

# **IHS Project Paper Series**

**Project Paper No. UEM 3  
Defence and Conservation of the Natural  
Swamp Area Pantanos de Villa, Lima**

**Arnold Millet Luna, Eduardo Calvo, Elsie  
Guerrero Bedoya and Manual Glave,  
Serpar, Peru**

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- UEM 3. *'Defence and Conservation of the Natural Swamp Area Pantanos de Villa, Lima'* by Arnold Millet Luna, Eduardo Calvo, Elsie Guerrero Bedoya and Manuel Glave; Serpar, Peru; 1997
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*David J. Edelman Editor*  
*Ed Frank, Project Manager*



**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

**Institute for Housing and Urban Development Studies**

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: Experiencias exitosas y propuestas para la acción*, 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

**Defence and Conservation of the Natural  
Swamp Area Pantanos de Villa, Lima**

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## Acknowledgements

The present paper describes an experience called "Conservation of the Natural Swamp Area of Pantanos de Villa," located in Lima, the capital of Peru. The experience consists of the management of a natural ecosystem situated in the interior of a metropolis, and in whose immediate surroundings conditions of critical poverty are found.

The Nature Area is one of the few areas of wildlife which exist in the city of Lima, and it is the most important. The area is an ecosystem with representative samples of local flora and fauna and is one of the seasonal residences of the hemisphere's migratory birds.

In addition, it possesses great natural and cultural value, not only for Lima, but also for other similar zones linked as a network for the hemispheric flow of birds. Its destruction would mean the loss of a recreation area and an important source of environmental education for the inhabitants of Lima. For scientists, moreover, this would mean the disappearance of a research laboratory of natural ecosystems. Such a loss would also affect the present bio-diversity, eliminating some species of birds, because they would lose a natural habitat to which they migrate periodically.

The analysis undertaken in this paper emphasises actions taken between the beginning of 1994 and the end of 1995 as a result of the consultative work of a group of institutions led by the Park Service of the Municipality of Metropolitan Lima (SERPAR Lima). During this period, the destruction of this natural area was finally reversed.

This paper first describes the situation found in the Nature Area at the beginning of the intervention of SERPAR and then sets the institutional and social context. The actions which led to the intervention are also outlined. The rest of the paper then demonstrates and analyses the experience and the internal and external factors which led to it, as well as the difficulties found, so that they can be considered by those who are facing similar problems.

The authors thank the general management and the Administrative Council of the Parks Service of Lima (SERPAR, Lima), the Institute for the Development of Local Democracy (IPADEL), the Centre of Integrated Studies (PROA), the Institute for Housing and Urban Development Studies (IHS) and the Dutch Embassy for the support, sponsorship and guidance given to the development of this research.



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# 1 Background

## 1.1 Characteristics and significance of the Nature Area

The Nature Area Pantanos de Villa gives shelter to more than 550 biological species and is a transitory home for migratory birds of the Neartic, the Amazone and the Alto Andina Lagoons. It is one of the areas with the greatest variety of flowers on the Central Coast of Peru. Its area of 396 hectares has enormous potential for the cultural, social and economic benefit of the population of Metropolitan Lima, a city which exhibits one of the lowest rates of green areas per capita in Latin America (1.9 m<sup>2</sup> per inhabitant).

This area consists of a group of lagoons formed by the hydro outcrop of the Rimac, the principal river of the city, forming a system of bodies of water and a community of water and land plants, in the presence of a unique number of species of fauna. In addition to migratory and resident birds, fish and invertebrates are also found. The Nature Area represents a sampling of the natural richness of Peru, which is recognised as one of the twelve countries of greatest bio-diversity on the planet, due to the great variety of natural ecosystems and animal and plant species which co-exist on its territory.

Situated at 12 degrees South Latitude and 77 degrees East Longitude, Patanos de Villa is found in a coastal zone in the delta of the River Rimac, near the Pacific Ocean, and it is surrounded by medium and high hills.

Under the law, it is considered a Protected Nature Area by the State; that is, it is protected by the State for research and protection purposes, as well as for the controlled management of its ecosystems. In the whole country, 46 Nature Areas of this kind have been recognised, and they occupy one tenth of the natural territory of Peru. However, because of the limited financial resources assigned to their management, the areas are not properly cared for and suffer from the processes of deterioration and destruction of their valuable resources.

Before the intervention reviewed here was undertaken, the Nature Area Pantanos de Villa found itself precisely in this situation. Its degradation had been gradual but constant, due to, among other factors, an absence of authority and a lack of environmental planning programs for the territory, as well as to an insufficient appraisal of its resources.

## **1.2 The urban context: social, environmental and management problems**

The urban context of the Nature Area is the city of Lima, which has more than 6 million inhabitants, and Patanos de Villa exists in its inner part.

Over the last five decades, Lima has experienced accelerated and chaotic urbanisation, guided by planning programmes not much related to the preservation of the environment, and its increasing population at the periphery faces critical environmental and poverty problems. Agricultural areas formerly utilised in food production for the city have been urbanised, and industrial activities have been located without thought being given to atmospheric contamination of residential areas located close by.

The annual population growth rate of Lima is 150,000 inhabitants. Three and a half million of its residents live in extreme poverty; 2 million are unserved by public waste collection, and 18% have no water services; the rivers are very seriously contaminated, as are the Pacific coast and the atmosphere. These factors, amongst others, also have a negative impact on the local economy. In 1993, for example, more than 900,000 cases of transmittable illnesses of environmental origin were registered. Moreover, in 1991, a cholera epidemic produced 2,300 deaths in Lima and more than one billion dollars in economic losses.

The city is administered by the Municipality of Metropolitan Lima and 43 district municipalities, which do not have integrated planning and urban control systems. Different institutions of the central government also have competence in its administration (water services, electricity, education, health, recreation, protection of the environment and of natural resources, the recognition of human settlements, etc.). This interferes with the administration and management of the metropolitan municipality, which has overlapping responsibilities with these institutions regarding the provision of various services. This often produces an 'action vacuum' or an unproductive duplication of efforts.

