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**Education for Nature (EDUNAT III)
Mid-term Evaluation**



Submitted by:

**Tropical Research & Development, Inc.
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List of acronyms

| | |
|--------------|--|
| AME | Ecuadoran Municipal Association |
| BEDE | Banco Ecuatoriano de Desarrollo |
| CD | Community development |
| EP3 | A.I.D. Environmental Pollution Prevention Project |
| GEF | Global Environmental Facility |
| IMQ | Ilustre Municipio de Quito |
| MOU | Memorandum of Understanding |
| MEC | Ministry of Education and Culture |
| USAID | U.S. Agency for International Development |

Executive summary

Purpose of the grant

The EDUNAT III grant represents a continuation of the U.S. Agency for International Development (USAID) support to Fundación Natura's program in environmental education. A primary purpose of this third consecutive grant over the last decade is to increase awareness among the Ecuadoran public concerning deterioration of the natural-resource base that supports development. The grant is also intended to motivate actions to conserve and manage these critical resources. EDUNAT III builds upon accomplishments of EDUNAT I and II, focusing on development and implementation of the following strategies:

- 1. Environmental awareness.** To develop and implement a program to educate, sensitize and motivate the Ecuadoran public in environmental matters.
- 2. Industrial pollution.** To develop and implement an information and assessment system for technologies related to environmental protection and conservation for public and private industries.
- 3. Environmental education.** To develop a mechanism for strengthening and expanding environmental education in the formal educational system.
- 4. Community development.** To develop and implement means to train and motivate public and private community development organizations in both rural and urban areas in environmental preservation.
- 5. Document center.** To develop and maintain a system for collecting, processing and disseminating scientific and technical information regarding environmental and natural-resource management.

To support the work of EDUNAT III, USAID granted Fundación Natura \$1.1 million for a five-year period. Fundación Natura agreed to make a counterpart contribution of an additional \$1.2 million. This grant addresses the USAID goals of more sustainable, long-term environmental productivity and more capable and productive citizens.

Evaluation purpose and methodology

Purpose

In this mid-term evaluation Tropical Research and Development (TR&D) has been contracted by USAID/Ecuador to analyze the progress of EDUNAT III toward achieving the goal of expanding and strengthening environmental education in Ecuador through the use of the five strategies enumerated in 1.1 above. Approximately 16 months remain before the anticipated end of the project in July of 1993. The purpose of this evaluation is to offer Fundación Natura and USAID an objective, external appraisal of EDUNAT III which will assist Fundación Natura in better achieving project objectives. The evaluation will also provide the USAID Agricultural and Natural Resource Office with information upon which to base decisions on future support to environmental education in Ecuador.

Methodology

The EDUNAT III grant project had no monitoring and evaluation plan or LOGFRAME against which the mid-term evaluation could make comparisons between verifiable indicators of the objectives

established at the beginning of the project and accomplishments. However, through interviews (see Annex 1), analysis of operational plans and project documents, field-site visits and observation of project activities, the TR&D team has been able to gain a clear picture, both qualitative and quantitative, of the accomplishments of EDUNAT III. Increased public awareness of environmental problems is an essential precursor to action to solve the problems that threaten sustainable development in Ecuador. Measurement of changes in awareness in an evaluation is at best qualitative and indirect. The team did find measurable indicators of level of activity in the initiatives related to industrial pollution, education, community development and documentation.

Findings and conclusions

Major findings

EDUNAT III has undertaken a wide array of activities under the five strategies enumerated above. Measurable success has been achieved in meeting project goals in all areas with greater progress in some areas than in others. Some objectives will not be achieved during the life of the project, but given the broad project mandate and a relatively limited funds available, EDUNAT III is considered by the evaluation team to be a success. USAID support has contributed directly to Fundación Natura's becoming one of the most effective and best known NGOs in the hemisphere.

