easily be used in multidisciplinary studies, and PRA could claim to be transdisciplinary, CVM is clearly wedded to economics. The desire to express people's preferences in monetary terms reflects an economic perspective. Even more rooted in economic orthodoxy is the assumption that people have well defined and consistent preferences, and that the difficulty is getting them to reveal these preferences in the absence of a market. CVM studies are often very concerned with the extent to which their results are consistent with economic theory, and there is considerable emphasis of conceptual coherence. Unlike PRA, there is little concern with the researcher-resident relationship, while empirical rigor is considered desirable, few allowances are made for the fact that people often find it difficult to define their preferences in the form economic theory suggests. While the World Bank has been heavily involved in the CVM studies in the water and sanitation sector, economics departments in universities are the more common research establishment conducting CVM studies, and even the World Bank studies have typically been headed by university researchers.

---

<sup>38</sup> Participant observation, a standard approach in anthropology, is not participatory in the sense of PRA. In participant observation, the researcher participates in the society while observing. In participatory appraisal, it is the local population that is intended to participate in the research.

### **5.1.3 Main Audiences and Actions Targeted**

The core audiences and action orientations of the techniques, summarized in rows 5 and 6, follow quite closely from the research bases. Sample surveys from statistical offices are typically designed in response to requests and funding from the government (or international donors). The sort of information a broad spectrum sample survey provides is very much the stuff of government reports, and situation analysis. A statistical summary of environmental conditions puts the researcher or planner in the position of judging the severity of environmental problems. Most of the information collected typically pertains directly to physical factors. This is the sort of information that many physical planners want as a matter of course. Existing physical conditions can be compared with acceptable conditions. If current conditions are not acceptable, it is up to the planner to determine how to get from here to there. (For this latter purpose, planners must also know a great deal more than the physical conditions, of course.)

A participatory rapid assessment (PRA) attempts to help people define their own environmental priorities. Residents are meant to participate in the research, with a view towards participating in the improvement process. Rather than having planners decide what the environmental priorities are, or having policy-makers consult local residents on how much they value different environmental amenities, residents are, ideally, given control over the environmental assessment process itself. This makes the residents the ideal audience, though in practice it is often project managers or local activists who initiate and use much of the information.

A contingent valuation (CVM) survey attempts to ascertain how much people would be willing to pay for environmental amenities if they could be purchased on the market. The severity of an environmental problem is judged not by its physical features, but by how much people would be willing to sacrifice to eliminate the problem. This is the sort of information needed by policy makers or commercial enterprises wishing to manipulate prices and supplies and ensure that currently suppressed demands for environmental amenities can be met in the future (in economic jargon, to correct market and public failures).

### **5.1.4 Dominant Paradigms**

Viewed in these terms, one can detect different paradigms, summarized in line 7 of Table 5-1, within which these techniques fit best. The broad spectrum sample survey fits within a modernist perspective, and a positivist philosophy of science. Facts are by and large treated as neutral, with knowledge progressing by contrasting hypotheses and theories with the facts, and rejecting the hypotheses and theories which the facts do not corroborate. Society too is treated as progressing in a relatively straightforward fashion through the application of knowledge. While many statisticians and other users of sample surveys are not positivists, the practice of statistics typically conforms at least superficially to the positivist model.

PRA fits better with a post-modern perspective, given its emphasis on the personal-political dimensions of research, its respect for non-scientific knowledge, its attempts to allow for multiple perspectives, its implicit critique of unilinear models of development, and its skepticism towards both empiricism and meta-theories. By and large, the philosophical foundations of PRA



are only beginning to be developed, but those beginnings suggest an explicit rejection of the positivist philosophy of science (Pretty, 1995).

CVM places too much emphasis on popular perceptions over expert judgement to fit the modernist vision of science leading societies ever onward. On the other hand, rather than having the post-modern flavor of PRA, its intellectual foundations lie in neo-liberal thinking, with its predilection for markets and "free choice". This applies especially to the use of CVM to help identify public failures, in the form of public services which the state does not provide despite the fact that people would be willing to pay the full cost.

## ***5.2 Lessons Learned for Practitioners***

To simplify drastically, the broad spectrum sample survey is the tool of the planner, contingent valuation the tool of the private sector advocate, and participatory appraisal the tool of the grassroots activist. It might seem that even in choosing how to gather information on local environmental problems, one is implicitly choosing how they ought to be dealt with. But the planner, the market and local collective organizations are all important to local environmental management.

Caricatures can be dangerous, when overextended. The fieldwork in Jakarta indicates that each of these techniques can provide important, and in many ways complementary, insights. A broad spectrum survey can be an invaluable means of monitoring local environmental changes, and providing a benchmark against which to measure planned improvements. Contingent valuation can provide critical insights relevant to a utility attempting to provide services more efficiently or equitably. Participatory assessment can help support grass roots initiatives. And each technique also provides information of relevance to other audiences.

Even if each technique is associated with a different approach to environmental management, and perhaps even a different world-view, they can all be simultaneously contributing to better local environmental management. Indeed, the tools do not simply assist the actors in the sectors they tend to favor, but can serve to hold them accountable. The broad spectrum surveys are not just a tool of government, but a tool for evaluating government programs. The same holds for PRA, which can be a tool in evaluating the performance of NGO's, and CVM which has been used to provide a damning indictment of public service utilities.

Table 5-2 compares the instrumental strengths of the three techniques. The categories are designed to give roughly equal weight to the strengths of each technique. As indicated in the stylized comparison of the three techniques, these are not neutral evaluation tools, but are to at least some degree associated with different development strategies. On the other hand, one should not expect the methodological "tail" to wag the policy "dog". How important these various strengths are will come to depend more upon the local situation depends upon the method selected.

**Table 5-2: Comparing instrumental strengths of sample surveys, participatory appraisal and contingent valuation**

	<b>Broad spectrum Sample Survey</b>	<b>Participatory Appraisal</b>	<b>Contingent Valuation Survey</b>
<b>Monitoring changing conditions</b>	<b>very useful</b>	less useful	N/A
<b>Providing data base for centralized planning</b>	<b>very useful</b>	less useful	less useful
<b>Identifying obstacles to environmental improvement</b>	useful	<b>very useful</b>	useful
<b>Establishing basis for active participation</b>	less useful	<b>very useful</b>	less useful
<b>Conducting economic evaluation of an improvement</b>	less useful	useful	<b>very useful</b>
<b>Pricing environmental services</b>	less useful	less useful	<b>very useful</b>

### **5.2.1. The Instrumental Strengths of the Broad Spectrum Survey**

The broad spectrum survey is the most effective at monitoring changing conditions across a whole urban area, or set of urban areas. Participatory appraisal is constrained by the difficulties of organizing PRA exercises across a wide area, and the difficulty of combining information from different appraisals if the local residents really did participate in determining what information would be collected and how. Contingent valuation does not really examine conditions, and is not suited to examining more than one or two carefully defined problems.

For somewhat similar reasons, the broad spectrum sample survey is the best suited for providing an empirical base for centralized planning purposes. A wide range of ministries can draw on the same data base, and use it for their own purposes. PRA is inherently more decentralized and CVM more focussed.

### **5.2.2. The Instrumental Strengths of PRA**

Participatory appraisal is the best suited of the three to actually establishing a basis for local participation in environmental management. Both the broad spectrum survey and the contingent valuation survey do generally extract information only for use by others. This should makes PRA the most attractive of the three for supporting processes of decentralized governance.

Participation is also credited with being the best at identifying obstacles to environmental improvement. This is perhaps debatable, but can be one of the most important advantages of PRA in informing outsiders. Both the broad spectrum survey and contingent valuation can be used to evaluate obstacles, but by and large only if they have already been identified. PRA is more open to new perspectives, and hence to new insights into why environmental problems allowed to arise and persist.

### **5.2.3. The Instrumental Strengths of CVM**

Contingent valuation provides information that can be compared directly with costs in an economic evaluation of a particular environmental improvement. In comparison, the information from a broad spectrum survey or PRA is only indirectly related to economic benefits. This allows the results of CVM to feed directly into extended forms of cost-benefit analysis, which incorporate goods not currently marketed, or not marketable at all.