### **The District of Chorrillos**

The Nature Area is situated the Lima district of Chorrillos. It has 217,000 inhabitants and 40,213 houses, and it is characterised by having very distinct sub-areas. These include the consolidated antique urban casque, human settlements of extreme poverty, residential sectors and small agricultural areas. The Nature Area occupies ten percent of its territory. In the last 13 years, its population has increased by 50% in spite of the fact that its rate of increase has declined in comparison to previous decades. Fifty-four percent of its inhabitants live in marginal conditions of poverty, while 40% of the houses lack sewerage. These houses surround the Nature Area.

Moreover, as the district and provincial municipalities did not and do not have any programme of environmental planning, authorisations for the establishment of diverse economic activities (industrial, commercial or service) on the periphery of the Nature Area were granted without evaluating the potential damage that they might cause.

### **The immediate urban surroundings of the Nature Area**

On the border of the Nature Area, there are 13 settlements with 2,500 inhabitants. Some of these have high income residents and others have those of very low income. The Nature Area is the borderline between the two types of communities.

The majority of both settlements and population in poverty are found to the west of the Nature Area. Because of the lack of sewerage, the people use non-hygienic latrines, with the potential risk of contamination of subterranean run-off towards the natural area. To wash themselves and for the washing of clothes, they use the water from the small "lagoons" caused by subterranean waters; this water afterwards flows towards the natural area. In addition, they use wash powder that is not biodegradable.

Sixty percent of these settlements have been created through invasions since 1967, and the majority of their inhabitants do not have legal title to the land. As a result, the communities lack drinking water, roads and equipment.



## 2 The Experience

### 2.1 The challenges

By the beginning of 1990, the situation of the Nature Area had become critical, and this is summarised in this section of the paper.

- The first important point concerns the **territorial reduction of Pantanos de Villa and the resulting serious threats to its ecosystem**. The territory of the Nature Area was reduced to a fifth of its original size (from 2,000 to 396 hectares) by the accelerated and chaotic process of urbanisation surrounding and impinging upon it. The closeness of urban development characterised by a deficiency of water and sewage services, the irrational extraction of resources from the natural ecosystem and the disposing of waste inside it led to the contamination of its water and over-exploitation of the aquifer.
- The second problem is **the absence of scientific management of Patanos de Villa's natural resources**. This is a consequence of no technical and scientific studies having been done which would identify the type, rate of incidence and effects of the urban processes on the ecosystem.
- **Institutional conflicts related to its management** are also a difficulty. While various public institutions have tried to protect this area, their actions were isolated and haphazard, and there were, consequently, frequent conflicts and confrontations between them about the management of the Nature Area. Those institutions included:
  - **The Municipality of Metropolitan Lima**, as the owner of the territory and the governing entity of the city in which it is located and to which the protection and preservation of the natural resources within its boundaries are its responsibilities;
  - **The District Municipality of Chorrillos**, because the natural area is situated within its immediate jurisdiction.
  - **The Agricultural Ministry**, which has competence regarding the protection of the Nature Areas protected by the State.
  - **The Ministry of Defence**, to which its protection has been entrusted since 1990 by the Central Government.
- **Poor appraisal and the absence of participation** has also played a role in the difficulties faced by Patanos de Villa. Prior to the project which this paper describes, neither the metropolitan nor the district population knew enough about the importance of the Natural Area and its deteriorating state, and while the neighbouring communities of Chorrillos undertook some interesting initiatives for their own protection, these did not last long and had only a limited impact.

At the end of the 80s, due to an initiative of some municipal authorities supported by neighbouring settlements, the "Patronage for the Defence of the Nature Area" was formed. It was a co-operative effort of a number of institutions, and it carried out public information campaigns. The intention was to stimulate the interest of citizens and institutions in the Nature Area. Unfortunately, the municipality withdrew its management support, and the Patronage began to reduce its activities and eventually lost the necessary impulse for gaining its objectives.

The organisations of the district population are numerous and diverse. In the middle class suburbs, they are of the neighbourhood type; they are more differentiated in the poorer settlements (e.g., zonal organisations, women's organisations, cultural organisations, sports organisations, etc.). There have been some isolated initiatives that tried to make the population conscious of the problems of the Nature Area. However, they were exceptions and did not have any contact with the institutions that were active in the Nature Area.

## 2.2 Phases

The experience was promoted and led by the Parks Service of the Municipality of Metropolitan Lima (SERPAR), which is in charge of the administration of the metropolitan parks of the city. The experiment was developed in two phases:

**1st Phase (1990-93).** The definition of a political will to preserve the Nature Area; it started when the Municipality of Lima declared the area a "Metropolitan Ecological Area," and when it is assigned an important role in the Metropolitan Development Plan 1990-2010 to the recreation of the inhabitants of the whole city, with emphasis on environmental education.

The SERPAR then took physical possession of its territory, undertakes judicial actions against illegitimate occupants, and began studies about its situation and importance. As it did not legal authority, it was only in charge of administrative and detached field personnel (5 persons). The legal defence actions were directly assumed by the General Management with the assistance of professionals of the Municipality of Lima and of NGOs.

As a result of the studies carried out and because of the continuing deterioration of the Nature Area, SERPAR created a special organ for promoting its preservation and development, which marked the beginning of the second phase.

**2nd Phase:** the initial labour continued, and the process of Environmental Management of the Natural Area began. This phase was led by the "Special Programme Great Metropolitan Nature Park Pantanos de Villa", created by SERPAR in December, 1993. The Programme is in charge of a General Co-ordinator, under whom the administrative and field personnel, as well as the guardianship fall (5 persons), and who is assigned by SERPAR to the Nature Area. With respect to accounting, administrative and legal aspects, the Nature Area receives support from the other areas of SERPAR, which also provide it with the necessary economic resources in order to solidify the Annual Work Plan.

