

# **IHS Project Paper Series**

**Project Paper No. UEM 2  
Environmental Sanitation and Infrastructure:  
The Case of the Marginal Urban Areas of the  
Southern Cone of Lima**

**Silvia Meléndez Kohatsu, Víctor Carrasco  
Cortez and Ana Granados Soldevilla  
Fovida; Peru**

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Infrastructure: The Case of the Marginal  
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*David J. Edelman* Editor

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**Institute for Housing and Urban Development Studies  
Rotterdam, The Netherlands  
February 1997**

### **About the Project Paper Series:**

The IHS Project Paper Series is published by the Institute for Housing and Urban Development Studies, Rotterdam to make available to an international audience the significant output of its projects in the fields of urban management, housing and urban environmental management. Far too often, project documents, the so-called 'gray literature', are not easily accessible to academics and professionals in the field. They do contain, however, relevant material. This series is an attempt to respond to this need by presenting such documents quickly and in a lightly edited form, under the supervision of the IHS Editorial Board.

### **Capacity Building for the Urban Environment: A Comparative Research, Training and Experience Exchange.**

A project implemented by the Institute for Housing and Urban Development Studies (IHS), Rotterdam in co-operation with: Instituto de Desarrollo Urbano (CIUDAD), Lima, Institut Africain de Gestion Urbaine (IAGU), Dakar, Instituto para la Democracia Local (IPADEL), Lima, Human Settlements Management Institute (HSMI), New Delhi, Centro de Servicios para el Desarrollo Urbano (PROA), La Paz. This project was supported by: the Directorate General for International Co-operation (DGIS), Netherlands Ministry of Foreign Affairs, The Hague, and Swiss Development Co-operation, Federal Department of Foreign Affairs, Bern

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The Institute for Housing and Urban Development Studies (IHS), established in 1958, is an independent educational foundation based in Rotterdam, The Netherlands. IHS is active in the field of housing, urban management and urban environmental management in Asia, Latin America, Africa and Central and Eastern Europe. IHS offers post-graduate training, research and advisory services to national and local governments, multilateral and bilateral agencies and private companies.

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# Introduction to the Capacity Building for the Urban Environment Project

## *Focus and Outline of the Project*

*Capacity Building for the Urban Environment* is a comparative research, training and experience exchange project that was launched in October 1994 with the support of the Dutch government. It provides an inventory and review of the experiences of relevant bilateral and multilateral organisations and of Best Practices in urban environmental management. For the countries of India, Peru and Bolivia, it identifies, communicates and extends the application of Best Practices in environmental management for cities. In May 1995, the project was expanded to include Senegal/West Africa with the support of the Swiss government.

The focus of the project is on learning from experiences in urban environmental management at the city level and on developing strategies for capacity building in order to replicate and scale up the best of these experiences elsewhere. The overall co-ordination of the project is the responsibility of the Institute for Housing and Urban Development Studies in Rotterdam, while co-ordination in the participating countries is the responsibility of the following partner organisations:

- Human Settlements Management Institute (HSMI), New Delhi, India;
- Instituto para la Democracia Local (IPADEL), Lima, Peru;
- Instituto de Desarrollo Urbano (CIUDAD), Lima, Peru (since January 1997);
- Centro de Servicios para el Desarrollo Urbano, (PROA), La Paz, Bolivia, and
- Institut Africain de Gestion Urbaine, (IAGU), Dakar, Senegal.

## *Project Activities*

Support to cities in the form of applied research and development activities in the area of urban environmental management has been, and continues to be, provided by the co-ordinating partner organisations through the following set of activities:

### *Research*

Within the applied research programme undertaken in the project, Best Practices in urban environmental management in Bolivia, India, Peru and, to some extent, Senegal were identified, and their lessons and experiences reviewed. An analysis and review of the identified Best Practices then took place involving a large number of individual research groups and professionals. In a process of on-going monitoring and review, guidance and support were provided by IHS and its partner organisations. The results of both the individual studies of Best Practices and their review are being published in several books and papers in both English and Spanish. These and their publication dates are listed in the *Introduction to the Project Papers*, which follows this note.

### *Networking*

In identifying the research priorities of the project, during the conduct of the research studies, and throughout the review of research findings, a structure was developed and utilised to ensure the participation of all interested and concerned individuals and institutions through a consultative process. Expert group meetings and consultative seminars were organised for this purpose.

### *Capacity Building Strategies*

After the Best Practices research, analysis and review were completed for all countries, outline capacity building strategies were developed for each based on what was learned from these local experiences and practices. These strategies were developed through a broad-based consultation process involving a large number of research institutions, individual professionals and academics, city representatives, NGOs and local representatives. They are currently being modified based on the outcome and findings of Habitat II, which was held in Istanbul in June 1996, and the emphasis has now shifted to applying a number of Best Practices to selected cities.

### *Best Practices Documentation*

Concurrent to and co-ordinated with this project, IHS served as the secretariat of and contributed to the review of the Best Practices that were submitted to the United Nations Centre for Human Settlements (UNCHS) for the *Global Best Practice Initiative for Improving the Living Environment* in preparation for Habitat II. HSMI, PROA, IAGU and IPADEL were also involved and contributed to the national preparatory processes that took place in their own countries. An overview of the Best Practice submissions to UNCHS, as well as summaries of the additional case studies received by IHS, are being made available on the Internet through the IHS Home Page.

### *Databases*

Two databases are also under preparation: an institutional database and a literature database. The institutional database is being developed in co-operation with the International Institute for Environment and Development (IIED) in London. It contains entries on relevant organisations, some of which are documented in extensive profiles, while others are included as shorter reference information entries. IHS is developing the second database, which provides references in the literature on experiences with urban environmental management.

### *Rotterdam Seminar*

The Rotterdam Seminar, which took place in May 1996 during the two weeks preceding Habitat II, brought together all principal researchers, as well as city representatives and other professionals involved in the project for a period of intensive discussions. The seminar resulted in a document that provided a comparative analysis of practices and experiences in the field of urban environmental management. This analysis included the project process and network building, governance, job creation and poverty alleviation and gender. This was published as a book in February 1997 and is listed later in the *Introduction to the Project Papers*.

The Rotterdam seminar also discussed *city-level capacity building strategies* for the cities of Calcutta, India; Ilo, Peru; Santa Cruz, Bolivia and Dakar, Senegal. Experiences in *urban environmental management* were reviewed for the cities of Tilburg, The Netherlands and Nairobi, Kenya.

### *Habitat II*

At Habitat II the project was presented in the Special Meeting on Implementing the Urban Environment, organised by UNEP and UNCHS, as well as in other fora.

*Capacity Building Strategies for Peru, Bolivia, India and Senegal*

The outline capacity building strategies which were developed in preparation for Habitat II (i.e., by CIUDAD, PROA, HSMI and IAGU with the support of IHS). They are being modified for implementation, which is expected to begin late in 1997.