Similarly, CVM provides information directly relevant to pricing policy, whereas the other techniques provide more contextual information. If environmental services are being provided

commercially, it is critical to determine how much different groups are willing to pay. While it is possible to doubt the validity of many CVM results, there is little doubt that a good understanding of who is willing to pay how much for different environmental services is critical to the design of pricing policy.

#### **5.2.4 Relative Costs**

When applied on a small scale, PRA tends to be considerably less expensive than a broad spectrum survey: in the case studies in Jakarta the PRA fieldwork cost less half that of the surveys (though the PRA also demanded more of local residents "free" time). Moreover, PRA is more flexible, and easily adjusted to local circumstances. On the other hand, there are appreciable returns to scale in sample surveys, particularly when adequate sample frames are available. It can easily cost \$5,000 to survey a minimal sample of one hundred households in a neighborhood. On the other hand, it may cost only \$50,000 to survey 1,000 households and enable one to draw conclusions about a whole city.

#### **5.2.5 Combining the Techniques**

Given their very different strengths, it is not surprising that there have been attempts to combine the different techniques into single studies. However, it is important to recognize that in many situation it is inappropriate and even damaging to merge these techniques. Indeed, this is likely to be the case if one is attempting to take full advantage of the rigorous sampling theory of the sample survey, the strong participatory element to PRA or the economic theory behind CVM. Combinations are more appropriate in the case of small surveys, PRA efforts which are willing to accept an appreciable level of outside orchestration, and CVM studies not attempting to conform with the rather strict criteria emerging in the economic literature.

In the context of participatory assessment, imposing the more rigorous demands of CVM or sample survey methods is often not only unrealistic but already begins to suggest that the participatory aspects of PRA are not being taken seriously. CVM requires information which may be well defined within economic theory but is often difficult to express in common sensical terms. Yet the flexibility of PRA is lost if detailed questions are provided. So is the participation itself. Much the same applies when sampling techniques and codable surveys are imposed.

Alternatively, the appropriate sample for a broad spectrum survey of conditions is unlikely to be the same as that for a CVM survey, and the questionnaires are unlikely to combine well. A rigorous CVM survey has a clearly defined "good" which is being evaluated, and typically needs to be tailored to particular groups of potential beneficiaries. Background information similar to that collected in a broad spectrum survey may be appropriate to collect (as in the CVM survey annexed to this report), but if extended to a broad spectrum of environmental conditions will almost certainly become excessive.

There are also many opportunities for combining the different approaches by applying them in parallel, as the needs and opportunities arise. Thus, for example, assume that a government or large NGO intends to initiate in a local environmental management program in the city of Pollutia, having had some success in nearby Degradia. Information on existing conditions is generally lacking. After contacting a number of GROs, they agree to assist in conducting PRAs

in three neighborhoods felt to reflect different varieties of disadvantaged settlements. After these initial PRAs, and while some new activities are being pursued in the initial neighborhoods, a broad spectrum sample survey of 1,000 households is undertaken. This provides baseline data for the program, is used in an assessment of how representative the different PRA neighborhoods are, and provides critical inputs to a stakeholders meeting held the following year. Water emerges as a key local environment issue in an hilly region to the South, where wells run dry in the summer. A contingent valuation survey is undertaken, and reveals that residents are willing to pay the cost for piped water. And the story continues.

This is, of course, a fairy story. In the real world, a series of difficult to predict problems will arise, disrupting, shifting and possibly reversing the process. Perhaps one of the GROs will turn out to have no roots at all. Perhaps the sample frame for the survey will turn out to be unusable, the quality control system will break down, and the enumerators will find that it is easier to fill in the questionnaires in the comfort of their own homes. Perhaps the results from the CVM will indicate that residents are not willing to pay the cost of piped water, despite serious public health problems. But the likelihood that a given assessment effort will fail, or that the results will be ignored or misused, cannot be discussed in the abstract but only in context.

Ultimately, proposals to undertake assessments based on one of these three techniques, or any other, must be judged on their own merits. In general terms, it is possible to describe some of the possible uses to which a technique can be put, to identify potential pitfalls commonly encountered, and to discuss relative strengths and weaknesses. But in the end there is no substitute for sound judgement, careful practice, and support of good governance, whichever technique is being considered.

### ***References for Chapter 5***

Pretty, J.N. 1995. Participatory learning for sustainable agriculture. *World Development*. 23(8):1247-1263.

Uphoff, N. 1993. Grassroots organizations and NGOs in rural development: Opportunities with diminishing states and expanding markets. *World Development*. 21(4):607-622.

## ANNEX 1

### City-wide Approaches for Understanding Environmental Issues

1. The focus of the main body of this report is on the neighborhood level. There are also a set of techniques available for understanding environmental issues at the city-wide level. Analysis can be conducted at either level for purposes of environmental impact assessment or urban environmental planning and management. This annex reviews the city-wide consequences or rapid urbanization, outlines two frameworks for conducting environmental analysis at a level above that of the neighborhood, and then summarizes tools for analyzing the urban environment at the city-wide level.

#### The Environmental Impact of Urbanization

2. Rapid urbanization has two sets of environmental consequences. Specific investments for urban development can have environmental impacts that typically receive a good deal of attention from environmental professionals. More important, though, are the broad range of environmental issues stemming from the resource consumption and waste disposal patterns of growing urban populations. Both sets of consequences are briefly described below.

3. *Environmental impacts of urban development investments.* Developers of urban projects (e.g. water supply, sewerage and other sanitation, drainage, solid waste management, electrification, land development) must be alert to a number of adverse environmental impacts that generally occur when the investments are not properly planned, sited, designed, constructed, operated, and/or maintained. Site selection for **land development** usually involves a number of potential environmental effects, e.g. soil and slope stability, risk of flooding in low-lying sites, damage to sensitive ecosystems such as wetlands, and conflict with culturally-valued land uses. **Water supply** can result in groundwater depletion if the aquifer is tapped, surface water abstraction can affect aquatic and bird life, dam and reservoir construction generally have a range of potential impacts, and increased consumption will also increase the output of wastewater which can have negative health effects if unchecked. Some of the potential negative impacts of **sanitation systems** include: interference with other utilities, impacts from sludge disposal, subsurface leaching to groundwater, degradation of water quality from overflows or improperly treated sewage, and health and safety hazards associated with sewers (trench cave-in during construction, toxic gas build-up, exposure to pathogens in sewage and sludge). Many of the potentially adverse effects of **solid waste management** have to do with dump or sanitary landfill siting and management: aquifer contamination, improper disposal of hazardous wastes, air pollution from burning wastes, landfill gas migration, subsurface leaching, and landscape degradation. **Drainage** construction can result in displacement and involuntary resettlement of households and, if drains are not maintained and are contaminated with solid and liquid wastes, they can flood and spread pathogens. **Electrification** at the community and household level poses health and safety risks from improper in-house wiring and collapse of overhead wiring during heavy weather; there may also be upstream impacts with a significant increase in demand and depending on how the power is generated.

4. *Environmental consequences of urbanization.* Rapidly growing cities, particularly in the developing world, are using more environmental resources (air, water and land), becoming exposed to greater risks, and generating more wastes. The critical problems facing these cities are the health impacts of urban pollution linked to inadequate water, sanitation, drainage, and solid waste services, poor urban and industrial waste management, and air pollution. Important underlying or related issues include inappropriate land uses, precarious housing, deficient public transportation, and road congestion and accidents. These are collectively dubbed the "brown agenda" and are related to what may be considered "green" and "social" issues of urban areas: depletion of water and forest resources, degradation of environmentally fragile lands, occupation of areas prone to flooding or landslides, overcrowding, degradation or loss of historical and cultural property, noise pollution, and other problems. Similarly, the brown emissions of cities from energy use for cooking, heating, industry, and transport contribute significantly to global problems such as climate change and acid rain (Bartone et al, 1994). These brown environmental problems occur and need to be addressed at different but often interrelated scales. So, even as cities address their most severe neighborhood-level environmental problems, they may be exacerbating their city-wide problems.