## 2.3 Action fields and principal actions

In order to fulfil its objectives, the Programme defined and participated in three “action fields”: institutional strengthening; management and preservation of the natural resources of the Natural Area; and control of the urban processes in its surroundings which produce alterations in its ecosystem and affect its territory.

**Institutional aspects:** In the face of the institutional conflicts and the dispersion of actions, a consultation process among the institutions involved with the Nature Area, was promoted and co-ordinated in order to organise joint efforts for the area’s physical protection and control.

**Technical-scientific management of the natural area:** This refers to the planning and execution of a series of activities with the help of specialised institutions-

- Activities related to the collecting and systematising of information. Here, a variety of technical documents are reviewed and systematised, the majority of them research theses of the last forty years, using issues related to biology and conservation.
- Activities related to the definition of a model of a natural ecosystem. Studies, evaluations and scientific investigations are carried out with the purpose of understanding a model of the functioning of the ecosystem. This is indispensable for the orientation of the appropriate management of the natural area and for the control of the negative effects of the urban surroundings.
- With regard to knowledge of the physical-chemical conditions of the aquatic environments. As the hydro resource is fundamental for the wildlife of the area, it is important to determine the degree of variability of the physical environmental conditions as a mechanism of control of the processes and ecological successions which they develop; therefore this aspect was also studied and evaluated.
- Hydro-meteorological monitoring. In May 1994, the evaluation of the water and climate of the natural area began with the installation of a network of 10 limnometrical stations, in order to gather data on the variation of the levels, volumes and quality of its waters. An ordinary meteorological and climatological station (CO) was installed, which provides information about the temperature of the water and air, the relative humidity, evaporation, precipitation and winds. The network of hydrological stations and the meteorological station continue to operate normally and generate daily information. In the near future they will be equipped with register sets, which will enable permanent monitoring of the hydro-meteorological conditions of Pantanos de Villa.
- Infrastructure for environmental management. A File of Hydro-meteorological Information has been created, which is essential for the evaluation of hydro and biological resources of the Nature Area and a keystone for guaranteeing its continued existence. A hydro-meteorological station was also installed, and the Museum of Site/Interpretation Centre was built.

**Promote the appraisal of the population and its participation:** A permanent relationship was established with the mass media; invitations were sent out and events were put on; and these efforts were co-ordinated with institutions that had already worked on these aspects.

In the beginning, a neighbourhood representative of the Patronage of Defence of the Pantanos de Villa was incorporated in the consultation process with the public institutions, and his performance was characterised by sporadic, alert activities with journalistic repercussions, trying to mobilise mass media, when confronted with destructive acts in the area. During 1994, he found himself in a political confrontation with some public officials of the Municipality of Chorrillos, after which his participation was weakened and debilitated by false denunciations. Various members of the Patronage of Defence have leadership and political experience in which actions of confrontation dominate. Thus, effects of his participation in the Programme were not perceived well in the base organisations.

In 1995, in order to promote representative participation of neighbours, it was decided to direct promotional activities directly at the population situated in the immediate surroundings of the Nature Area, as well as at the district centralising organisation. After various promotional actions under the direction of field personnel of the natural area, they were called together for an event designated to disseminate studies which were being conducted on the Nature Area and to prompt their participation.

The institutions with which they were consulting, and all the neighbourhood organisations of the surroundings, attended. They agreed to create a preparatory commission which would promote the establishment of a local support committee to the Programme.

In order to improve the living conditions of the marginal population of the surroundings, feasibility and financial management studies for the construction of community laundries are being carried out.



### **3 Achievements and Impact of the Experience**

#### **3.1 Achievements**

##### **3.1.1 With regard to the administrative/political aspect**

Through a special organ, the collaboration of institutions which previously supervised, in a dispersed way, the Nature Area, or which were opposed to SERPAR in the administration of the Nature Area, was obtained.

##### **The multisectoral co-ordinator Pantanos de Villa**

This is an instance of consultation, integrated by public institutions with competence in the Nature Area, in which the alleviation of the previous conflicts and the implementation of joint action is sought.

##### **Instance of multisectoral co-ordination for the defence and preservation of the Nature Area's Institutional Competence**

A number of organisations have reached agreement in the preservation of the Nature Area in a "Coordinadora." These include:

- Municipality of Metropolitan Lima - Metro Lima is the owner of the Nature Area. The legal entity (SERPAR) has competence. There is agreement of the Metropolitan Council to administer the area, which lies within the jurisdiction of the District Municipality; that is, the Nature Area is situated in the territory of Chorrillos.
- Ministry of Defence (COINDE) - In 1990, the central government put it in charge of the preservation of the Nature Area.
- Ministry of Agriculture - In general, this ministry (IRENA) has national responsibility to develop norms, administer, and preserve all nature areas protected by the State.
- Ecological Police - Incorporated in 1995, this institution has the national responsibility for defence of the environment and of nature areas (incorporated in 1995). With its creation, it was possible to decrease the disagreements which impeded an effective job with respect to the natural area by defining the specific action fields for each situation, and establishing a common Agenda, principally orientated to attain the physical preservation of the natural area and to realise activities of urban control.

As a consequence of the creation of multisectoral co-ordination, a positive change of attitude and the extension of institutional responsibilities has occurred. Thus, the Municipality of Chorrillos modified its previous erratic policy about the Nature Area. For example, it annulled licences which permitted the discarding of rock in the Nature Area; and starting in 1995, it assumed normative responsibility and the urban control which corresponds to it. The rest of the institutions strengthened their functions of preservation or control.

However, this process was not without obstacles. There was, for instance, the difficulty of establishing regular and organic relationships, and the Common Agenda of the Coordinadora could only be agreed upon a year after its creation in 1995. The periodic meetings were also interrupted because of a change in political authority, which produced changes in personnel. Notwithstanding, its successors have not modified the adopted policy, and the co-ordination continues. Nevertheless, the commitments and actions of the institutions have not always been at the same level. This is expressed in the evaluation of the Annual Work Plan of the Coordinadora.