- **Finding 1 - Environmental Awareness.** EDUNAT III has prepared databases, surveyed the public's knowledge of environmental issues, developed public-service announcements for radio and television, produced radio programs and published booklets and pamphlets. The information and publicity generated has greatly benefitted other project strategies. EDUNAT III has conducted 18 seminars to date for people in leadership positions. These seminars have contributed substantially to the national dialogue on environmental protection and management. A concrete manifestation of the accomplishments of the awareness strategy has been progress toward the passage of a national environmental law. This achievement was due to the efforts of both EDUNAT III and the Congressional Commission on the Defense of the Environment.
- **Finding 2 - Industrial pollution.** Under the project strategy to create a system of information on industrial pollution, EDUNAT III has compiled a wealth of information. A significant accomplishment has been the publication of *Potencial Impacto Ambiental de las Industrias en el Ecuador*, the first such compendium ever produced in Ecuador. It has created heightened awareness of industrial pollution problems in the country and, through EDUNAT III seminars, is being used to stimulate debate and generate recommendations for reducing industrial contamination. Systems have been created for compiling and organizing information on industrial pollution. However, in an effort to cover the entire industrial sector, time and effort for data collection was underestimated. To date, the project has completed or nearly completed data collection for only 14 percent of the 164 industrial processes it identified as having significant impacts. EDUNAT III will not complete data collection before the end of the project. Contacts with industry have been spotty. Only after the publication of the *Potencial Impacto* book in December 1991 did many of the industries become aware of EDUNAT III activities. The project has the opportunity to overcome some of these problems as it prepares and distributes detailed reports on individual industries (*Vademecos*). The effort to address the whole industrial sector, coupled with lack of experience in the Fundación in this field has limited accomplishments of this strategy to date.

- **Finding 3 - Environmental education.** The greatest accomplishments have been achieved under this strategy. EDUNAT III has signed an interministerial agreement, Convenio, which is being used to institutionalize environmental education in the school system of Ecuador. The Ministries of Health, Social Welfare and Education have contributed staff and other resources to establish a decentralized administrative structure in 21 offices throughout the country. By comparison, the matching ministerial contribution has been approximately three times that of EDUNAT III. EDUNAT III contributes educational materials and staff to conduct training seminars and other educational activities, such as ecological clubs and local research at the pre-school, primary and secondary levels. At the time of the mid-term evaluation, schools had received more than 300,000 pieces of material, and more than 200 seminars had been held for more than 8000 teachers. The target number of teacher seminars was doubled at the request of the Ministry of Education.
- **Finding 4 - Community development.** Under the strategy, a number of targeted technical-assistance efforts were undertaken. Activities with the Municipality of Quito show generally positive results. Specifically, the major information and outreach campaign in Quito is generally credited with improving the way citizens handle their garbage and control litter on the streets. Training for the Ecuadoran Association of Municipalities (AME) has resulted in significant sensitization of AME staff to environmental concerns, which now are dealt with extensively in AME's own training.
- **Finding 5 - Document center.** Development of the Fundación Natura document center is a major success of EDUNAT III. The document center is a permanent feature of Fundación Natura, housing more than 15,000 documents and 700 periodicals. The center is a valuable resource for those concerned with environmental protection in Ecuador. Although EDUNAT III did not accomplish all of the promotional activities it had planned, the document center has become well known and more than 300 people use the center every month.

General conclusions

EDUNAT III has been cost effective and largely successful in its contribution to greater environmental awareness and knowledge about Ecuadoran environmental problems and their solutions. The environmental education and documentation strategies were particularly successful. The component to improve public awareness of environmental problems was viewed as successful although difficult to document. The industrial-pollution component has high promise if the design is modified. The community-development component would, however, require significantly greater resources beyond its current small allocation in order to achieve the real potential of this activity.

Grant funds allocated were insufficient to conduct all five distinct and complex strategies on the scale at which they were designed. Achievement of project goals was hampered by the thin spread of funds, the diverse nature of the activities (some new to Fundación Natura) and the scarcity of experienced personnel willing to work for long under insecure contracting arrangements. Assuming that continuing USAID funding will be limited, if available at all, it is concluded that an in-depth focus on fewer strategies will have a greater potential for funding, whether by USAID or other sources. Specific recommendations derive from this conclusion.