*Outline Training Program for Local Officials, CBO Workers, and other Partners for Peru, Bolivia and India*

These training materials are to be developed over the next few months and will comprise curricula for short courses related to the most directly applicable Best Practices identified for each country in view of its national strategy for capacity building in urban environmental management.

*The Development of a Medium-Term Capacity Building Strategy for Senegal and West Africa*

This activity is in progress and addresses the building of individual and institutional capacities at the local level for urban environmental management in both Senegal and throughout West Africa.

Ed Frank, Project Manager  
Rotterdam, February 1997

## Introduction to the Capacity Building for the Urban Environment Project Papers

A number of publications have appeared under the Capacity Building for the Urban Environment project. These are listed below and can be ordered from IHS or its partner organisations respectively:

- *Capacity Building for the Urban Environment*, edited by David J. Edelman and Harry Mengers, summarises the research findings of the project and the conclusions of the Rotterdam Seminar. It was published by the Institute for Housing and Urban Development Studies (IHS) in Rotterdam in February 1997;
- *Urban Environmental Management: The Indian Experience*, edited by B.N. Singh, Shipa Maitra and Rajiv Sharma, reviews the Indian experience in urban environmental management and presents all the Indian Best Practice of the project in detail. It was published by the Human Settlements Management Institute (HSMI) and (IHS) in New Delhi in May 1996;
- *Problems and Issues in Urban Environmental Management: Experiences of Ten Best Practices*, also edited by B.N. Singh, Shipa Maitra and Rajiv Sharma reports on the Indian Best Practices of the project in an abridged form. It was published by HSMI and IHS in New Delhi in May 1996, and
- *Ciudades para la Vida: Experiences exitosas y propuestas para la accion*, edited by Liliana Miranda Sara, presents the Best Practices and outline capacity building strategies for Peru and Bolivia for a Spanish speaking audience. It was published as Volume 6 in the Urban Management Series of the joint UNCHS/UNDP/World Bank Urban Management Programme in Quito in May 1996.

The objective of this series of *Project Papers*, then, is to bring to an English speaking, audience the results of the project research in Peru and Bolivia appearing in the Miranda book. In addition, the Indian research, while documented in English in the second and fourth references listed above, has not appeared as complete, individual studies. Consequently, a selection of these will also be selected for this series. Finally, the first reference in the above list covers aspects of the research undertaken in all four countries of the project. Consequently the selection of work appearing in the *Project Papers* includes the following:

### *Bolivia*

- 'Urban and Environmental Reality Workshops' by Zoila Acebey;
- 'Urban Agriculture in Community Gardens' by Julio Prudencio Böhr, and
- 'Institutional and Development Framework for Urban Environmental Management in Bolivia' edited by Gastón Mejía.

### *Peru*

- 'Defence and Conservation of the Natural Swamp Area Pantanos de Villa, Lima' by Arnold Millet Luna, Eduardo Calvo, Elsie Guerrero Bedoya and Manuel Glave;
- 'Consultation in Urban Environmental Management: The Case of Ilo' by José Luis López Follegatti, Walter Melgar Paz and Doris Balvín Díaz;
- 'Promotion of Employment, Health and the Environment, Lima' by César Zela Fierro and Cecilia Castro Nureña



- 'Environmental Sanitation and Infrastructure: The Case of the Marginal Urban Areas of the Southern Cone of Lima' by Silvia Meléndez Kohatsu, Víctor Carrasco Cortez and Ana Granados Soldevilla, and
- 'Inter-institutional Consultation and Urban Environmental Management in San Marcos Cajamarca' by Marina Irigoyen and Russeles Machuca.

### *India*

- 'Power to the People: The Local Government Context' by the Times Research Foundation;
- 'Carrying Capacity Based Regional Planning' by the National Institute of Urban Affairs;
- 'NGOs/Civic Societies and Urban Environmental Advocacy' by Development Associates;
- 'Integrated Low-Cost Sanitation: Indian Experience' by Sulabh International Institute of Technical Research and Training;
- 'City-Wide "Best Practices" in Solid Waste Management in Collection, Transportation and Disposal' by HSMI/WMC of UIFW;
- 'Environmental and Health Improvement in Jajmau Area, Kanpur: Lessons and Experiences for Wider Replication' by Ministry of Environment and Forests;
- 'An Approach to Pollution Prevention in Electroplating Sector' by Development Alternatives;
- 'Integrated Study on Wetlands Conservation and Urban Growth: A Case of Calcutta's Wetlands' by Institute of Wetlands Management and Ecological Design;
- 'Sustainable Urban Development: A Case of Navi Mumbai (New Bombay)' by City & Industrial Development Corporation;
- 'Community Based Sanitation and Environmental Improvement Programme: Experiences of Indore, Baroda and Ahmedabad' by Shri Himanshu Parikh, and
- 'Institutional and Development Framework for Urban Environmental Management in India' by HSMI.

It should be emphasised here that the nineteen *Project Papers* in this series reflect the views of their authors only and have been edited to varying degrees. Initial English language editing was done by, among others, B.N. Singh, S. Maitra and R. Sharma for India and by D.J. Edelman for Peru and Bolivia. In fairness to both the authors and the publishers, they should, therefore, be characterised as working papers rather than full academic papers.

David J. Edelman, Series Editor  
Rotterdam, February 1997

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## Acknowledgements

Fomento a la vida (Promotion of Life - FOVIDA) developed the "Environmental Sanitation and Infrastructure" project for the residents of the marginal urban areas of the South Cone of Metropolitan Lima, which lacks water supply and sewage networks. To carry out the project, FOVIDA organised in 1992 a multi-disciplinary working team with the economic support of INTERMON (a Spanish foundation) and NOVIB (the Dutch Organisation for International Development Co-operation).

Grounded on an evaluation of the needs of the population, and using the Surveys of Health and Nutrition at the District Level (Encuestas Distritales de Salud y Nutricion - EDSAN) as its reference point, this team selected five districts of Metropolitan Lima for the project: Puente Piedra, Carabayllo and Independencia in the North Cone, and San Juan de Miraflores and Villa Maria del Triunfo in the South Cone. For the selection of the specific areas of the project, the team also took into account the economic situation of the inhabitants and the existence of social organisations.

The project developed two types of activities. The first was the implementation of a financial programme, making use of a system of interest free rotating funds so that low-income households could have access to minimal infrastructure for water storage and the elimination of excreta from their dwellings. The second project activity was linked to the training and promotion of sanitation in the population supported by local organisations and institutions.

With this intervention, FOVIDA has contributed to the development of the capacities of the population of these marginal areas to control better and more extensively their environmental health problems.