## APPROACHES TO URBAN ENVIRONMENTAL MANAGEMENT

### Environmental Impact Assessment

5. Environmental impact assessment is used to identify the potential environmental consequences of a proposed project or investment program in order to incorporate approaches with positive environmental effects as well as mitigating measures for negative effects early in the program planning process. This section briefly identifies the types of environmental consequences caused by urban infrastructure investments, describes a generic environmental impact assessment process, and outlines guidelines that can be used to manage the specific case of involuntary resettlement.

6. *Impact assessment process.* Many guides have been written on environmental impact assessment. The process should identify potential environmental impacts of an investment early in the design stage and ways of improving the intervention by preventing, minimizing, mitigating, or compensating for adverse environmental effects. For example, according to World Bank guidelines, a project-specific environmental assessment should cover: (a) baseline environmental conditions; (b) potential environmental impacts, both positive and negative, in the area of influence of a project; (c) a systematic environmental comparison of alternative investments, sites, technologies, and designs; (d) preventive, mitigating and compensatory measures, generally in the form of an environmental mitigation or management plan; (e) recommended environmental management and training; and (f) a proposal for environmental monitoring (World Bank, 1991b). Preparation of the assessment should involve representatives of potentially affected groups and draft findings should be disseminated for public review and comment.

7. Alternatives to the project-specific assessment include: a **regional environmental assessment** where a number of similar and significant development activities with potentially cumulative impacts are planned for a localized area, **sectoral assessments** where the

environmental impact of investments, policies, and numerous smaller investments in one sector can be reviewed together, and application of **environmental guidance criteria** to projects (e.g. pollution standards construction design criteria, siting guidelines, monitoring and inspection procedures). Environmental assessment, in whatever form, should help project designers and implementers to address environmental issues in a timely fashion, and help avoid costs and delays in implementation due to unanticipated environmental problems (World Bank, 1991b).

8. *Involuntary Resettlement.* Urban development activities can lead to the involuntary resettlement of individuals, households and business. This problem should be addressed by seeking ways to minimize involuntary resettlement. When population displacement is unavoidable, a detailed resettlement plan, timetable and budget are required. The plan should develop a strategy and package to provide displaced people with the means to improve or at least restore their former living standards, earning capacity and production levels. The process for developing the plan should involve both resettlers and hosts in resettlement activities. It usually requires developing valuation and compensation principles for land and other assets affected by the project. Several guidelines have been developed to deal with urban resettlement (World Bank, 1990; Davidson et al., 1993).

#### Urban Environmental Planning and Management

9. The option of impact assessment is *ad hoc* in that urban environmental issues are addressed as particular projects and programs arise. The second option of environmental planning and management can be used to select or rank policies, programs and projects according to strategic environmental priorities. With differing urban problems and many tools for dealing with them, each city will need a process for determining the most appropriate mix of actions and investments that respond to its environmental priorities. When confronting environmental problems, cities exhibit different degrees of awareness, political commitment, and capacity to mobilize resources. A strategic approach to urban environmental planning and management is recommended based on enabling participation and building commitment. It has been tested in industrialized and developing-country cities and is a viable approach for cities working toward setting up local version of Agenda 21 or pushing the national environmental action planning process down to the local level.

10. The strategic approach can involve several activities, each of which should emphasize strengthening local capacity:

**Informed consultation** in which rapid assessments are conducted, environmental issues are clarified, key stakeholders are involved, political commitment is achieved, and priorities are set through an informed consultative process;  
the formulation of an integrated **urban environmental management strategy** that embodies long-term goals and phased targets for meeting the goals, and agreement on **issues-oriented strategies** that cut across the concerns of various stakeholders and **actor-specific action plans** that cut across various issues for achieving the targets, including the identification of least-cost project options, policy reforms, and institutional improvements;  
and



**follow-up and consolidation** in which agreed programs and projects are initiated, policy reforms and institutional arrangements are solidified, the overall process is made routine, and monitoring and evaluation procedures are put in place.

These elements of a strategic approach, and examples of their application, are more fully described in *Toward Environmental Strategies for Cities* (Bartone et al., 1994). Specific guidance on city consultations, institutional requirements, evaluation, dissemination, and training, have been addressed in a *Manual for Urban Environmental Management* (GTZ, 1994).

### Institutional and Financial Requirements

11. The **institutional responsibility** for determining whether a project or the entire investment program requires an assessment, or for preparation of an urban environmental strategy can vary according to local capacity and institutional arrangements. In large cities, a centralized and coordinated function may exist for environmental policy and analysis. More typically, environmental decision-making is fragmented between municipal departments, councilors, committees, community groups, and non-governmental organizations. To remedy this situation, final decision-making about the need for impact assessment or the responsibility for developing an environmental strategy should rest with one coordinating mechanism. This might be an environmental office, an environmental management committee, or a municipal officer with an environmental function (primarily for smaller cities and towns). Regardless of the institutional arrangement, there should be adequate provision for involving the full range of stakeholders (representatives of affected and concerned communities, experts, decision-makers) in the assessment or planning process.

12. **Financing** of the impact assessment is usually built into the cost of project preparation. Recent World Bank experience indicates that the assessment process amounts to 5-10% of project preparation costs (or usually less than 1% of the total investment). Funding the strategic management process will depend on several factors: local budgetary flexibility; existing institutional capacity; relative political priority attached to environmental issues. Costs can range from less than US\$20,000 for a rapid urban environmental assessment to over US\$1 million for a complete strategy with detailed action plans. Local governments with a high level of in-house expertise and political commitment can undertake either exercise with their own resources. Municipalities with budgetary flexibility and political commitment can contract consultants, community expertise, and NGOs to assist them. If there is only political commitment, but little in the way of budget or expertise, then external resources must be mobilized.

## **TOOLS FOR ANALYZING THE URBAN ENVIRONMENT**

13. Baseline data and analysis are essential in order to understand and prioritize urban environmental problems than can be addressed through infrastructure investments. This section briefly reviews six data collection and analytical tools (urban environmental data questionnaire, collecting and ranking indicators, health risk assessment, economic valuation, techniques for

community and household assessment), geographic information systems, and a process (rapid urban environmental assessment) that combines analysis and public consultation. Then, their utility, limitations and costs are briefly assessed.

### The Tools

14. *Data questionnaire.* An urban environmental data questionnaire has been designed for use in developing country cities by the UNCHS/World Bank/UNDP Urban Management Program (Leitmann, 1994a). The questionnaire is extensive (50 pages) and covers a comprehensive range of topics. The questionnaire is available on diskette with a downloadable database and help screens. Data can be entered at the level of the city, the metropolitan area, and/or the urban agglomeration. It is intended to support preparation of an urban environmental profile and to inform a consultative process as part of a rapid urban environmental assessment (see below).

15. *Urban indicators.* There have been a number of efforts to develop indicators of urban environmental quality. These indicators allow for a static assessment of conditions, monitoring of change over time, and ranking within or between cities. The World Bank and UNCHS have developed a set of urban indicators to improve their operations and help countries prepare for the 1996 Habitat II conference (UNCHS and World Bank, 1994). These indicators cover six sub-sectors: (a) urban poverty, productivity and employment; (b) social; (c) infrastructure; (d) transport; (e) local government; and (f) environmental management. The environmental indicators are linked to policy goals (improved access to basic infrastructure and services, pollution reduction or prevention, sustainable environmental practices, and minimization of vulnerability to hazards). China has used its own set of urban environmental indicators to monitor progress in individual cities over time, make comparisons between cities, prepare comparative rankings, and financially reward performance (Leitmann, 1994b). The World Resources Institute collects environmental data for the 75 largest US metropolitan areas and conducts an unweighted "Green Metro" ranking based on nine indicators (moderate air pollution days, drinking water quality, toxic releases and transfers, number of toxic waste collected per capita, heating and cooling degree days, vehicle miles traveled per capita, mass transit passenger miles traveled per capita). In addition, indicators are collected on population density, percentage of urban area devoted to parkland, percentage of waste recycled, water use per capita, percentage of groundwater dependence, and miles of bike paths (World Resources Institute, 1994).