The Coordinadora was, in any case, able to develop other levels of environmental management (e.g., scientific research, environmental monitoring, approximating the population, etc.) through utilising the significant resources contributed and sharing responsibilities in the preservation of the Nature Area.

### **3.1.2 With regard to the technical and scientific management of the ecosystem**

A scientific management group was created to preserve and manage the natural resources of the Nature Area. It addresses a number of aspects:

#### *Scientific knowledge of the natural area*

The experience improved in an important way the level of scientific knowledge. Among the investigators, the general opinion is that the interdisciplinary integration of the various branches of biology with regard to the characteristic taxonomy groups of the Nature Area was successfully managed.

The technical management of the natural area was accomplished through the monitoring of the hydro-meteorological factors, a periodic census, the systematisation of the resources of vascular flora and the evaluation of the general conditions of the water quality of the surfaces. Thanks to all this, the inventory of ictiological resources was actualised, a plan to recolonise it with native species was formulated, and the publication of the results of the systematisation of the flora resources was monitored.

The management actions of the natural resources have had as a corollary the realisation of a workshop with the participation of 16 specialists in diverse thematic areas

#### *Monitoring and scientific evaluation*

Monitoring and scientific evaluation have made it possible to indicate guidelines for the environmental management of the Nature Area, with regard to the following aspects:

- The data bases of the hydro-meteorological file. This allowed the monitoring and management of the quality and the amplitude of the water components, indicating in a timely fashion the hydraulic control mechanisms, the cleaning of the canals and the hydro management by means of sluice gates. This guarantees the preservation of the hydromorphic conditions, support of ecological activities and processes, as well as the protection of areas of nesting, reproduction and nutrition.

- The analysis of the composition of the flora has led to a division in zones of the botanical formations in order to orientate the use capacity and the development of excursions, as well as the elaboration of basic features for the management of cattail. The creation of a data bank with the taxonomic identification and bio-ecological characteristics of the species in the area helped to orientate the land use, the intangibility of areas, cleaning actions and physical protection, in order to tend to the conservation of the more than 500 distinctive biological species. This helped avoid further degradation of the environmental factors of the resources.

### **3.1.3 With regard to the urban processes which affect the ecosystem of the natural area**

The control of urban processes which affect the physical integrity of the natural area and lead to the deterioration of its ecosystem is advancing in a number of ways:

#### *Regarding the physical protection of the Nature Area*

- The territorial integrity of the Nature Area was preserved. Fourteen hectares were legitimately recovered and it is expected that an additional 70 hectares will be recovered with the evident presence of wildlife as a result of the joint work of NGOs, in which the Peruvian Society of Environmental Law (Sociedad Peruana de Derecho Ambiental), and legal assistance of SERPAR (in the 1st Phase) have been prominent. Furthermore, the physical protection of the Nature Area was consolidated.

#### *Regarding the irrational mode of using urban space and the incompatibility of land uses*

- Environmental impact studies are required as a prerequisite for the authorisation of economic activities in the surroundings of the Nature Area. The district municipality has also initiated the evaluation of the establishments which already exist in the zone, using this criterion, and is studying the annulment of the authorisation of those enterprises which potentially could be dangerous for the Nature Area. For this task, it receives technical assistance from the representative of the Ministry of Agriculture.

#### *With regard to urban control*

A 24 hour a day system of physical protection for the Nature Area was created consisting of four Ecological Policemen, with the logistical support of the police command and of special operatives, who have practically eliminated criminal acts. The Ecological Police Force will be extended to 20 men and given control and sanction capacity. The industrial, commercial, and service enterprises with activities that could be damaging for their surroundings are also inspected (These inspections are in charge of the representative of the Ministry of Agriculture). Furthermore, the first steps have been taken with regard to overcoming the socio-sanitary deficiencies of the population.

## **3.2 Impact**

### **3.2.1 On the sanitary conditions of the marginal population**

A hundred families will improve their sanitary conditions. Two community laundries with sewage treatment will be constructed in two settlements. This will benefit the Nature Area, because the families who do not have these services contaminate the water of the Nature Area where they wash their clothes. The quantity of resources obtained with the laundries is one of the most significant of the experiment.

### **3.2.2 With regard to knowledge about the natural area and its appraisal by the population**

The previous situation of indifference and lack of knowledge is beginning to change; the great majority of the inhabitants of the district know and value the Nature Area as an ecological tourist or cultural zone. Also many of them perceive the problems the area faces, and they know some of the institutions which participate in co-ordinating its preservation.

The appraisal of the Nature Area's value by the population is also reflected in the increase of individual and institutional visitors in recent years. The increased interest of students, who represent more than two thirds of visitors is notable, as is their collective interest in its defence. More than 4000 students from 36 educational centres of the various districts of Lima have signed an open letter to the authorities. Its text says, " We have verified that there is progress in the preservation of the Pantanos de Villa, and we therefore congratulate the respective institutions. We also urge you to take direct actions and realise the necessary co-ordination which is still lacking." (Activity organised by the NGOs TERRA NUOVA and CIDAP).

### **3.2.3 With regard to the participation of the population**

The preparatory commission of the Support Committee for the Natural Area, integrated by institutions and leaders of neighbourhood organisations, was created; and the majority of members are leaders, that is, representatives of stable, constituted organisations of inhabitants, and active in the surroundings of the Nature Area. Many of them have a background of concern for its preservation as well as of participation in concrete activities. They have agreed that the Support Committee will have the following characteristics:

**Type of organisation** - It is a non-profit institution and representing the inhabitants of the mentioned area and NGOs with demonstrated positive activities in the surroundings.