In January 1995, when the first phase of the project was completed, the Institute for Housing and Urban Development Studies (IHS), Rotterdam, The Netherlands, the Instituto para el Desarrollo Local (IPADEL), Lima, Peru and the Centro de Servicios Integrados para el Desarrollo Urbano (PROA), El Alto, Bolivia, organised an international competition on Successful Experiences in Urban Environmental Management. FOVIDA participated with the "Environmental Sanitation and Infrastructure" project. The project was selected as one of the four which deserved to be studied. This is the basis upon which the present research has been undertaken, and it has been carried out within the framework of the Dutch government funded project "Capacity Building for Urban Environmental Management." The period that has been taken into account for the systematisation and study of the experience is 1993-94. The scope of analysis includes only the areas of Tablada de Lurín, José Gálvez, José Carlos Mariátegui and Virgen de Lourdes, all in the district of Villa María del Triunfo; and Pamplona Alta, which is in the district of San Juan de Miraflores; both districts are located in the southern part of Metropolitan Lima.

The members of the team in charge of the research were Lic. Silvia Meléndez Kohatsu, Lic. Ana Granados Soldevilla and Dr. Víctor Carrasco Cortez. They were supported in conducting interviews by Ms. Pilar Dávila, and the survey was developed with a team of social work students from the Catholic University of Peru.

The authors thank the Institute for Housing and Urban Development Studies (IHS), the Instituto para el Desarrollo Local (IPADEL), the Centro de Servicios Integrados para el Desarrollo Urbano (PROA) and their own institution, FOVIDA, for their confidence and support. Without them, the systematisation work would have been difficult to carry out. In addition, they would also like to thank once again the households of the involved neighbourhoods for their participation and support, which made possible the finalisation of this experience and research.

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# **1 Environmental Sanitation and Infrastructure**

## **1.1 The problem of environmental sanitation**

Environmental sanitation has a direct relationship to the health and nutrition of the population living in conditions of poverty in the Third World. According to the World Bank, by securing drinking water and appropriate sanitation for all persons, the number of infant deaths by diarrhoea could be reduced by 2 million and the episodes of illness by 200 million.

Despite the vital importance of water, broad sectors of the Peruvian population live in poor sanitary conditions. In most of the marginal urban areas of the country, water is scarce and lacks the quality required for human consumption. Additionally, systems for the elimination of excreta do not exist or are insufficient for the size of the population.

For example, in three popular districts of the South Cone of Metropolitan Lima, it was detected that 34% of the households consume water of doubtful quality distributed by trucks and stored in precarious containers and water tanks. These districts confirmed that the higher presence of diarrhoeal illnesses is associated with inadequate water provision and storage and with improper elimination of excreta. A sample of residual chlorine was taken from dwellings in Villa Maria del Triunfo, and the results showed a low concentration in 32% of the cases (FOVIDA, 1994).

The problem is even more acute due to the cost of the water distributed by trucks, which is from 20 to 40 times higher than in areas with household connections (Ruiz, 1995). Households in conditions of poverty consume around 20% of their income to buy drinking water, and they do not consume the required minimum levels (Acevedo, 1995). The combination of insufficiency and low quality of water has a negative impact on the nutritional condition of the population, affecting children in particular, and maintaining a vicious circle of poverty.

The rapid and anarchic growth of Lima during the last few decades is at the core of this situation. The migration stream of the rural population in search of better living conditions in Lima has taken place within the context of scarce public investment finance for the improvement and extension of services. This means that, while each day there are more residents in the capital, there are not enough investments forthcoming to provide for their needs.

## **1.2 Project Justification**

The policies of structural adjustment and stabilisation executed by the liberal government of Ing. Fujimori since the beginning of the 90s have led to a deterioration in the living conditions of the population. Poverty and the lack of access to the resources needed for the satisfaction of basic needs were aggravated by decreases in real income and the reduction of public social expenditures.

Nevertheless, the increase of sanitary risk to the urban population and the impossibility of tackling the global problem justified immediate local intervention. The idea was to carry out innovative and effective programmes of improvement to basic infrastructure services, encompassing financial systems, promotion, education and sanitary observation activities, while also strengthening popular participation.

Within this context, FOVIDA, proposed to develop and carry out a project for environmental sanitation in marginal areas of Lima, with priority given to popular participation and the development of capacities for concerted action.

Five districts were chosen, all located in the North and South Cones of the capital, which house around 936,662 inhabitants (1993 Census). The activities were executed in the neighbourhoods of José Gálvez, Tablada de Lurín, Nueva Esperanza, Virgen de Lourdes, José Carlos Mariátegui, Pamplona Alta, Ensenada, Laderas, Animas, Cercado, Rosa Luz Salgado, Jerusalén, Bella Aurora, Zapallal, Tahuantinsuyo Alto, Zona Urbana 4 and Zona Rural de Carabayllo. The project enabled 1187 households to construct sanitation works and involved 12,404 households in training-promotion activities.

The selection of the areas was made after considering their high prevalence of diarrhoeal illnesses, their deficiency of water and sewage services, the inadequate quality of the water (levels of residual chlorine) in their household water reservoirs, the low incomes of their populations and favourable institutional conditions for the development of the project.

### **1.3 Objectives**

The Environmental Sanitation and Infrastructure project had one general objective and several specific ones. The first was to increase the health conditions of a sector of households of human settlements<sup>1</sup> of Metropolitan Lima, improving the conditions of its basic sanitation and the environment of its dwellings by means of effective, low-cost solutions and with local concerted action.

The specific objectives were:

- Improving the quality of water for intra-dwelling human consumption;
- Decreasing the risk of water and food contamination due to inadequate solid waste disposal;
- Favouring knowledge generation, skills acquisition and improvement in the attitudes of the population and the communal promoters of basic sanitation;
- Giving impetus to the organisation and functioning of a Rotating Credit Fund to promote the provision of sanitation facilities and to create related micro-enterprises; and
- Designing and executing working plans with local governments, grassroots organisations and Health Territorial Units (Unidades Territoriales de Salud - UTES, now Health Social Services, i.e., Servicios Sociales de Salud - SBS) of the corresponding Ministry in the project districts.

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<sup>1</sup> In this paper, the settlements of the urban poor, usually called *barriadas* or "pueblos jóvenes" in much of Spanish speaking Latin America, will simply be referred to as settlements.

## **1.4 Components**

### *Educational-Promotional Component*

This included training courses addressed to health promoters to check the quality of drinking water. They were designed to enable the appropriate water conservation at intra-dwelling level by means of water chlorination and the use of methods for cleaning of water containers and to support the maintenance of latrines.

### *Economic Component*

This included the creation of a rotating credit fund for the construction of intermediate works (water storage tanks and latrines).

The project assessed and sponsored the creation of sanitation micro-enterprises, which, in a first phase, were in charge of the construction of the previously mentioned intermediate works.

## **1.5 Work strategy**

Before initiating its activities the team in charge considered different alternative strategies:

- To facilitate the concerted promotion of environmental health among grassroots organisations and public institutions such as the Ministry of Health (MINSA) and local governments;
- To recuperate partially the working capital of the rotating credit fund for intermediate basic sanitation works, creating groups of organised households. This included enabling the highest possible accessibility of households to the works; and
- To create basic sanitation micro-enterprises composed of residents working as temporary bricklayers.