16. *Risk assessment.* Urban environmental problems can be prioritized according to the degree of risk that they pose to human health. Health risk assessment consists of four steps: (a) hazard identification; (b) exposure assessment; (c) dose-response assessment; and (d) risk characterization (National Research Council, 1983). Hazard identification is a qualitative determination of whether human exposure to an agent might result in adverse health effects. Exposure assessment involves a quantitative or qualitative estimation of the level and duration of a population's exposure to a toxic agent. The dose-response assessment uses a mathematical model to estimate the probability of occurrence of a health effect based on human exposure to a hazardous substance. Characterizing risk means estimating the incidence of an adverse effect on a population (Brantly et al., 1993). This technique has been used elsewhere in several

developing country cities to rank environmental problems according to their effects on human health. In Bangkok, exposure to lead was found to be the top environmental health problem, resulting up to 400 deaths, 500,000 cases of hypertension, 800 heart attacks and strokes, and 700,000 lost IQ points in children per year (USAID, 1990). In Quito, food contamination from micro-organisms and outdoor air pollution were determined to be the most serious environmental health risks (Arcia et al., 1993).

17. *Economic valuation.* Urban environmental problems have real economic costs that are usually linked to lowered productivity, health effects and loss of amenities. For example, annual productivity losses from waterborne contamination in Manila are estimated at US\$100 million, Bangkok currently loses one-third of its potential gross city product due to congestion-induced travel delays, and annual health care costs from air pollution in Mexico City are estimated to exceed \$1.5 billion. A number of economic valuation techniques exist to estimate the costs of productivity losses, congestion and health, as well as lowered ecological productivity and loss of amenities (Shin et al., 1997). These analyses can also include an equity dimension to determine the burden of costs that are borne by the poor.

18. *Geographic information systems.* GIS, often combined with remotely sensed data, is a powerful tool for urban environmental analysis that is increasingly being used throughout the developing world. Environmental applications of GIS in developing country cities have included: land suitability analysis; hazard and environmental "hot spot" identification; land-use and land cover mapping; watershed analysis; and siting of environmental services and infrastructure. Other urban applications of GIS include preparation of base maps, change analysis, management of infrastructure networks, housing typologies, and demographic analysis (Paulsson, 1992).

19. *Rapid urban environmental assessment.* The techniques described above are useful for assembling information, analyzing data, portraying problems, and ranking issues. Rapid urban environmental assessment is a process that builds on data and analysis to clarify issues, involve stakeholders, set priorities, and achieve political consensus for action. The assessment consists of three steps: (a) assembly of existing data; (b) analysis of environmental conditions and causal relationships; and (c) public consultation. Data are collected using the questionnaire referred to in paragraph 12 and come from a range of sources (routine monitoring, information on existing infrastructure and services, epidemiological and other health data, information on natural resources and systems, etc.) This data and the results of existing studies, including environmental health risk assessments, indicators analysis, and GIS work, can be used to prepare an urban environmental profile that reviews environmental quality in an urban area, development-environment interactions, and the institutional setting for environmental management. Information is then shared with a range of stakeholders who are brought together to discuss problems, constraints, priorities, and ways forward. The process is a useful first step towards tackling urban environmental problems because it can address issues that cut across conventional lines of authority, geographical boundaries, and time horizons (Leitmann, 1994a).

### Comparison of Tools

20. The following matrix provides information on the most appropriate applications for each tool, limitations and both monetary and temporal costs. The neighborhood approaches from this report are included for purposes of comparison. While the matrix is a generalization, it may help to point the reader to a more appropriate tool or set of instruments, depending on one's needs and resources.

<b>TOOL</b>	<b>APPLICATIONS</b>	<b>LIMITATIONS</b>	<b>\$*</b>	<b>TIME</b>
Data questionnaire	1) assemble secondary data 2) identification of data gaps	1) not perspective 2) data usually not comparable over time, areas and population groups 3) variable reliability	\$	As little as one staff-month
Indicators	1) development of baseline information 2) monitoring and evaluation 3) comparative analysis	1) not prescriptive 2) garbage in, garbage out (GIGO)	\$	Depends on frequency & level of detail
Health risk assessment	1) ranking problems & options 2) prediction of outcomes 3) input for economic valuation 4) identification of causal factors	1) variable validity depending on source of assumptions 2) identifies problems but not solutions	\$ - \$\$\$	Months (d/r model) - years (epidem.)
Economic valuation	1) ranking problems & options 2) input to cost/benefit or cost effectiveness analysis 3) investment planning	1) "valuation of human life" controversy 2) GIGO 3) All costs cannot be captured in economic terms	\$ - \$\$\$	Months
Random sample surveys	1) development of baseline data 2) monitoring changing conditions over time 3) problem identification	1) only provides snapshot 2) not prescriptive 3) issues are often predetermined by survey designers	\$	Depends on experience & sample size
Contingent valuation	1) determination of pricing policy for service utility 2) choice of technology 3) valuation of amenity	1) provides individual perspective, not societal value 2) usefully only for issues that can be monetarily valued	\$	Months
Participatory rapid appraisal	1) problem identification 2) consensus building 3) community awareness	1) not necessarily representative (non-random) 2) subject to political manipulation	\$	Days to months
GIS	1) physical information 2) correlation analysis 3) monitoring 4) problem investigation	1) takes time to understand hardware and software 2) potential for limited transparency	\$ - \$\$\$	Variable depending on data required
Rapid urban environmental assessment	1) identification & prioritization of issues & options 2) data & methodology for decision-making 3) input to strategic process	1) requires political commitment for follow-up 2) can be subject to political manipulation	\$	months

\$ = less than US\$20,000; SS = US\$20-50,000; SSS = 50,000

### **For more Information**

- Arcia, Gustavo et al. 1993. "Environmental Health Assessment: A Case study Conducted in the City of Quito and the Country of Pedro Moncayo, Pichincha Province, Ecuador," WASH Field Report No. 401, USAID, Washington, SC.
- Bartone, Carl, J. Bernstein, J. Leitmann & J. Eigen 1994. *Toward Environmental Strategies for Cities*, UNCHS/World Bank/UNDP Urban Management Program Policy Paper No. 18, World Bank, Washington, DC.
- Davidson, Forbes et al. 1993. "Relocation and Resettlement Manual," Institute for Housing and Development Studies, Rotterdam.
- Gesellschaft fur Technische Zusammenarbeit (GTZ) 1994. *Manual for Urban Environmental Management*, GTZ, Eschborn, Germany.
- Leitmann, Josef 1994a. *Rapid Urban Environmental Assessment*, Volumes 1 and 2, UNCHS/World Bank/UNDP Urban Management Program Discussion Papers No. 14 and 15, World Bank, Washington, DC.
- Leitmann, Josef 1994b. "Urban Environmental Profile of Tianjin," *CITIES*, Vol. 11, No. 5.
- National Research Council 1983. *Risk Assessment in the Federal Government: Managing the Process*, National Academy Press, Washington, DC.
- Paulsson, Bengt 1992. "Urban Applications of Satellite Remote Sensing and GIS Analysis," UMP Discussion Paper No. 9, World Bank, Washington, DC.
- UNCHS and World Bank 1994. *Urban Indicators Review: The Survey Instrument*, Monitoring the City Indicators Program, UNCHS, Nairobi.
- USAID 1990. "Ranking Environmental Health Risks in Bangkok, Thailand," Office of Housing and Urban Programs Working Paper, prepared by Abt Associates and Sobotka & Col.
- World Bank 1991a. *Environmental Assessment Sourcebook*, Volume 2- Sectoral Guidelines, Technical Paper No. 140, World Bank, Washington, DC.
- World Bank 1991b. "Operational Directive 4.01: Environmental Assessment," *World Bank Operational Manual*.
- World Resources Institute 1994. *The 1994 Information Please Environmental Almanac*, Houghton Mifflin Company, Boston.

## ANNEX 2

### Broad Spectrum Survey on Household Environment in Jakarta - DKI Indicative Translation - Unnumbered First page with control Information omitted

*Respondent should be principal woman of household if there are adult women.*

#### List of Household Members

Listing starts with household head, follows with the principal homemaker and then proceeds from youngest to oldest members. If household head is principal homemaker, leave first row blank.