**Aims** - It promotes the legal and physical protection of the Nature Area, the territorial integrity of its nucleus, the solution of the problems of titles to property, the physical-legal problems, as well as the sanitation problems of the area surrounding the Nature Area. Furthermore, it helps enable the natural and recreational surroundings of the Nature Area to be of benefit to the city as well as to its direct neighbours. This Support Committee has motivated the majority of the organisations of the two socio-economic sectors which border the Nature Area. In this way joint efforts of the different social sectors interested in the preservation of the Nature Area have been organised.

The Support Committee meets periodically in the Interpretation Centre (Centro de Interpretacion) of the Nature Area. Here, the correlation between basic, unsatisfied necessities and type of participation can be observed; that is, the representatives of the marginal organisations of the district and of the surroundings are in the majority.

The objectives of the Support Committee reflect the relationship between the necessity to improve the living conditions of the people in the area and the protection of the Nature Area, as well as the principal objectives of the community organisations; i.e., to obtain titles to property and to receive basic services. That is to say, a principal motivation for supporting this experience is the perspective that, as a result of the actions to preserve the natural area, their basic demands will be attended to, and with this their districts and surroundings will be revalued and improved.

#### **3.2.4 With regard to the strengthening of the programme and the outlook for of the experience**

As a result of the progress in the preservation of the Nature Area and the performance of its consultative leadership, the programme has proved to be a legitimate and responsible entity of the Nature Area. It is recognised as such by the rest of the members of the Coordinadora, by other public institutions, and by the mass media. It also has acquired tools for the improvement of its planning capacity and technical scientific management (studies, research and data banks) obtained principally through the consultation process. Its field personnel have been trained in the management of the hydro-meteorological station, and their ranks strengthened with the addition of three guides for visitors.

Basic infrastructure has also been improved. Previously, the Nature Area did not have any infrastructure which could facilitate the development of cultural, scientific and administrative activities. Now it has an Interpretation Centre (Centro de Interpretacion) with audio-visual equipment, whose services are offered to the people. It also has a climatological and meteorological station, and the paths and circuits for the interpretation and visits to the Nature Area have been determined.

The foundations for the continuity of the experience have, therefore, been put into place. The progress in scientific knowledge of its ecosystem will allow the Nature Area to be declared a special category of Nature Area Protected by the State. In this way, it will be assigned a modality of permanent management, and it will be recognised as such, which will give major legal support to the actions for its preservation.



## **4 The Internal and External Factors which Contributed to the Success of the Experience**

The four key interrelated factors which have contributed to the success of the experience are: the existence of an institutional base; the presence of a shared objective and a guiding strategy; the promotion of institutional consultation, and the achievement of a permanent information exchange and communication.

### **4.1 An institutional base**

The experience reviewed in this paper could get started because the Municipality of Metropolitan Lima, with the Law of Municipalities as a legal framework, had the political will to preserve the Nature Area and, through SERPAR, created a specific organ to which it provided resources to achieve this: the Special Programme for the Great Natural Park "Pantanos de Villa".

This meant the presence of an own administrative instance, which had the capacity to undertake initiatives, and which was totally dedicated to acting to solve its diverse problems in order to preserve the Nature Area.

### **4.2 A shared objective and a guiding-strategy**

Success was also possible because the programme followed the conceptual and methodological framework of environmental management from the beginning. That is to say, it was understood that the preservation of a Nature Area near a city aids, not only the management of its natural resources, but at the same time promotes the improvement of the living conditions of the population in the surroundings, when undertaken within a framework of institutional consultation. Therefore, a strategy was developed, which included the maintenance of the ecological processes and support of bio-diversity by means of research, monitoring and permanent evaluation, by strengthening institutions, through the maximisation of authority, and by developing the perception and increasing the participation of the local population in order to develop concrete projects which would improve the basic living conditions and impact positively on the preservation.

Within this global approach, it is necessary to underline the fundamental role which the improvement of the level of scientific knowledge of the ecosystem played in leading to the success of this experience.

On the other hand, one of the most important and difficult aspects to handle was the arrangement of a system of decision making which balances the interests of all the groups involved. Therefore, it was necessary to identify and select the actors for their capacities and evaluate the political moment in which the institutional activities evolved. The solution was sought to integrate the community, the work of the institution in charge of the environmental management of the Nature Area and the necessities of sectoral planning. This led to the creation of two representative entities: the Institutional Co-ordinator (Coordinadora Institucional) and the neighbourhood Support Committee (Comite Vecinal de Apoyo).

### **4.3 Institutional consultation: Prerequisite for environmental management**

Consultation was the fundamental element underlying the achievements of the experience. It operated in several ways: on the multisectoral level; exclusively with government institutions; and with a group of public and private institutions.

- **Multisectoral consultation**

Multisectoral consultation with public institutions which were previously in conflict has been fundamental to the consolidation of the physical protection of the Nature Area. An obvious relationship between the formation of the “Coordinadora,” the development of new institutional attitudes and progress in the protection of the Nature Area has been observed; and the magnitude of the contributed material and human resources of the partners, and the scope and application of its normative and executive functions, were decisive for attaining success.

- **Bilateral consultation with government institutions**

This second type of consultation was carried out in a progressive manner with specific institutions through bilateral agreements. In this way, the necessary support was obtained for the institutional strengthening and scientific management of the Nature Area’s ecosystem, as well as for the progress of community awareness and attention to the basic necessities of the marginal population in the surroundings. The involvement of public as well as private institutions was attained. This consultation has been stable and demonstrates a high level of fulfilling the stipulated agreements. This could be explained by the fact that the participating institutions do not suffer the frequent political-administrative changes that affect the large public entities.

- **Bilateral consultation with other public and private institutions**

The third type of consultation was carried out with a variety of public and private institutions. A number of the most important are listed below with the roles they have played:

- National Hydrological and Meteorological Service (SENHAMI) - provided scientific studies and technical assistance.
- National Museum of Natural History - conducted scientific studies.
- National Technical University - provided technical assistance.
- St. Mark’s University - provided technical assistance.