## **1.6 Executed activities**

At the level of concerted action:

The co-ordination and organisation of activities for environmental health promotion (campaigns for the addition of chlorine to water) between the grassroots or community based organisations (CBOs), FOVIDA and the Ministry of Health (MINSA) were implemented.

Initially, FOVIDA assumed the role of facilitator to give impetus to the co-ordinated work between the CBOs and MINSA. At a later stage, the areas of intervention in the selected districts were chosen after considering sanitary, economic and organisational factors. Training courses, the organisation of sanitation promotion activities, and campaigns of water chlorination were carried out in the chosen areas.



The activities were executed in co-ordination with residents of the chosen settlements, the health promoters of the same settlements and the technicians of the Environmental Health Units of the Health Territorial Units (Unidades Territoriales de Salud - UTES).

At the financial level:

A rotating fund was implemented for the households living in poverty and extreme poverty to develop diverse types of environmental sanitation works such as water storage tanks and latrines, and to finance studies for water and sewage projects and for the installation of communal drinking taps.

FOVIDA represented the rotating fund legally, and, as its owner and administrator, it established the following conditions:

- Time limit: 8 to 10 months;
- Rate of interest: 0;
- Amount of the loans: \$ 110 for the construction of water tanks, \$ 70 for latrines, and \$ 20 per household for collective water and sewage projects;
- Grace period: 15 days;
- Guarantee: Signed contracts and bank letters;
- Direct subsidy of 10% for the construction works; and
- Coercive measures: 5% monthly interest in case of late payment; and, in extreme cases, the withdrawal of the loan.

To have access to credit, solidarity groups had to be organised among the residents who demanded the works. Each group had to elect a co-ordinator or representative to be in charge of the supervision of the works and the execution of the charges, to make the bank deposits and to sign the documents of the loan guarantee.

For the monitoring of loan recovery, it was agreed to have periodic meetings with the representatives of the groups, to control late paying members by means of interviews and visits and to have meetings with the groups to solve problems related to payments and the advancement of the works.

## **2 The Research Approach**

### **2.1 Research topic**

The decision to systematise the executed works once the first phase of the project was completed corresponded to the opportunity offered by the International Competition on Best Practices in Urban Environmental Management organised by IHS, IPADEL and PROA. The project qualified as one of the four relevant experiences developed in Peru.

With this motivation, FOVIDA decided to evaluate the already executed part of its project and organised the present research with a small multi-disciplinary team.

Due to the size of the research budget, FOVIDA limited the research to 1492 households in Pamplona Alta (San Juan de Miraflores), Tablada de Lurín, José Gálvez, José Carlos Mariátegui and Virgen de Lourdes (Villa María del Triunfo). The period from March 1993 until December 1994 was chosen, because in this period the largest number of loans was granted and, thus, the highest number of works was executed.

In Peru, there have been very few financial programmes addressed to low-income urban groups, and even fewer for sanitation infrastructure works, which have been considered unproductive and unprofitable. That it is the reason why it was considered opportune to review experiences from other countries regarding the provision of credits to low-income households. (See Appendix 1).

### **2.2 Objectives**

The research had three objectives:

- To systematise the process of concerted action developed by the social actors in planning, programming and execution of the project, highlighting the role of local groups in activities of environmental health promotion;
- To analyse the functioning of the credit system for the execution of the works and to determine the rate of late payment; and
- To study the effects of the interventions (construction of sanitary works and training activities) in the handling and use of drinking water.

### **2.3 Methodology**

#### **2.3.1 Local concerted action**

Local concerted action was defined as the way to make compatible the interests of the public and private sectors, since they both have essential, although different and complementary functions. Such action is the way to establish interdependency links and to concretise the spatial dimension.

**Hypothesis:**

Good co-ordination between the public health services and grassroots organisations increases the efficiency of training activities for environmental sanitation (The campaigns of water chlorination are covered here.).

The units of analysis included, on the one hand, the Offices of Environmental Health of the UTEs (now Health Basic Services - SBS) from the districts of San Juan de Miraflores and Villa María del Triunfo, as well as the Health Centres of Villa San Luis and Tablada de Lurín; on the other hand, they included the Committees of Health Promoters of Virgen de Lourdes, Tablada de Lurín and Pamplona Alta in the same districts.

The variables which were taken into account for the analysis of the concerted action were the planning and programming of activities in a combined way.

**Instruments for information gathering**

To evaluate the experience, the representatives of the Offices for Environmental Health and the leaders of the Vaso de Leche Committees, which appointed health promoters, were interviewed. Interviews were also held with grassroots promoters (six female leaders of the Committees, who acted as promoters, and two other grassroots promoters), and four environmental health technicians, who participated in the promotional-preventive activities of the project.

Additionally, forms to register secondary information were used.

**2.3.2 Economic component (rotating credit fund)****Definition of a rotating fund**

For the purposes of the present study, the definition employed by the Development Cooperation Information Service of the Dutch Ministry of External Affairs is used. In this definition, a rotating fund is one whose available resources are placed at the disposal of the users for only one time, while they change constantly. However, to this definition must be added the temporal character of such a fund as development funds or aid funds, as is suggested in several studies.

**Hypothesis:**

The rotating credit fund allows for the development of a larger number of works, because it stems from environmental sanitation needs and the saving capacity of the households in marginal urban areas.

To analyse the behaviour of the rotating credit fund, the following variables were established:

- Location and main characteristics of the target group;
- Nature and objectives of the fund;
- Financial technology used;
- Initial capital of the fund, number of approved loans and finalised works;
- Late payment rate;

- Costs of the sanitation works (tanks and latrines) and operational costs of the fund; and
- Direct subsidy to the works.

The units of analysis were the solidarity groups which functioned during the period March 1993 - December 1994.

To understand better the results of the fund's operation, a group from Villa Maria del Triunfo was selected as representative of the whole sample to observe the specific behaviour of costs and subsidies. The group was located in the district where the largest number of water tanks was built, and, therefore, in which the highest volume of credit was concentrated.

### **2.3.3 Comparative study of knowledge, attitudes and practices of the population (control case)**

The following hypotheses were taken into account:

- The construction of water tanks, their use and participation in promotional-preventive activities improve the knowledge, attitudes and practices of the participating families with respect to water handling and consumption; and
- The prevalence of residual chlorine at null or low levels is less in the households that built and used home-tanks and who participated in the promotional-preventive activities.

### **Operationalisation of the variables**

#### **Independent Variables**

- Households which have built a water tank in their dwelling, with loans provided by the project, and who participated in the promotional-preventive activities (campaigns of water chlorination); and
- Other households; i.e., those which did not participate in the project but which live in marginal urban areas.

#### **Dependent Variables**

- Knowledge, attitudes and practices of the households. The adequate handling of water, the knowledge of some techniques of water purification (chlorine tablets, granulated chlorine, bleach, iodine and others) and a favourable attitude towards the water chlorination campaigns; and
- Household consumption of contaminated water. Those households where the residual chlorine analysed in the home water tanks was low or null.