Principal recommendations

1. **Environmental awareness and the documentation center.** These two strategies are core functions of Fundación Natura. As such, they are, to varying degrees, an integral part of a wide array of activities. In line with the conclusion that future activities under the EDUNAT rubric should be more narrowly focused, the following is recommended:
 - (a) environmental awareness should be a core responsibility of Fundación Natura, as well as being an integral component of EDUNAT activities where appropriate
 - (b) Fundación Natura should take responsibility for operation of the documentation center, funded from its various programs.

2. **Industrial pollution.** This topic has a high profile nationally and to an increasing degree with USAID and other donors. It therefore has a strong potential for funding if presented in an appropriate framework. Potential programs include the following: (a) Global Environmental Facility (GEF), both pollution of international waters and ozone concerns; (b) A.I.D. Environmental Pollution Prevention Project (EP3), (c) World Environment Center industry-to-industry activities and (d) programs of national industries. Potential funding sources include the following:
 - (a) debt-for-development swaps
 - (b) structural adjustment set-asides
 - (c) P.L.480 funds
 - (d) USAID funds (new or old), and other donors.

An industrial strategy should have an identity distinct from Fundación Natura. The Fundación functions admirably as a watchdog, denouncing pollution. It cannot expect to also establish a collegial and collaborative industrial strategy. A joint strategy for industry and environment must work with industry to raise awareness and identify pollution-prevention strategies that save money. Parallel activities can focus on the development of a regulatory framework that is reasonable, effective and enforceable.

3. **Environmental education** Continued activities in support of environmental education in the formal school system are vital to ensure that major advances achieved under EDUNAT III are sustained and augmented. The establishment and implementation of an interministerial/NGO, environmental-education *Convenio* with offices in the 21 provinces of the country is a major accomplishment and should receive continued assistance in order to reinforce this nationwide teaching network. An additional priority area should be added: support for professional education at the technical and university levels to provide Ecuador with the talent to resolve its environmental problems. USAID should continue funding this activity and actively collaborate with other donors in order to secure complementary funding (World Bank, for example).

4. **EDUNAT's efforts to advance the state of awareness and knowledge about environmental problems and needs within community development organizations have broken important new ground.** This important strategy merits additional support to consolidate and reinforce the efforts to date.

Lessons learned

Grant projects, as much as contracted activities, are well served by having verifiable indicators of accomplishment and an integral monitoring and evaluation component. While the evaluators are intuitively certain that EDUNAT III has been successful, a lack of measurable benchmarks has made it difficult for the evaluation team to provide solid evidence of this achievement.

In order to function efficiently and competitively, NGOs should consider offering employment conditions that attract and hold experienced professionals. This implies convergence with the private for-profit sector in the areas of management and entrepreneurial pursuit of funding.

1. Introduction

This is a report on the mid-term evaluation of the Education for Nature Project (EDUNAT III). A team from Tropical Research & Development, Inc. (TR&D) conducted the evaluation in Ecuador from February 25 through March 27, 1992.

1.1 Purpose of the grant

In July 1988, the USAID mission in Ecuador signed an agreement with Fundación Natura establishing an environmental-education project, EDUNAT III. Fundación Natura is an Ecuadoran, environmental, non-governmental organization. It had received two previous environmental-education grants from USAID -- EDUNAT I and EDUNAT II. EDUNAT III builds upon activities initiated under the previous projects. The ascension of Fundación Natura to the largest environmental organization in Ecuador can, in large measure, be attributed to the three EDUNAT projects.

The goal of EDUNAT III is to expand and strengthen environmental awareness among the Ecuadoran public in such a manner as to motivate actions to protect and conserve the environment and natural resources. Fundación Natura supports the goal of EDUNAT III through five strategies:

- **Environmental awareness.** To develop and implement a program to educate, sensitize and motivate the Ecuadoran public in environmental matters.
- **Industrial pollution.** To develop and implement an information and assessment system for technologies related to environmental protection and conservation for public and private industries.
- **Environmental education.** To develop a mechanism for strengthening and expanding environmental education in both the formal educational systems.
- **Community development.** To develop and implement means to train and motivate public and private community-development organizations in both rural and urban areas in environmental preservation.
- **Document center.** To develop and maintain a system for collecting, processing and disseminating scientific and technical information regarding environmental and natural-resource management.