- Major environmental NGOs - contributed environmental education.
- Private enterprise - offered legal assistance.
- Dutch Technical Co-operation - Helped in improving living conditions of the marginal population surrounding the Nature Area.
- TERRANOVA - helped in education.

Moreover, there were no fields of conflict since these relationships are based on mutual institutional interests and mutually perceived benefits; and they are consolidated through the behaviour and fulfilment of the agreed commitments on both sides.

#### **4.4 Information exchange and communication**

The fourth factor of success for the experience was the favourable context for the exchange of information and communication. First, Peru confirmed the agreements of the Earth Summit (Cumbre de la Tierra) in June 1993, and, second, the environmental NGOs assisted in communication with the press. Months before, and during the course of the experience, the majority of the mass media in Lima informed the public extensively about the institutional conflicts, the invasion, the decline and the importance of the Nature Area. The programme always paid special attention to the press, informing their representatives regularly and facilitating the systematic flow of scientific and institutional information, as well as information about the progress of preservation.

The political will of the Municipality of Lima in initiating the programme, the change of attitude of some institutions in accepting the consultation process, although they were in conflict, and the better appreciation of the inhabitants for the Nature Area, have much to do with the success of the experience; but it also has to be recognised that the enormous and influential interest expressed by youth reflects the results of the promotional work carried out by the environmental NGOs, the labour of their teachers, consultation with private enterprises (1600 pamphlets for young visitors), as well as the policy of SERPAR to give them free entry to the Nature Area.

Thus, the achievements of the experience leading to the progressive change of the situation of the Nature Area are the reflection of the efforts of all the parties in applying the principles and methodology of environmental management.



## **5 Economic Appraisal of the Preservation of the Natural Area**

The preservation, development and protection of nature areas produce monetary and non-monetary benefits which need evaluation. In many cases, economic quantification is not possible, and the evaluation of costs and benefits must be indicated in non-monetary terms, because the issue of concern is examined by indirect methods or by assessments of a social and ecological type.

### **Evaluation of costs: opportunity costs**

A first approximation for the Nature Area consists of the determination of the maximum monetary value that it can support viewed from the perspective of the best alternative to its conservation. Thus, if the Nature Area's 396 hectares are used for urban habitation (thereby neglecting its conservation), its value could be US \$ 600 per m<sup>2</sup>, a value corresponding to the municipal rate for a piece of arable land without infrastructure services and with drainage difficulties. Then it can be calculated that the Nature Area of Pantanos de Villa has an actual net value of US \$ 23,760,000, an estimated price obtained of its habitation for urban objectives, the best alternative use. This assessment constitutes the best indicator assumed as opportunity cost, if the alternative use of conservation and nature area development is discarded.

### **Evaluation of benefits**

In order to distinguish and support the economic assessment of a proposal of preservation and development of a nature area, it is indispensable to evaluate the tangible and intangible benefits which this proposal implies, deducing from these benefits the direct costs of the conservation and development work, and deducing as well the net benefit from a comparative analysis with the opportunity cost as indicated above. The benefits obtained from the conservation and maintenance of the area are estimated here to be US \$ 2,706,450, resulting from the following:

- Revenues of tickets: 19,500 visitors annually multiplied by US \$ 1.1. per person = US \$ 21,450.
- Revenues from the sale of products = US \$ 10,000.
- Indirect benefits of tourism: 250 tourists annually with a stay of approximately 2 days in Lima at a cost of US \$ 70.00 per tourist per day = US \$ 35,000.00.
- Indirect health benefits: The sanitary improvement in water and sewage infrastructure for 22,000 inhabitants, situated in the area of influence west of the Nature Area, can be considered to imply a substantial improvement of health. This can be expressed in the reduction of both working hours lost and in family expenditures resulting from morbidity; totalling a benefit of US \$ 2,390,000. The above mentioned population obtains water from water tanks for a total annual sum of US \$ 250,000, with regard to the actual tariffs of SEDAPAL.

- Indirect benefits in education: Undoubtedly, the maintenance of the natural conditions of the area produces a positive impact on the development of academic and research activities in the natural sciences; likewise, it allows the development of diverse scientific disciplines and the training of professionals, generating indirect benefits to a student and potential university population of 1,700,000 students.
- Benefits in recreation: The beauty of the landscape and the direct contemplation of the wildlife produce satisfaction of an aesthetic kind to the visitor. According to registered data, the annual visits at the time of the writing of this paper in December 1995 have risen to 19,500, which is a 60% increase over those in 1994.
- Benefits in the hemispheric network of migratory birds (existence value): The natural area of Pantanos de Villa is a seasonal residence of important migrations of birds of great displacements, which depend on different aquatic environments along their course from the bio-geographic region Nearctica to the southern part of the American continent, and from the Amazon and High Andines Lagoons. About 80 species of birds of the arctic immigrate towards the south. The destruction of wetlands could eradicate some species. That is, in destroying the Nature Area, the hemispheric network of birds would suffer a reduction of its bio-diversity; and that could damage the tourist possibilities generated by observers of birds from other humid soils, nearby as well as far from the Nature Area Pantanos de Villa.
- Benefits in the ecological processes: The singularity and the interrelation of the present natural processes define the area as a representative sample of bio-diversity, created by a system of interactions between biological organisms from protozoa up to birds with abiotic components, and the interchange of energy. Such a system permits and supports wildlife; it is considered the most important diversity of flora in the whole central and southern coast of Peru. The maintenance of the ecological processes and of the vital cycles of functioning allow the preservation of the area and the possibility of the enjoyment of each one of its natural resources.

### **Analysis of direct costs**

To determine the minimum direct costs for the preservation of the Nature Area, cost/effectiveness analysis is utilised here. Included here are the direct costs used in the experience described in this paper and other costs necessary for the preservation of the natural state of the area.