### **Control Case**

A comparative study was made between the households which participated in the project and the ones which were not included (witness group).

In four settlements (Villa María del Triunfo, Pamplona Alta, José Gálvez y José Carlos Mariátegui), two groups were organised. The first included the participant households, and the second (witness group) consisted of the non-participant households. Within the participant group, two differentiated sub-groups were observed. These consisted of (1) households who repaid their loans as agreed and (2) those who repaid late or not at all.

### **Sampling**

The determination of the sample of households for the analysis of the control case was made with the Statcalc package of the Epi-Info V.5 programme, and the selection made use of the random numbers table. The sampling was random by conglomerates (See Appendix 2: Sampling System).

The units of analysis used to study the results of the experience were the households which received loans and sanitary advice and the rest of the households of the settlements which were studied.

### **Instruments for data collection**

Survey - For the study of the households, a survey was designed, with the objective of collecting primary data from the sample population. It consisted of closed questions, which included the necessary data to analyse the research variables (See Appendix 5.). 140 surveys were executed, each with four sections:

Section 1: General data of the household

Section 2: Ways of provision and storage of water

Section 3: Knowledge of, attitudes to and practices for handling water for human consumption

Section 4: Participation in financial systems

Register forms - Register forms were used to gather secondary data related to the health and basic sanitation situation. These were furnished by the Health and Nutrition District Surveys (EDSAN), the Ministry of Health (MINSA) and the Informatics and Statistics National Institute (Instituto Nacional de Estadística e Informática - INEI).

Chlorine comparative instruments - These were used for the measurement of residual chlorine.

### 3 Analysis of Results

#### 3.1 Grassroots organisations

The work of the communal health promoters began with the organisation of the Vaso de Leche as an activity complementary to the preparation and distribution of milk by the Vaso de Leche Committees of the settlements. Women organised in these committees have displayed skills and knowledge for the execution of health promotional-preventive programmes, developing these tasks on a voluntary basis:

*The work that we perform as promoters is voluntary. We have no income, the equipment (such as scales, instruments to measure chlorine, etc.) is borrowed on a rotating basis.* (Ms. Gaby)

*We have arranged with Dr. Igunza that the promoters can have free access to the Health Centre.* (Ms. Sonia)

Some female leaders consider that it is important to incorporate new promoters into the production workshops, to give work to local households, and to implement communal kitchens for children in order to overcome problems of malnutrition at early ages.

The broad territorial coverage of these committees facilitated the programming of health activities addressed to children under 6 years old and to pregnant women, communal "medicine chests" (e.g., in the case of the Vasco de Leche Committee of Virgen de Lourdes), and the improvement of sanitary conditions.

*Our work includes 32 committees of the community, approximately 3277 beneficiaries.* (Ms. Marina)

In general, the promoters interviewed stated that they initially found resistance to participating in health promotion activities, but that this decreased as the people saw the work they performed, even if some distrust remained.

*There are some persons who do not receive it in a good way, who are suspicious, distrustful; it may be due to the violent situation and so many fears that we live with. There are persons who do not accept us; sometimes they have rejected the chlorine because they say it is poison, or because they say they know how to purify water.* (Ms. Sonia)

Asked about their main accomplishments, some leaders stated that they have helped to reduce cholera, typhoid, the multiplication of houseflies, and water contamination. They show a clear idea of the impact of their interventions for the improvement of sanitary conditions and on changing attitudes towards sanitary measures.

*We have trained many people; we have taught them how to disinfect water and to clean their water tanks.* (Ms. Octavia)

The female leaders with experience in grassroots organisations were another favourable factor in channelling the work of public and private health organisations in the locations that were studied.

*I have already been co-ordinator of the Vaso de Leche of my neighbourhood for seven years; they initially elected me for two years. (Ms. Teresa)*

On the negative side, however, the presence of leaders in the same posts for several years could be limiting the promotion of potential new leaders for the Vaso de Leche organisation.

### **3.2 Co-ordination of the promoters with the public health services**

Health Basic Service is the institution in charge of administration, planning and evaluation of health activities at the local level. The Health Centres and Posts are in charge of executing the activities of basic care in their areas of intervention. The co-ordination and exchange of the service with grassroots organisations is made at this level.

The promoters consider it vital to co-ordinate with the public health services because they facilitate the tackling of the problems of the community. They promoters feel that this co-ordination brings concrete benefits, for example, regarding the implementation of Oral Rehydration Units (UROS), food support for children with malnutrition, etc. However, some of them think it is possible to execute their communal work in a parallel way to the formal public health sector.

Most of the promoters are related to the health services through NGOs, which function as intermediaries. The promoters are regarded as having a relatively passive attitude toward the health services in that they wait to be called to the activities carried out by the state such as vaccination campaigns, first aid courses, etc.

*Sometimes we co-ordinate with the Health Centre, for instance, when they call us for vaccination (campaigns). (Ms. Marina)*

The promoters perceive that the MINSA Health Centres perform a "curing" role more than a preventive and training role and that the centres call on them for "their activities", which are far from the programmes of the promoters.

*The Health Centre calls us for some things and not for others. (Ms. Teresa)*

In only a few instances, such as in Virgen de Lourdes, do the leaders of the Vaso de Leche take the initiative and develop working links with the Health Basic Services (SBS) and local governments to demand support in the form of professional staff, equipment and other material resources. For example, on one such occasion, garbage collection was co-ordinated with the municipality of Villa Maria del Triunfo, and the acquisition of stretchers for the communal "medicine chest" with the SBS.

On the other hand, the leaders who were interviewed felt that any support to their communities is welcome due to the many and urgent problems with which they are faced.

All of these comments and observations leads to an analysis of the perception of the Vaso de Leche leaders regarding the planning and programming of their own work. The perception of NGOs and the State as supporting organisations for the community is implicit. In practice, however, the committees end up developing the lines of action of these institutions as if they were their own.

*We do not have an established work plan; they give us a guide in FOVIDA and the Health Centre. (Ms. Gaby)*

*We work with children under six years old, pregnant women and sanitation because in the community we need everything. There are many children with malnutrition, and we lack medicine. (Ms. Marina)*

There is a certain dependence of the grassroots organisations with respect to external agents due to the lack of infrastructure and absence of their own equipment, the lack of income to finance and continue with health promotion activities, and the lack of know-how in local management and planning, among other factors.

### 3.3 The Health Centres

There are five high priority programmes for the Environmental Health Units of the Ministry of Health. These are water quality control, food manipulation control, solid waste control, zoonosis control and excreta control. All of them fit the sanitation needs of the settlements located in marginal urban areas of the South Cone. However, these units are provided with insufficient funds to undertake such broad and diverse activities. As an example, insect and rat control is not adequately performed because it requires money and equipment for fumigation activities.

Additionally, these units lack the resources for the proper dissemination of training materials and adequate equipment to broaden the coverage of sanitation training activities.