	Name	Position in household	Sex	Age	Education	Work
1						
2						
3					XXXXXX	
4					XXXXXX	
5					XXXXXX	
6					XXXXXX	
7					XXXXXX	
8					XXXXXX	
9					XXXXXX	

#### CODES

##### **Position in HH:**

1 = "Mother of household  
2 = Head of household  
3 = Child of 1 or 2  
4 = Other Relative  
8 = Servant  
9 = Other

##### **Sex:**

1 = Male  
2 = Female

##### **Age:**

Years: 0 if less than one

##### **Education:**

0 - no schooling  
1 - started but not graduated SD  
2 - graduated SD  
3 - started but not graduated SMTP  
4 - graduated SMTP  
5 - started but not graduated SMTA  
6 - graduated SMTA  
7 - started but not graduated Univ.  
8 - graduated university/PT

##### **Work for Money**

0 - does not work for money  
1 - works for money at home only  
2 - works for money away from home

	Total number of household members? ____ <i>Consult definition of household if not sure whether a person qualifies</i>	Number..... ____
	How long have you (PH), yourself, been living in Jakarta?	Years..... ____
	How long have you been living in this house?	Years..... ____

<b>I HEALTH</b>				
	Which if any of the following conditions have you (PH) had in the last two weeks?	Diarrhoea.....	No 0	Yes 1
		Blood/mucus in feces.....	0	1
	Which if any of the following conditions have you (PH) had in the last two weeks?  <i>For coughs refer to persistent cough</i>	Sore throat.....	No 0	Yes 1
		Hoarseness.....	0	1
		Dry cough.....	0	1
		Wet cough.....	0	1
		Bloody cough.....	0	1
	Have any of your <b>children under six</b> had the following symptoms in the past two weeks.	Diarrhoea.....	No 0	Yes 1
		Blood/mucus in f.....	0	1
		Vomiting.....	0	1
		Stomach ache.....	0	1
			0	1
	Have any of your <b>children under six</b> had the following symptoms in the past two weeks?	Sore throat.....	No 0	Yes 1
		Hoarseness.....	0	1
		Dry cough.....	0	1
		Wet cough.....	0	1
		Bloody cough.....	0	1
		Episode of rapid and difficult breathing.....	0	1
	Which of the following do you think is generally the most important cause of diarrhoea among young children in this neighborhood?	Bad water.....	1	
		Bad air.....	2	
		Change of season.....	3	
		Bad food.....	4	
		Bad sanitation and hygiene.....	5	
		Crowding.....	6	
		None are important.....	7	
	Which of these same factors do you think is generally the most important among young children in this neighborhood?	Bad water.....	1	
		Bad air.....	2	
		Change of season.....	3	
		Bad food.....	4	
		Bad sanitation and hygiene.....	5	
		Crowding.....	6	
		None are important.....	7	

<b>II WATER</b>		
	What is your household's principal source of drinking water (including tea)? What is your household's principal source of water for cooking? What is your household's principal source of water for bathing? What is your household's principal source of water for washing clothes?	Code: Water not used for this purpose.....0 Private PAM connection.....1 Private well.....2 Water vendor.....3 Public well.....4 Public hydrant.....5 Rain water.....6 Stream, pond or the like.....7 Other (specify under question).....8
	<b>For households using private PAM connection:</b> Is the PAM connection you use metered? Is the connection shared with other households (including for example households in the same building)? How many households share the connection? Who do you pay for the use of this water?	No.....0 Yes.....1 No.....0 Yes.....1 Number of households..... Pay PAM directly.....1 Other household.....2 Do not pay.....3 Do not know.....4
	<b>For households using a private well:</b> Is the private well you use shared with other households (including for example households in the same building)? How many households share the well? Do you need to fetch the water from the well?	No.....0 Yes.....1 Number of households..... No.....0 From in House Compound.....1 <20 meters.....2 20-40 meters.....3 >40 meters.....4
	<b>For households using a communal well:</b> How far is the well from your home?	Almost every day.....1 About every other day.....2 At least once a week.....3 Less than once a week.....4 Vendor does not deliver.....5
	<b>For households buying vendor water:</b> Does the vendor come by your home to deliver water	Raw water.....1 Cooked water.....2 Bottled water.....3
	What kind of water do members of your household drink?	
	How is drinking water stored?	No storage.....0 Pour container.....1 Closed container with ladle.....2 Closed container without ladle.....3 Open container with ladle.....4 Open container without ladle.....5 Other.....6
	What are the conditions of the bathing water storage container (bak)?	No container.....0 Open with mosquito larvae.....1 Open without mosqu. Larvae.....2 Closed with mosquito larvae.....3



		Closed without mosquito larvae .....4 Other .....5
	What are the conditions of the reserve water storage container?	No container .....0 Open with mosquito larvae .....1 Open without mosqu. Larvae .....2 Closed with mosquito larvae .....3 Closed without mosquito larvae .....4 Other .....5
	When was the last time in the past year your principal drinking water source was interrupted for at least a day?	Has never been interrupted .....0 Within the last week .....1 Within the last two weeks .....2 Within the last month .....3 Within the last six months .....4 Within the last year .....5
	What water source do you use if your principal source of drinking water is interrupted?	Code: Water not used for this purpose .....0 Private PAM connection.....1 Private well.....2 Water vendor.....3 Public well .....4 Public hydrant.....5 Rain water .....6 Stream, pond or the like .....7 Other (specify under question) .....8
	How much does your household spend per month to obtain water for own use?	Rupiah/month

### III SANITATION FACILITIES

	Where do members of this household normally defecate?	Do not use toilet ..... 0 Private toilet inside your home ..... 1 Private toilet inside house compound...2 Private toilet in someone else's home or house compound .....3 Public toilet .....4
	What kind of toilet?	With specific tank or aqua privy .....1 Sewered toilet ..... 2 Drop toilet over water ..... 3 Pan latrines.....4 Other .....5
	How many households share this (these) toilet(s)?	No other households ..... 0 One to two other households ..... 1 Three to five other households..... 2 Six to ten other households ..... 3 More than ten other households ..... 4 Do not know ..... 5
	What is the floor material of the toilet?	Earth ..... 1 Construction material .....2 Other .....3
	Do puddles of water accumulate on the toilet floor?	No .....0 Yes ..... 1 Do not know ..... 2
	Is water for cleaning available in the toilet?	No .....0 Yes..... 1 Do not know ..... 2
	Is soap available at the toilet?	No .....0 Yes..... 1 Do not know ..... 2
	Is the toilet hole open or water sealed?	Open ..... 1 Water sealed ..... 2 Do not know ..... 3
	How much do you and your household members typically spend on sanitation (e.g. fees for public toilet) in a month?	----- Rupiah

	Do you (ibu rumah tangga) always wash hands before preparing food?	No ..... 0 Yes, but without soap ..... 1 Yes, with soap ..... 2
	Do you (ibu rumah tangga) always wash hands after defecating?	No ..... 0 Yes, but without soap ..... 1 Yes, with soap ..... 2
	Are there any adults or children in this neighborhood who defecate outside in, for example, empty lots, drains or similar locations?	No ..... 0 Yes..... 1 Do not know ..... 2
	Where does the sullage (grey water from washing, etc. not including fecal material) go?	Dumped/drained in yard ..... 1 Drains into natural waterway ..... 2 Drains into road ..... 3 Drains into open gutters ..... 4 Other ..... 5
	Does the waste water	Flow directory underground ..... 0 Flow unimpeded away from house..... 1 Flow slowly away from house ..... 2 Stagnate ..... 3
	How many times has your home been flooded in the past year?	Times
	In which seasons have these floods occurred?	No floods ..... 0 Dry season ..... 1 Wet season ..... 2 Both seasons ..... 3
	Did the most serious flood in the past year enter your home?	No flooding ..... 0 Flooding in yard only ..... 1 Flooding inside home ..... 2
	How high did the flood waters reach?	No flooding ..... 0 Less than ankle deep..... 1 At least ankle deep ..... 2 At least knee high..... 3
<b>IV SOLID WASTE</b>		
	How is waste stored (before taking outside) in your home?	Take straight out ..... 1 Closed container..... 2 Open container..... 3 Plastic bag..... 4 Other..... 5
	How does your household store waste outside your home (before disposal)?	Don't store outside..... 1 Closed container..... 2 Open container..... 3 Plastic bag..... 4 Other..... 5
	Do you have your garbage collected at your home, and if so how often?	Is not collected..... 0 Collected less than once a week..... 1 Collected 1-2 times a week..... 2 Collected 3-5 times a week..... 3 Collected 5-7 times a week..... 4
	Do you dump your garbage away from your home, and if so where?	Do not dump..... 0 Collection point..... 1 Empty land..... 2 Waterway..... 3 Other..... 4 Do not know..... 5
	Do you burn part of your garbage?	No..... 0 Yes..... 1 Do not know..... 2
	Do you bury or compost part of your garbage	No..... 0 Yes..... 1 Do not know..... 2
	How much do you typically pay each month to dispose of your waste (e.g. the collection fee) Notes:	----- Rupiah/month
	Do pickers collect any of your household's solid waste to resell, without	No..... 0