#### **Yearly expenditure**

Study costs	US \$ 31,000
Expenditure for personnel	US.\$ 30,000
Expenditure for operatives	US \$ 25,000
Equipment	US \$ 2,000

#### **Investment**

Expenditure for infrastructure	US \$ 65,000
Expenditure for basic sanitation in the influence area	US \$ 1,600,000

<b>Total direct costs</b>	<b>US \$ 1,753,000</b>
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### **Analysis of net benefits**

For the calculation of net benefits, considered separately from the conservation and maintenance of the Nature Area, the procedure used is to consider benefits versus costs. According to the above analysis of benefits, monetary benefits equal US \$ 2,706,450, while non-monetary benefits are related to the value of the existence of the Nature Area and its related benefits for education, recreation, the hemispheric network of migratory birds and ecological processes. The present value of the monetary benefits reaches US \$ 15,035,8333.33 (to infinity), assuming a discount rate of 18%.

The present value of the net benefits for the conservation of the Nature Area is the difference between the present value of the total benefits to infinity and present value of the direct costs for preservation of the Nature Area in perpetuity. These equal US \$ 2,153,888.00, assuming a discount rate of 18%. Therefore, the present value of the net benefits will be at least equal, without considering the non-monetary benefits, to US \$ 12,881,944.44 (US \$ 15,035,833.33 minus US \$ 2,153,888.88).

Assuming that the non-monetary benefits of the unique Nature Area to the more than 6,000,000 inhabitants of the city of Lima would be equal to those of the monetary benefits, the total benefits equal US \$ 30,071,666.66.

The present value of the net benefits is then equal to the present value of the total benefits minus the present value of the direct costs, which equals US \$ 27,917,777.80 using the 18% discount rate in relation to the value of the best alternative use; this indicates that the preservation and development of the Nature Area Pantanos de Villa is a real alternative, which produces benefits for the population of the locality and of Metropolitan Lima as a whole.



## 6 Balance

On balance, then, the following points can be made about the experience reported on in this paper:

- It was possible to slow down the accelerated process of destruction of the natural ecosystem and establish the basis for a consultative and technical-scientific environmental management.
- A process of institutional consultation was prompted which could be the beginning of a system of co-management of the Nature Area and which has contributed decisively to two central aspects of its conservation; i.e., the political-administrative and the technical-scientific, the latter being the more developed and consolidated. The principal problems in political-administrative consultation have been the difficulty of maintaining a regular and organic relationship and the inflexibility of the various institutions. This is characteristic of Peruvian public institutions that are affected by permanent political changes and changes of personnel. In addition, both types of consultation require better community participation.
- The development and the application of technical-scientific knowledge has been a fundamental tool to orientate the environmental management of the Nature Area, and this was one of the areas where the most progress was registered.
- While important progress in the control of urban processes which impact negatively on the Nature Area has been made, a more active role of the district municipality in controlling and arranging the economic and neighbourhood activities which take place in the environs of the Nature Area is still required.
- With regard to community participation in the conservation of the Nature Area, the inhabitants are still not participating actively in all phases of the process. While, the inhabitants of the immediate surroundings have started to communicate their needs to the institutions responsible for the preservation, the brevity of the first community representation illustrates the difficulties of a consultation process in which institutions with conflicts to resolve and neighbourhood leaders with limited delegated representation and without consultation experience, participate at the same time. In this regard, a limitation in the process was the absence of personnel specialised in promotion who would possess good information about the neighbourhood dynamics of the district and the zone.
- Although the environmental management of the Nature Area has related the preservation activities to the satisfaction of the basic needs of the inhabitants in the surroundings, this was only an initial action. The commitment of institutions to much larger scale intervention is necessary.
- The economic evaluation of the preservation and development of the Nature Area shows the benefits which it produces for the metropolitan population and for the population of its immediate surroundings.

- The activities which have been undertaken in this preservation experience require further development and consolidation because there are still risks that the process could be halted. Thus the process must be continued through persistence and readjustments where necessary.



## 7 Conclusions and Recommendations

### 7.1 General conclusions

The general conclusions of this study are summarised below:

- The reduction of the original extension of the Nature Area Pantanos de Villa, the accelerated urbanisation of its immediate surrounding and the demographic and institutional information of the district of Chorrillos confirm the intensive pressure which nature areas within urban surroundings have to bear. The basic causes of this situation are accelerated population growth and the absence of environmental planning criteria in urban planning.
- The municipalities, in whose jurisdiction nature areas exist, have a great responsibility. The lack of directives for urban management, such as a development plan and an environmental law, prevent them from guiding the urbanisation practices of the marginal sectors and from slowing down the speculative interests with regard to land use. It also prevents them from foreseeing the negative effects which their authorisations and licenses could have for certain economic activities in the surroundings of the nature areas.
- Other important limitations of the municipalities, principally of the district ones, to assume the administration of the nature areas within their boundaries are the lack of individuals qualified in consultation practices and, fundamentally, the instability and discontinuity of their policies.
- The mere municipal decision to preserve or administer a natural area is not sufficient; the municipality will not be able to do it appropriately if it does not seek co-operation of institutions with technical and scientific resources to formulate a strategy, objectives and consistent conservation plans.
- The experience of the Municipality of Metropolitan Lima in the administration of the Nature Area Pantanos de Villa and the consultation process which was developed show that local resources to initiate relations, which are mutually beneficial among the participant institutions, do exist. This complement of efforts and resources has made possible the development of the capacity for immediate action and produced a municipal strategy for the preservation of the Natural Area.
- The improvement of the living conditions of the marginal population of the surrounding of the nature areas, principally reversing the great deficits of basic services, cannot be attended to in a significant way by the preservation programmes. The solution lies with other organs of the State. Nevertheless, it is possible, with the support of the international technical co-operation, to provide some emergency solutions and contribute to the management of the population in order to get the inadequacies attended to by the State. The local support committees have to prompt the management of the nature areas in this direction.