Regarding the elaboration of the work plans, there are two work spheres, one at SBS level, and the other at the level of the Health Sub-Region, according to an environmental health technician who is a staff member of the San Juan de Miraflores SBS: *The sector decides the guidelines and norms for the formulation of yearly work plans, and the programmes are already determined.*

In the SBS of Villa Maria del Triunfo, more flexibility seems to be the case according to the technician: *The work plans have been modified, and now the planning is made from the bottom to the top, before it use to be from the top down.*

On the other hand, a technician of the Health Centre of Tablada de Lurin - Villa Maria del Triunfo stated: *To prioritise the activities of my annual work plan, I take into account the necessities in the field, and I go deeper there. Last year it was the garbage collection problem. Now we provide prevention with conferences in communal kitchens, markets and schools so that they can also help us.*



### 3.5 Analysis of the behaviour of the rotating fund

Due to the nature of the fund, as well as the conditions under which the loans were granted, it can be called a strategy of lost funds. That is, the fund did not seek full sustainability through time, since the condition of granting loans without interest would eventually reduce the capital to zero. Additionally, being addressed to residents living in poverty and extreme poverty, a direct subsidy to the construction work was also given.

The resources of this fund were intended to provide credit to households organised in solidarity groups and to micro-entrepreneurs whom the project wanted to train. The main users were actually households who did not have legal ownership titles to their dwellings. Around 60% of the dwellings have only two rooms, and 78% have been built with precarious materials and lack the basic services of water provision, sewage and electricity.

Most of the household heads are independent workers (51%) or (dependent) workers (26%). The average level of income varies between 280 and 300 soles a month (Survey, August 1993), or 610.90 to 654.60 soles per capita annually.

#### Initial capital and coverage of the fund

The initial capital assigned to the fund in the period studied (1993-94) was US\$ 38,886.50 equivalent to 77,889.65 new soles, from which 7,139.50 were used as subsidies to the works, so the effective rotating credit fund was 70,750.15 soles.

51 loans were accepted and granted, 39 of them for works, 4 for investment capital for micro-enterprises and one for water and sewage connection studies. The credit for works made possible the construction of 406 water tanks and 14 latrines. The loans were mainly for the construction of water tanks, since this was the type of construction most needed.

25% of the works were executed in 1993, and the rest (75%) in the following year. Most of them (75%) were in settlements of Villa Maria del Triunfo, where a high demand existed.

An important assumption of the strategy was that the fund could rotate 1.5 times a year, allowing the coverage to broaden and achieve acceptable levels of sustainability over the period of project implementation. However, the actual rotation obtained was only 1.23 in almost two years of operation, mainly due to the high rate of late payment.

The total amount paid out for credits was 87,100.79 new soles, 16,350.64 more than initially planned. This allowed the construction of 16% more intermediate works. With the initial fund, 342 water tanks would have been constructed, but the number increased to 406.

### **Analysis of the operation of the fund**

To analyse the fund, a number of indicators were studied in order to arrive at a cost-benefit ratio. These included the rate of late payment, capital rotation, costs of the works, operation costs of the fund, direct and indirect subsidies, implementation of the financial technology of the project and the opportunity cost of the capital. The main instrument for analysis was the cash flow.

The real amount paid out for credits was 94,240.29 soles, but after deducting the subsidy granted for each loan for works (7,139.50 soles) the net amount for credit was 87,100.79 soles, as was mentioned above.

Most payments were made in 1994 (75%). In both 1993 and 1994, however, the monthly expenditures were higher than the monthly receipts:

1993	Expenditures	2,833.80 new soles
	Receipts	483.50 new soles
1994	Expenditures	5,869.00 new soles
	Receipts:	2,030.30 new soles

These results are associated with the high average rate of late payment for the two years (56%). However, the rate of the first year (69%) was higher than that of the second (42.2%), when the system for money recovery was modified.

In 1993, the expected recovery rate was 77.6% of the loans granted and in 1994 72% according to the proposed capital rotation of the fund (1.5 a year). Unfortunately, the results were far from the planned figures, and the fund began to give new loans with recovered capital only in July 1994.

It is important to note, however, that there are substantial differences in the rate of late payment according to the type of loan. The solidarity groups, for example, who contracted obligations for construction works, have higher rates of late payment than the ones who used the loans to finance studies. The micro-entrepreneurs registered high rates the first year, but these were considerably lower the second year.

A number of factors influenced these results:

### **The amount of monthly payment and household consumption capacity**

The annual average income of these households in August 1993 ranged from 610 to 654 soles. According to ENNIV, families in extreme poverty had an average income of 668 soles, although the cost of the "food basket" was 911 soles. Even using data from June 1994, it appears that most households which contracted the loans belong to this social segment, if it is assumed that the rate of sub-employment and open unemployment did not change during this period (August 1993-June 1994). The precariousness of the incomes would explain the low or null saving capacity.

This variable would also partially explain the different late loan payment rates for works and for studies. While the monthly payments for works loans were between 25 and 35 soles, the ones for studies were between 10 and 15 soles, representing only 5% of average income. In the survey of the control group, 62% of the late payers said they were not able to pay because "my income is not enough."

### **Some social and cultural factors**

The perception about the acquired good also played an important role. The households that obtained loans for water tanks and latrines considered it an additional expenditure in their monthly budget, while the ones who contracted the loan for studies considered it a kind of household capitalisation. This perception was observed in the promotion phase of the project, when the demand for this resource was low, despite its necessity.

An external factor which helped to support this view was the presence of programmes that completely subsidised these works<sup>2</sup>.

In both types of loans, the responsible organisation was the Neighbourhood Directive Board (Junta Directiva Vecinal), but it only assumed the responsibility over the obligation in the case of loans for studies. Here the board behaved as if all these loans were all actually only one loan, for which 62 households were organised in eight groups to be participants of a study (which was by nature collective) and for the follow-up of the financial obligations that they had acquired.

### **The recovery system and coercive measures**

Another factor that influenced the late payments was the low impact that the recovery system and coercive measures had. In theory, the co-ordinators of the solidarity group should have been in charge of recovering the money and depositing it in the bank. However, three difficulties were faced in this regard:

- The co-ordinator did not receive any remuneration for this task, so s/he just stopped carrying it out if s/he found any paying job;
- Monitoring was weak, so sometimes a household would pay its obligation on time, but the funds were not placed in the bank; and
- The co-ordinator had a double role as both debtor and collector.

The coercive measures foreseen in the project did not work out because the bank letters the borrowers signed had no economic back-up. Therefore, they were impossible to cash and were not effective in exerting psychological pressure. A 5% interest rate was applied on the outstanding loan after missing two monthly payments. This increased the obligation until it became so large that it was impossible to recover.

The other coercive action that was foreseen, the removal of what had been built, was, in fact, too expensive; and, in any case, it depended on finding some other household in the same neighbourhood which wanted to buy it. This was rarely the case. However, in the few cases that this action was undertaken, it had a positive impact on the payment of the obligations of the rest of solidarity groups.