	paying you anything?	Yes..... 1
	What sort of materials do they collect?	No Yes Do not know Paper ..... 0 1 2 Metals ..... 0 1 2 Bottles ..... 0 1 2 Other ..... 0 1 2
	Do you or other household members collect your old waste materials to sell, trade or give away?	No ..... 0 Yes ..... 1
	What sort of materials?	No Sell Trade Give "durables" ..... 0 1 2 3 paper ..... 0 1 2 3 metals..... 0 1 2 3 bottle..... 0 1 2 3 other..... 0 1 2 3
	Is there a problem in your neighborhood RT due to solid waste being dumped carelessly and fouling the environment?	No ..... 0 Yes ..... 1
	Where are the most serious problems? If other, specify:  <i>Marginal areas include gutters, streams, ponds, etc.</i>	Streets ..... 1 Collection points ..... 2 Marginal areas ..... 3 Your land..... 4 Other ..... 5
<b>V INSECTS</b>		
	When you are preparing the main meal of the day, are there flies landing on the food?  (many if more than five visible)	No.....0 Sometimes.....1 Usually.....2 Always some.....3 Always many.....4
	When you go to the toilet, are there flies present?	No.....0 Sometimes.....1 Usually.....2 Always some.....3 Always many.....4
	When did you last see a cockroach in your house?	Have never seen one .....0 More than 1 year ago ..... 1 More than 6 months ago ..... 2 More than 1 month ago ..... 3 More than 1 week ago ..... 4 More than 1 day ago ..... 5 In last 24 hours ..... 6
	When did you last see a rat (tikus) in your house?	Have never seen one .....0 More than 1 year ago ..... 1 More than 6 months ago ..... 2 More than 1 month ago ..... 3 More than 1 week ago ..... 4 More than 1 day ago ..... 5 In last 24 hours ..... 6
	Does anyone in this household use a bednet? <i>Rarely - less than once a week.</i> <i>Sometimes - once a week but not daily.</i> <i>Regularly - daily.</i> <i>Very often - more than once a day.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3 Very often ..... 4
	When are the mosquito coils most often lit?	Do not burn ..... 0 Mornings ..... 1 Midday ..... 2 Evenings ..... 3 Upon going to sleep ..... 4
	Does anyone in this household use bug repellent? <i>Rarely - less than once a week.</i> <i>Sometimes - once a week but not daily.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2

	<i>Regularly - daily.</i> <i>Very often - more than once a day.</i>	Regularly ..... 3 Very often ..... 4
	Does household use aerosol spray insecticides? <i>Rarely - less than once a week.</i> <i>Sometimes - once a week but not daily.</i> <i>Regularly - daily</i> <i>Very often - more than once a day.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3 Very often ..... 4
	Does household use pump spray insecticides? <i>Rarely - less than once a week.</i> <i>Sometimes - once a week but not daily.</i> <i>Regularly - daily.</i> <i>Very often - more than once a day.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3 Very often ..... 4
	Which insects do you spray for?	None ..... 0 Mosquitoes ..... 1 Flies ..... 2 Cockroaches ..... 3 CIRCLE AND SUM FOR CODE
	When do you most often spray?	Do not spray ..... 0 Mornings ..... 1 Midday ..... 2 Evenings ..... 3 Upon going to sleep ..... 4
	Do you use an insect "lamp"?	No ..... 0 Yes ..... 1
	Which insects do you control with the "lamp"?	None ..... 0 Mosquitoes ..... 1 Flies ..... 2 Cockroaches ..... 3 CIRCLE AND SUM FOR CODE
	Do you use an insect tape or traps?	
	Which insects do you control with the tape or trap?	
	Does household use traps to control rats? <i>Rarely - catch less than one a week.</i> <i>Sometimes - catch one a week but not daily.</i> <i>Regularly - catch daily.</i> <i>Very often - catch more than one a day.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3 Very often ..... 4
	Does household use tape to control rats? <i>Rarely - catch less than one a week.</i> <i>Sometimes - catch one a week but not daily.</i> <i>Regularly - catch daily.</i> <i>Very often - catch more than one a day.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3 Very often ..... 4
	Does household use poison to control rats? <i>Rarely - place poison less than one a week.</i> <i>Sometimes - place poison once/week but not daily</i> <i>Regularly - place poison daily.</i>	No ..... 0 Rarely ..... 1 Sometimes ..... 2 Regularly ..... 3
	How much does your household typically spend in a month on lotions, sprays, traps, poisons and so on? Notes:	----- Rupiah/month
	Do you keep a dog or cat in your home?	No ..... 0 Yes ..... 1
	Do you keep a fowl in your home?	No ..... 0 Yes ..... 1
	Do you keep a goat in your home?	No ..... 0 Yes ..... 1
<b>VI FOOD</b>		
	Does your household's morning meal generally include vendor prepared food?	No ..... 0 Yes ..... 1
	Does your household's midday meal general include vendor prepared food?	No ..... 0 Yes ..... 1
	Does your household's evening meal generally include vendor prepared food?	No ..... 0 Yes ..... 1

	When was the last time you, or one of your small children, consumed gado-gado prepared by a good vendor?	Never.....0 More than a year.....1 More than six months.....2 More than a month.....3 More than two weeks.....4 More than a week.....5 More than 24 hours.....6 24 hours or less.....7
	When was the last time you, or one of your small children, consumed an ice drink prepared by a food vendor?	Never.....0 More than a year.....1 More than six months.....2 More than a month.....3 More than two weeks.....4 More than a week.....5 More than 24 hours.....6 24 hours or less.....7
	How does your household store perishable leftovers from the evening meal?	Not stored.....0 Refrigerator.....1 Food cupboard.....2 Closed container.....3 Covered on table.....4 Open on table.....5 Other.....6
<b>VII AIR POLLUTION AND HOUSING</b>		
	Which is your household's principal cooking fuel?	Do not cook.....0 Firewood or similar.....1 Charcoal.....2 Kerosene.....3 LPG.....4 Electricity.....5 Other.....6
	Do you have a second fuel which you also use?	No second fuel.....0 Firewood or similar.....1 Charcoal.....2 Kerosene.....3 LPG.....4 Electricity.....5 Other.....6
	Where does your household cook your meals (i.e. where is stove used)?	Do not cook in home.....0 Indoor separate kitchen.....1 Indoor multipurpose room.....2 Outdoors.....3 Other.....4
	<i>If sometimes indoor, is room ventilated?</i>	Not ventilated.....0 Ventilated.....1
	How many hours is your household stove "burning" to prepare breakfast?	Hours.....
	How many hours is your household stove "burning" to prepare lunch?	Hours.....
	How many hours is your household stove "burning" to prepare supper?	Hours.....
	<i>If household has children under six</i> Is one or more of these children (under six) usually with you when you cook? <i>Yes --- → always?      No- →</i> <i>Occasionally?</i>	Never.....0 Occasionally.....1 Usually.....2 Always.....3 No children < six.....4
	Do you (PH) smoke cigarettes?	No.....0 Yes.....1
	How many cigarettes a day do you (normally) smoke?	Number.....
	Do you smoke in your home?	No.....0 Yes.....1
	Does anyone else in your household smoke cigarettes inside at home?	No.....0 Yes.....1
	How many other people?	Number of others