- If there is no co-management and institutional strengthening, the complex and interactive indicators of the urban model of influence, characterised by processes of contamination, illicit occupation of land, physical insecurity, poor environmental awareness, uncontrolled urban intrusion, a systematic reduction of species, the degradation of the environment and the loss of the nature area's genetic, cultural, economic, social and recreational potential.
- With regard to the natural nucleus, it is demonstrated that the best institutional management is the one that protects the land and the habitats, regulates land use and establishes permissible standards. Likewise, the best co-management between local government, the State and civil society is one that preserves and maintains the ecological cycles and processes by using resources in a rational manner and by maintaining the stock of resources.
- With regard to the urban pressure on the natural environment, the following indicators were identified as causes of the lack of natural sustainability of the area:
  - Pressure on the carrying capacity of the natural ecosystem.
  - Overexploitation of the aquifers of influence with the risk of reduction of the water surfaces and the hydromorphic environments.
  - The reduction or the alteration of populations and the degradation of environmental factors due to zoning, incompatible land use and socio-sanitary deficiencies.
  - The absence of environmental monitoring, with hydro and geo-biological alterations, due to inadequate urban control.

This problem, which has been verified by the experience, can only be counteracted with the help of consultation and inter-institutional co-management between the local government, the State and the organised communities that are affected.

## 7.2 Recommendations

The authors of this paper have arrived at three sets of recommendations: those regarding consultation, those concerned with participation and those related to environmental education. Each of these is presented below.

### Consultation

- The necessity for preservation and appropriate management of the natural areas show clearly the vital importance of initiating and institutionalising the consultation processes.
- The urgency and importance of preserving nature areas has made indispensable an active and protagonist participation of the municipalities as part of a general policy of environmental urban management and which covers all fields of its jurisdiction. Therefore, previous knowledge about the potentiality and the importance of a municipality's natural resources is required, as well as internalisation of the concepts of sustainable development.

- With regard to nature areas, moreover, it is necessary to have information on their scientific and cultural value, to have established legal, institutional and management norms to preserve them, and to work together with local technical and scientific institutions, who could contribute specialised knowledge on planning and integrated environmental management
- The consultation in the management of areas which are facing accelerated processes of degradation and territorial invasion has to be extensive, flexible and continuous; and it has to take place on various levels, i.e., political-legal, technical-scientific, environmental education and community participation, with the aims of sharing information and findings, of improving the commitment of the participant institutions on every level and of promoting the process as a whole. In this process, the capacity for action of the institutions with definite responsibilities for preservation is also strengthened, and the incorporation of environmental considerations into those institutions in which they are absent, is facilitated. Therefore, in the first phase, the design of definite organic structures is not indispensable; these are constructed and defined during the process itself.

## **Participation**

- In order to preserve nature areas surrounded by urban marginal populations, relating the need for conservation to the needs of the population is indispensable. By improving its living conditions and showing the inhabitants the benefits which it will receive by preserving these natural areas, its co-operation is stimulated. The inhabitants not only have to be considered in support of the protection of the nature areas, but also as their beneficiaries.
- It is useful if the institutions in charge prepare a diagnosis of their organisation forms, define policies and methodologies and train their personnel in order to promote their participation in conservation.
- These diagnoses must also include the inclusion of local leaders with initiatives to protect the nature areas and local individuals with greater awareness, who are spread over different socio-economic strata and institutions of the population.
- The organisations of the marginal urban population facilitate its participation in protective actions for the nature areas. However, its great number, variety and differences in interests, as well as the distinctive quality of its leaders, make it necessary to stimulate the participation of the most democratic, dynamic, solid and representative ones. This should include those with a high level of awareness and environmental commitment, and with a capacity to reach and influence a large number of people. Among these, women's organisations stand out.

## **Environmental education**

- The scientific information and the technical studies elaborated by the initial process of conservation, if properly diffused, can also be of great utility in promoting the value of nature resources and raising the consciousness of the population with regard to environmental problems. The mass media play a very important role as well.
- In education programmes, it is necessary to consider the socio-economic situation of the population, its cultural level, its needs, and to reach the population strata with a greater capacity to assume lasting commitments and implement actions with multiplier effects. Women and students can play important roles here.
- In addition, environmental education should be incorporated in a systematic way in the formal educational system. Teachers and students are one of the most sensitive and receptive population groups with regard to this type of information.
- The conservation and development programmes of nature areas situated in urban zones can contribute to the stimulation of positive attitudes to nature and the environment among many population groups due to their nearness and accessibility.
- The interest of municipalities in preserving nature areas situated within their territories promotes in them the development of policies for urban environmental management.

## 8 The Experience as a Model: The Possibility of Replication

The indispensable conditions for the experience outlined in this paper to be replicated are, in the opinion of the authors, the following:

- The existence of an entity, either of municipal origin or otherwise, with the primary responsibility for the nature area, with clear knowledge of its value and a definite strategic policy with regard to its conservation. This entity should also assign responsibilities for the necessary actions, and it should appoint stable and specialised personnel.
- This entity has to develop a consultation process with State institutions and civil society in order to develop controls, scientific research, education and the participation of the population.
- Scientific management of the area, with the indispensable presence of the universities and technical-scientific institutions of the State.
- The creation of a consultation instance, which is institutionalised during the process and is endowed with an action programme with responsibilities and defined fields of action.
- The management strategy of the area has to be based on a framework of balance between the management and preservation of biological resources and the organisation and institutionalisation of the components of participating management. It also has to orient its management towards the perception of common ground between local economic and cultural interests and the conservation of the nature area.
- The social benefits of education and health should be developed jointly with preservation actions.
- The monitoring of the preservation and the development of the area should be done in an interdisciplinary manner with the biological and social sciences considered jointly.

The ecological processes which form the basic support for the conservation of the bio-diversity of the area should be maintained.

- The institutionalisation of the process should be strengthened by pursuing the social and economic development of the local inhabitants. At the same time, it is necessary to strengthen the ties of consultation and those of interests between the community and the institutional actors with regard to the conservation of the nature area.