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<sup>2</sup> A programme funded by UNICEF and the Ministry of Health gave global subsidies to this type of work.

The weaknesses in the recovery system are summarised by the sentence, "We pay when we can." This was the answer given by 82% of the households surveyed in the control group which expressed the opinion that the FOVIDA loan was good.

In June 1994, the credit program was revamped, and it was decided to separate the promotion function from the ones for money recovery and loan monitoring. This contributed to lowering the rate of late payment, so that 73,3% of the surveyed households declared they had paid off their loans.

### **Analysis of costs and subsidies**

In calculating the costs for construction works, promotion and training costs were not taken into account. An estimation of the financial costs that this type of strategy implies was also absent.

Moreover, the expenditures of the monitoring and recovery system should have been reflected in the interest rates, but the project gave priority to increasing the access to water tanks and latrines and to improving the health conditions of the households in extreme poverty to cost recovery.

These factors make an evaluation of the financial and global costs of the works very difficult. As a result, it was decided to approach the analysis by considering the costs of the project in one case. Solidarity group No.7 (1993), which constructed water tanks of 1,5 M<sup>3</sup> was chosen. This case is discussed below.

### **Production costs of the works**

The total amount of the loans granted to each solidarity group was considered to be the direct costs of the works. The expenditures paid out for promotion of the works, organisation of the solidarity groups and assessment of the micro-enterprises were considered indirect costs. This classification permits the total costs of the works to be differentiated and the subsidy granted to each water tank to be estimated.

The direct costs totalled 253 new soles per tank, including building materials, labour and the profit of the micro-entrepreneurs, among others. It is important to highlight that this figure corresponds to the final price of the tank paid out by the fund. However, the households contracted an obligation of only 224 soles. The difference (12.5%) constitutes the direct subsidy granted.

The indirect costs were 128 soles, the most important of which was personnel (81%). This included the salaries of the staff members of the institution, who were in charge of the promotion and training tasks, and the work of the community leader, who participated in the organisation of the solidarity group. Other indirect costs were administrative costs, including accountancy expenditures, electricity, telephones, etc.; and these represented 9% of the total costs.

The results of the study show that the project did not have a significant impact on the attitudes of the population, except with regard to the chlorination campaigns. In both practices and attitudes, the level of education is a factor that might influence results. Mothers without basic school represent 34% of the participant households and 24% of the non-participants, while women who are heads of household are 15% of the participants and only 3% in the non-participants.

### **Gender related to the practices of basic sanitation**

The study found that the decision to contract a loan was shared between the father and the mother of the participant households; in 35% of them, women decided on the participation, and in 20% both. However, men were in charge of payment. The decision of women to participate could be explained by the fact that they feel themselves to be direct beneficiaries of the works, since the construction of water tanks releases them from some of their daily housework.

67% of the participants were housewives, a fact that reflects the low level of economic independence that women have.

In the participant households, the husband was mostly in charge of cleaning the water container, while in the non-participant households, this was so in only 23% of the cases. This task was performed by women 35% of the time with participants and 49% by non-participants. The study did not explore the reasons for this, however.

## 4 Conclusions

### 4.1 Processes of concerted action

- In the settlements where the project was carried out, the co-ordination among grassroots organisations, the state, and FOVIDA was adequate in general terms. In these processes, NGOs played a intermediary role between the state and grassroots organisations; and
- The local population showed a collaborative and co-operative attitude, despite the weakness of the external agents linked to the project. This is mainly due to the centralist and normative character of the planning processes in the public health sector, and to the precarious channels of communication between the social actors, explained in turn by the unequal availability of information and resources, among other factors.

### Economic component

- 51 loans were approved and granted, 39 for works, 4 for investment capital for micro-enterprises, and one for complete studies of water and sewage connection. The loans were mainly addressed to the construction of water tanks, the type of work most demanded by the households;
- A total amount of 16,350.64 soles was paid out, more than was initially available. This additional expenditure allowed 64 more water tanks to be built;
- The fund rotated only 1,23 times in nearly two years of operation, rather than 1,5 times per year as was foreseen;
- The average rate of late payment over the 1993-1994 period was 55.6%, with substantial differences recorded according to the type of loans. The relationship between the amount of monthly payment and the consumption capacity of a household (610 to 654 new soles per capita annually) plays a role in these results;
- The recovery of the loans was difficult, because the group co-ordinator had too many responsibilities without any remuneration, and he performed the double role of debtor and collector. Furthermore, the monitoring system of the project was weak;
- The coercive measures foreseen in the project did not work. The measures that had good results were the reprogramming of loans and the follow-up of loans and charges;
- The total costs of construction were 460 new soles, of which 55% correspond to direct costs, 28% to indirect costs and 17% to financial costs. In addition to the direct subsidy granted to the works, there were also some other hidden subsidies which were clarified during the analysis;
- According to the criteria of indirect costs or financial costs, the percentage of subsidy to the loan granted to each household was 70% and 105% respectively;

- Taking into account the opportunity cost of the initial capital of the fund had the money been placed in a bank for a period of 21 months and monthly interest rates of 2.69% in 1993 and 1.66% 1994 been paid, the available capital would have increased to 55,146 new soles, 18% more than what was actually obtained. Moreover, in the case of the project, the social costs of the training acquired by the residents, grassroots organisations and FOVIDA would have to be subtracted;
- The so-called direct subsidies to the works were not homogeneous but mainly the result of the methodology to establish the value of the loan. The "umbilical" relationship established between the fund, solidarity groups and micro-enterprises, leaving aside market relations, also played a role; and
- There were efficient elements in the management of the rotating fund, however. For instance, the conditions of the loan allowed the households in poverty and extreme poverty to have access to better sanitation conditions. This generated a sense of responsibility among the participants rather than the passive attitude of recipients of a donation. Furthermore, the participation of some neighbourhood leaders in the promotion and organisation of solidarity groups contributed to higher levels of loan recovery.

### **Project efficacy**

- The construction of water tanks had an impact on the monthly water budget. The expenditures of the households which participated in the project decreased by 17 soles per month or 17% of their income. Despite the small amount, the effects are relevant taking into consideration the meagre income of these households;
- No difference in knowledge about basic sanitation was found to exist between participant and non-participant households;
- There exists a negative association in the frequency of cleaning water containers; non-participant households clean their containers more frequently. This is explained by the smaller number and dimensions of the water tanks in comparison to the other types of containers used. However, participant households use chlorine bleach, the preferred product for the cleaning process, more frequently than non-participant households;
- Moreover, there exists a positive association among the participant households regarding the attitude towards water chlorination. This can be taken as a valuable indicator to try out other alternatives to basic sanitation problems;
- Water contamination in containers is practically the same in both groups. This verifies the assumption that in these areas the main problem concerning water contamination is water distribution by trucks and the economic constraints to obtaining chlorination products; and
- No significant associations were observed in relation to the elimination of excreta or with respect to gender for both household groups, except in the case of women's basic education in the participant households.