	Do you have problems with dampness in this house?	No.....0 Yes.....1																																	
<b>TENURE AND WEALTH</b>																																			
	What is the status of the land this house is on?	Hak milik.....1 Hak guna bangunan.....2 Hak pakai.....3 Other.....4																																	
	Are you an owner, renter or what?  Specify other -----	Own outright .....1 Rent .....2 Own on credit .....3 Dinas .....4 Other .....5																																	
	If your house were rented, what level of rent do you think it would fetch?	Rp/month.....																																	
	How many lamps does your household have?	Number.....																																	
	Which of the following appliances does your household have, in working conditions? <i>Skip to OTHER if not electrified.</i>	ELECTRIC: <table style="width:100%; border:none;"> <tr> <td></td> <td style="text-align:center;">No</td> <td style="text-align:center;">Yes</td> </tr> <tr> <td>Iron.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>B&amp;W TV.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Color TV.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Video.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Refrigerator.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>AC.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Hot plates.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Fan.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Microwave.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> <tr> <td>Radio-case.....</td> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> </tr> </table>		No	Yes	Iron.....	0	1	B&W TV.....	0	1	Color TV.....	0	1	Video.....	0	1	Refrigerator.....	0	1	AC.....	0	1	Hot plates.....	0	1	Fan.....	0	1	Microwave.....	0	1	Radio-case.....	0	1
	No	Yes																																	
Iron.....	0	1																																	
B&W TV.....	0	1																																	
Color TV.....	0	1																																	
Video.....	0	1																																	
Refrigerator.....	0	1																																	
AC.....	0	1																																	
Hot plates.....	0	1																																	
Fan.....	0	1																																	
Microwave.....	0	1																																	
Radio-case.....	0	1																																	
<b>HOUSE OBSERVATION</b>																																			
	House type	Detached.....1 Multi family, one storey.....2 Multi family, two storey.....3 Multi family, >two storey.....4																																	
	Number of rooms for use of household	Number.....																																	
	Estimate of floor space for household	Square meters.....																																	
	Estimate of households yard area	Square meters.....																																	
<b>PRIORITIES</b>																																			
	Which of the following improvements do you think the government should prioritize and try the hardest to achieve. Please keep in mind the role you think the government should play in society. <b><i>Picture cards were used for this question</i></b>	Improving household water.....1 Reducing open water pollution.....2 Improving sanitation.....3 Reducing indoor air pollution.....4 Reducing outdoor air pollution.....5 Reducing food contamination.....6 Reducing the number of insects and rats .....7																																	
	Which of these same improvements do you think you and your neighbors should try the hardest to achieve?	Improving household water .....1 Reducing open water pollution .....2 Improving sanitation.....3 Reducing indoor air pollution.....4 Reducing outdoor air pollution.....5 Reducing food contamination .....6 Reducing the number of insects and rats .....7																																	

## ANNEX 3

### Contingent Valuation Method Questionnaire Indicative Translation

#### Introduction

(Greetings). "We are from the Urban Health Study Group Atma Catholic University and are doing a study of what people think about different water supply systems. In this part of the study, we are trying to find out how valuable piped water would be to families in this vicinity. You are aware that this neighborhood is not currently served with household piped water connections. If the piped water is eventually offered, we assume you will have a service level and a charge similar to what is usually practiced in Jakarta.

We would like you to participate in a survey. You will be asked questions about your willingness to pay a certain amount for that type of piped water service and you merely have to answer 'yes' if you would be willing to pay the prices mentioned or 'no' if you would not.

First it needs to be clear to you that the prices we are mentioning to you are not the official water prices PAM charges, or any prices you actually likely to be offered. The prices are only tentative prices for the purpose we just mentioned. Please answer the questions with due regard for your both earnings and benefits of having piped water rather than your current water supply. This effort would be very helpful and become a valuable input in the study of environment improvement and the water supply service.

#### Version 1. Existing system and payment scheme as starting point

##### Explanation of types of charge

"There are several conditions that you should understand carefully. Now I am going to explain to you about paying for a standard PAM household water connection. There are three types of payment that you would have to make to get the water.

First you would have to pay about Rp.20,000 - to get piping and at least one tap in your home. Second you have to pay a down payment for connection charge of Rp.150,000 - to PAM in having a metered water supply. Third, assuming you consume the same amount of water as most households, you would have to pay monthly charge of about RP (SEE CARD) for any water that you consumed in the previous month." (This part is supported with pictures)

#### CVM1A (Down payment for connection charge, ordinary water quality)

"Given these three types of payments, would you want to be connected to the piped water system? Just to remind you, the payments included a down payment of connection charge R.150,000.- Rp.20,000.- for piping in your home and a monthly charge of about Rp (SEE CARD) for water consumed. Again, just to remind you, with house connection you would have indoor piped water from the PAM system"

Answer:            Yes                    No                    Do not know

If the answer is 'yes' continue with background questionnaire.  
If the answer is 'no' or 'do not know' continue with the question.

**Reason for answering 'no' or 'do not know'**

"Why?" 1. Current water supply already good (or similar answer) 2. Too expensive (or similar answer) 3. House-owners decides (or similar answer) 4. Other reason .....
If answers 3 or other answer indicating respondent cannot answer questions appropriately, break of interview and than respondent. Otherwise continue.

**CVM2A (Down payment for connection charge, better quality of water)**

"Now want to remind you that we are not representing PAM. We are from a study group wanting to know the willingness to pay of the community for a piped water service. Our effort is in connection with the improvement of environment and the water supply service. Let us suppose the water supply service could be improved to the point where the water was always available at a tap in your home, and that you would never have discolored or otherwise unsatisfactory water, and you do not need to boil the water because it would contain no germs. Would you want your home to be connected to the piped water system at the prices just mentioned?" (repeat prices as necessary)
Answer:            Yes                    No                    Do not know

**CVM3A (Connection charge paid in installment, ordinary water quality)**

"What about if the water were of the normal PAM service, but connection charge were paid in installment of RP 5000 - per month for 3 years (1% interest per month already included). So you would be paying an indoor piping of RP. 20,000 - and monthly charge of (SEE CARD) plus RP 5000, but no down payment to PAM. Under these conditions, would want your home to be connected to the piped water system?"
Answer:            Yes                    No                    Do not know

**CVM4A (Connection charge paid in installment, better quality of water)**

"There is still a last possibility, if the water supply service is improved to an ideal system with water always available at a tap in your home, never discolored and directly drinkable like I have mentioned before and the connection charge is paid in installment every moth Rp. 5000.- for 3 years (interest of 1% per month included) together with monthly bill, would you want your home to be connected to the piped water system?"
Answer:            Yes                    No                    Do not know



### **CVM5A (Actual PAM Charges)**

"Thank you very much for your time.... Maybe you know already that the actual PAM charges at the current time are a standard connection fee based on the breadth of the house like R. 60,000 for homes with a floor area of up to 25 m2 and monthly bill charged based on how much water consumed in the previous month. If water consumption is not too excessive it would be Rp 350 up to Rp 1150-/m3/month (see payment scheme on page 13). With additional indoor piping installation charge. Would you want your home to be connected to the piped water system when there is a possibility?"

Answer:            Yes                    No            Do not know

"I need to stress again, that we are not officials or representatives of PAM and we do not promise anything with regard to the connection of piped water from PAM. We are from the study group trying to find out the willingness to pay for piped water in the community. Our task is in relation with the study of improving the environment and water supply service. Again, thank you for your understanding. We happened to have brochures of PAM, maybe it would be of some help to you." (The interviewer gives the PAM brochures on new installation of household piped water). "Now I would like to ask you a few background questions."

(GO TO BACKGROUND QUESTIONNAIRE)

### **Version 2: Reverse ordering**

#### **Explanation of types of charge**

"There are several conditions that you should understand carefully. Now I am going to explain to you about paying for a standard PAM household water connection. There are three types of payment that you would have to make to get the water.

First you would have to pay about Rp. 20,000 to get piping and at least one tap in your home. Second you might have to pay a down payment for connection charge of Rp. 150,000 to PAM in having a metered water supply. Third, assuming you consume the same amount of water as most households, you would have to pay monthly charge of about RP (SEE CARD) for any water that you consumed in the previous month." This part is supported with pictures)

### **CVM1B (Connection charge paid in installment, better quality of water)**

"First we want to know your willingness to pay if the water supply service is improved to become a perfectly functioning system. Let us suppose the water was always available at a tap in your home, and that you would never have discolored or otherwise unsatisfactory water, and you do not need to boil the water because it would contain no germs. Water will always be available at a tap in your home, never discolored and directly drinkable because contains no germ. Also, suppose the connection charge is paid in installment every month Rp. 5000 for 3 years (interest of 1% per month included). So you would be paying an indoor piping of Rp. 20,000 and monthly charge of 5000, together with your monthly bill of about (SEE CARD) for the water you consumed, but no down payment to PAM. Would you want your home to be connected to the piped water system?"

Answer:            Yes                    No            Do not know

If the answer is 'yes' skip to CVM2B.

If the answer is 'no' or 'do not know' continue with following question.

**Reason for answering 'no' or 'do not know'**

- "Why?"
1. Current water supply already good (or similar answer)
  2. Too expensive (or similar answer)
  3. House-owners decides (or similar answer)
  4. Other reason .....

If answers 3 or other answer indicating respondent cannot answer questions appropriately, break off interview and thank respondent. Otherwise check to make sure that respondent would not prefer to pay lump sum rather than installments. If not, break off interview and thank respondent. If yes, then ask questions CVM2B, and then stop.

**CVM2B (Down payment for connection charge, better quality of water)**

"Now assume that you have to pay a down payment of Rp. 150,000 for the connection, an indoor piping charge of Rp. 20,000 and monthly water bill of about (SEE CARD) according to the water consumption in the previous month. Would you want to have your home connected with a piped water? Remember, the water supply service is improved to an ideal system and water was always available at a tap in your home and that you would never have discolored or otherwise unsatisfactory water so that you do not need to boil water because it would contain no germs.

Answer:            Yes                    No            Do not know

**CVM3B (Connection charge paid in installment, ordinary water quality)**

"There is still a possibility in that the water supply service is not improved, and you receive the normal PAM service. The connection charge is paid in installment for Rp 5000 per month for 3 years (1% interest per month already included). So you would be paying an indoor piping of Rp. 20,000 and monthly charge of installment together with your monthly bill of water of about (SEE CARD) according to the water consumed, but no down payment to PAM.

Under these conditions, would your home connected to the piped water system?

Answer:            Yes                    No            Do not know

**CVM4B (Down payment or connection charge, ordinary water quality)**

"Still another possibility is that the cost would include a down payment for connection of Rp. 150,000, Rp. 20,000 for piping in your home and a monthly charge of about Rp. (SEE CARD) for water consumed. Again, just to remind you, with house connection you would have an indoor piped water from the PAM system. Would you want your home connected to the piped water system?

Answer:            Yes                    No            Do not know

### **CVM5B (Actual PAM Charges)**

"Thank you very much for your time.... Maybe you know already that the actual PAM charges at the current time are a standard connection fee based on the breadth of the house like Rp. 60,000 for homes with a floor area of up to 25 m<sup>2</sup> and monthly bill charged based on how much water consumed in the previous month. If water consumption is not too excessive it would be Rp. 350 up to RP. 1150 /m<sup>3</sup>/month (see payment scheme on page 13). With additional indoor piping installation charge. Would you want your home to be connected to the piped water system when there is a possibility?"

Answer:            Yes                    No            Do not know

"I need to stress again, that we are not officials or representatives of PAM and we do not promise anything with regard to the connection of piped water from PAM. We are from the study group trying to find out the willingness to pay for piped water in the community. Our task is in relation with the study of improving the environment and water supply service. Again, thank you for your understanding. We happened to have brochures of PAM, maybe it would be of some help to you." (The interviewer gives the PAM brochures on new installation of household piped water). "Now I would like to ask you a few background questions."

## CVM Household Background Information

**Respondent's Identification Number [ ][ ][ ]**

Name of Husband: .....

Name of Wife: .....

Respondent's Address .....

RT/RW .....

Kelurahan .....

	<b>1<sup>st</sup> interview</b>	<b>2<sup>nd</sup> interview</b>	<b>3<sup>rd</sup> interview</b>
Name of interviewer: Date of interview: Submitted to the supervisor on:			
Name of interviewer: Date of interview: Length of interview: Submitted to the supervisor on:			
Name of interviewer: Date of interview: Length of interview: Submitted to the supervisor on:			

Perception of interviewer .....

Atmosphere during interview .....

**Respondent's Identification Number [ ][ ]**

<b>I. Respondent's Identity</b>	<b>Code</b> [ ]
1. Name: Status: husband Age: ..... yr.	0 none [ ] 1 exist [ ][ ]
2. Name: Status: wife Age: ..... yr.	0 none [ ] 1 exist [ ][ ]
3. Total number of household members? ..... persons	[ ][ ]
4. Total number of children under 6 yr. (including adopted children and nephew/niece)	[ ][ ]
5. Number of household in the house, specify: ..... HH	[ ][ ]

**Respondent's Identification Number [ ][ ][ ]**

<b>II. Water Supply</b>		<b>Code</b>	
6	What is your household principal source of drinking water?	Water not used for this purpose	0
		Mineral/bottled water	1
7	What water source do you use other than principal source, for example for washing?	Private PAM connection	2
		Private well/water pump	3 [ ][ ]
		Water vendor	4
		Public hydrant	5 [ ][ ]
		Public well/water pump	6
		Rain water	7
		Stream, pond or the like	8
		Other (specify)	9
8	Is the water source currently used also for purpose other than household usage)?	No .....	0
		Yes: Selling food	1 [ ]
		Water sold to others	2
		Other (specify)	3
9	When was the last time your principal drinking water source was interrupted for more than 1 day?	More than one year	0
		Within the last week	1
		Within the last two weeks	2
		Within the last month	3
		Within the last six month	
		Within the last year	
10	What water source do you use if your principal source of drinking water is interrupted?	Has never been interrupted	0
		Mineral/bottled water	1
		Private PAM connection	2
		Private well/water pump	3
		Water vendor	4
		Public hydrant	5
		Public well/water pump	6
		Rain water	7
		Stream, pond or the like	8
		Other (specify)	9
11	How much does your household spend per month to obtain water for own use? (interviewer need to assist in calculation) Rp .....	[ ][ ][ ][ ][ ][ ]	
12	Do you boil your drinking water?	No .....0	[ ]
		Yes .....1	
		Sometimes .....2	
13	How much water approximately is used for drinking daily? (interviewer to convert local units into approximate liters) ..... liters	[ ][ ][ ]	

**Respondent's Identification Number [ ][ ][ ]**

<b>III. Background</b>		<b>Code:</b>	
14 Land ownership	Privately owned, no certificate	1	
	Privately owned, with certificate	2	[ ]
	Government property, no certificate	3	
	Government property, with certificate	4	
15 House ownership	Own outright	1	
	Ret	2	[ ]
	Government Property (Dinas)	3	
	Own on credit	4	
	Other (specify .....)	5	
16 Which of the following appliance does your household have, in working condition		No	Yes
	B&W TV	0	1
	Color TV	0	1
	Refrigerator	0	1
	AC	0	1
	Telephone	0	1
	Radio, Cassette	0	1
	Fan	0	1
	In-house electricity	0	1
	Gas stove	0	1
	Bicycle	0	1
Motor cycle	0	1	
Car	0	1	
17 How many light-bulb used in this house? ..... lamps (maximum 8 pcs)	Missing answer	9	[ ]
18 Cooking facility most frequently used?	Gas stove	1	
	Hot plate	2	
	Kerosene stove	3	[ ]
	Firewood	4	
	Coal	5	
	Other (specify ....)	6	
19 Any other household living in this house with separate kitchen (separate cooking)?	No	0	
	Yes	1	[ ]
20 Who would have the last word on piped water connection?	Housewife alone	1	
	Housewife with	2	
	Husband together	3	
	Other (specify ...)	4	
	House owner (rented house)	5	