## 5 Recommendations

This experience indicates the importance of the role of health services in gathering and organising the participation of the different actors for local activities in environmental health promotion. For concerted work, it is necessary:

- To design "Operative Plans for Intervention" and "Work Manuals" defining objectives and goals of combined activities, as well as the functions and responsibilities of each of the involved agents;
- To organise a work team taking into consideration the possibilities and limitations of the participants' intervention regarding time-schedules, travel allowances, work materials, etc. This should contribute to decreasing the tensions inherent in negotiations, where conflicts of interest can be produced in the decision-making process;
- To involve the highest levels of management of each participant institution, in that they should know and approve the work plans and allocate the necessary resources;
- To define a co-ordination framework for the rotating fund which would avoid the authoritarian and vertical attitudes of the ones who have more resources; and
- To edit a bulletin to inform the grassroots about the proposals and advancement of the concerted work and to channel the participation of the population (opinions, suggestions, disagreements). In the medium term, this will contribute to gaining the trust of the population and to motivating it towards more active participation.

At the level of training and sanitation promotion strategies, it is recommended:

- To focus training in settlements with high sanitation risks;
- To develop training materials that respond to the socio-cultural characteristics of the households (education level, sanitary habits, perception of the sanitary measures, economic resources, etc.);
- To overcome the heterogeneity of health promoters, regarding age, household composition, origin, education level, experience and knowledge of health promotion. It is recommended to carry out studies that could give a better perspective of the personal dimension of health promoters and to formulate a training strategy according to levels of experience and knowledge;
- To implement sanitary activities with simple technologies of easy replicability and low cost, such as the use of instruments to measure residual chlorine and the dissemination of information brochures (with, for example, an explanation of water disinfecting techniques), as well as implementing observation and drinking water disinfecting activities;
- To generate a socio-sanitary information system that could serve to help warn involved institutions about the conditions of provision and storage of water. FOVIDA has a methodology for socio-sanitary diagnosis and data registers that can be used for this end; and
- To persuade the state to recognise the labour of the health promoters. At a formal level, they should be registered and provided with credentials; at the operational level, basic incentives should be provided (e.g., travel allowances, training and implementation courses, among others). Furthermore, their work should be supervised, and the development of environmental health programmes should be monitored.



At the level of the rotating credit fund, it is recommended:

- To have a subsidy policy targeting population groups with high sanitary risks. They should also receive information about and orientation training in basic sanitation;
- To address the subsidies to an entire population group (settlements, committees or sectors), making categories according to housing conditions (building material, number of rooms, absence of basic services), topographic conditions where the neighbourhood is located (because the cost of the installation of services varies accordingly), accessibility to roads, capacity of the community to guarantee the responsible participation of the population, and the type of economic activity of households (income, stability);
- To target credit interventions at diverse segments of the population, according to their income, in order to involve groups with higher capacity to repay their loans and to achieve more adequate levels of money recovery; and
- To enable the users of the credits to make decisions regarding the hiring of local bricklayers who offer quality products at reasonable prices.

## Appendix 1: International experiences in credit management for sanitation

In the 1970s, Honduras and the Dominican Republic carried out projects, funded by their respective governments and the Interamerican Development Bank, for financial systems for domiciliary connections making use of rotating funds (OPS, 1977). The proposed characteristics of the funds were that:

- The monthly payment should be the smallest possible, which means loan recovery over the long term as much as the institutional financial capacity allows;
- The integrity of the fund should be maintained in the event of a possible currency devaluation and rising inflation;
- The fund should constitute a direct financing vehicle for sanitation works rather than an indirect means;
- Administration costs of fund management should be considered; and
- The amount of the fund should be determined and its operation started with the allocation of the resource, then "feeding" it back to the fund with the refund of the unpaid accounts.

According to Hardoy and Satterthwaite (1992), a good alternative in case of poverty is to make the credit directly accessible to communal organisations and their members, without the intervention of public entities, which are generally inefficient.

They assert that poor communities are a minor risk for many governments and private banks if the initial allocations of the loans are granted under conditions of administrative and technical support. Very poor persons would have to be subsidised.

Many poor have shown initiative and willingness to face their shortages, individually or collectively, as witnessed by many experiences in Africa, Asia and Latin America. These experiences present common aspects: they are oriented to satisfy the needs of poor groups; they are co-ordinated and managed by non-profit institutions; they have a modern and flexible administration; the interest and monthly payments of the loans are related to the salaries or minimal income of the residents; and the scale of credit operations ensures their longevity.

An objective of these credit programs is to promote within low-income groups a sense of financial responsibility regarding the loans by organising small solidarity groups and using the security of these organised groups.

There has been a variety of credit programmes and projects. They have been organised to acquire land, to provide drinking water, sewage and surface drainage networks, to establish a building materials bank, etc.

## Reflections on the financial system of the projects

A lot has been written and discussed about the level of subsidies that the projects for production and maintenance of the habitat of low-income sectors should provide. On the one hand, it is stated that these projects should contribute to a redistribution of resources towards the poor. On the other hand, it is emphasised that the capacity of some beneficiary groups to provide their own resources promotes a higher level of involvement, which increases the sustainability of the projects by promoting the recovery of part of the external investment (Bombarolo, 1992).

This discussion has been useful to evaluate the worth of granting credit to beneficiaries as an adequate instrument for project finance, and some innovative aspects in this sense are:

- The use of solidarity guarantees within the group by persons seeking loans;
- The use of flexible instruments such as rotating funds in which the participants pay an agreed amount to a fund from which more loans are later granted;
- The search for ways to lower operation costs;
- The need to adjust the type of project to the possibilities and needs of each community or organised group; and
- The determination that small-scale can be the key to the success of a credit programme.

## Appendix 2: Sampling plan

The sampling plan of the study was comprised of the following steps:

### 1. Construction of the population frame

The complete registration and address of each participant household was acquired, and the total number of non-participant households in each settlement was determined.

### 2. Proceedings

The sample was probabilistic and multi-staged; the selection was random and systematic. The calculation of the necessary estimation was done with the Statcalc package of the EPI-INFO computer programme, Version 5, of the Centre for Disease Control in Atlanta, USA.

### 3. Determination of non-sampling errors

The main errors are the lack of coverage of all selected households and errors in the formulation of questions or in data processing. The original sample had an additional margin of 10%, taking into account the households which would not collaborate with the survey. To decrease the errors in questions and answers, a pilot survey was conducted, and training of the surveyors was carried out. The coding and processing of data were improved with the results of the pilot survey.

### 4. Measurement of the estimated level of precision

The estimated margin of error of the survey was  $\pm 5\%$ , and the level of validity 95%. The expectation of frequency (variance) for participant and non-participant households was 20%. These last data were obtained from the average results regarding the low or null presence of residual chlorine in households of the area in previous activities.