Each of these strategies in essence became individual programs with their own goals and projects.

To support the work of EDUNAT III, USAID granted Fundación Natura \$1.1 million for a five-year period. Fundación Natura agreed to make a counterpart contribution of an additional \$1.2 million.

1.2 Evaluation purpose and methodology

1.2.1 Purpose

In this mid-term evaluation, TR&D has been contracted by USAID/Ecuador to analyze the progress of EDUNAT III toward achieving the goal of expanding and strengthening environmental education in

Ecuador through the use of the five strategies enumerated above. Approximately 16 months remain before the anticipated end of the project in July of 1993. The purpose of this evaluation is to offer Fundación Natura and USAID an objective, external appraisal of EDUNAT III. This appraisal will assist Fundación Natura in better achieving project objectives. The evaluation will also provide the USAID Agricultural and Natural Resource Office with information upon which to base decisions on future support to environmental education in Ecuador.

1.2.2 Methodology

The EDUNAT III grant project had no monitoring and evaluation plan or LOGFRAME against which the mid-term evaluation could make comparisons between verifiable indicators of the objectives established at the beginning of the project and the accomplishments. In many cases, the project design lacked specific, objectives that could be quantified. As a result, the evaluation team had to identify its own impact indicators. Because of the lack of time and data, many of the indicators are qualitative, rather than quantitative. Indicators that the evaluation team developed and used to assess the project are discussed in the sub-sections of the report dealing with individual strategies.

To assess the effectiveness of EDUNAT III, the evaluation team strove to achieve as thorough an understanding as possible of the project and its Ecuadoran context. Each evaluator was assigned to different project strategies. The assignments were based on the expertise area of the evaluator.

Each evaluator collected information for the evaluation in a similar manner. Briefings were scheduled with relevant AID officials, the project director, strategy coordinators and technical and administrative staff (Annex 1). Basic materials -- work programs, quarterly reports, written products, work logs, and reports of project accomplishments (Annexes 2 and 3) -- were reviewed. And to the extent possible, project activities were observed. In an iterative process, moving back and forth between materials and staff interviews, the team developed an understanding of the dynamics and accomplishments of the project.

This understanding was tested through extensive interviews in Quito and in the field with persons and staff of organizations knowledgeable about EDUNAT III and its work (Annex 2). To the extent possible, these interviews included project participants and beneficiaries. But because of the large size and dispersed nature of EDUNAT III's activities, only a small percentage of the total individuals served by the project could be interviewed. Nonetheless, the team attempted to interview representative individuals.

In a further iteration, the information collected through material reviews and outside interviews was reviewed and refined with relevant EDUNAT III staff. Evaluators then applied standard, professional criteria and informed professional judgement to reach their final conclusions and recommendations.

1.3 Structure of the report

The following chapter of the report, Chapter Two, Analysis and Findings, describes the activities, successes and difficulties encountered by EDUNAT III in the implementation of its five strategies. To the extent possible, the impacts of each strategy also are assessed. The chapter concludes with discussions of the project's performance in three programmatic areas: policy dialogue, organizational development, and administration.

Chapter Three and Chapter Four contain conclusions and recommendations of the evaluation team.

2. Analysis and findings

The evaluation team reviewed the performance of EDUNAT III's five strategies. In addition, the team reviewed the performance of EDUNAT III in three programmatic areas: policy dialogue, organizational development, and administration. The results of these reviews are presented in this chapter of the report.

2.1 Strategies

2.1.1 Environmental awareness

2.1.1.1 Description of strategy

The goal of the Environmental Awareness Strategy is to develop and implement a program to educate, sensitize and motivate the Ecuadoran public in environmental matters. Through this strategy, EDUNAT III strives to provide accurate, relevant information on the environment to both the general public and public leaders. The strategy incorporates use of mass media, publications and symposia. This strategy is implemented through the following four components:

- A survey of the knowledge, attitudes and practices of the general population of Ecuador regarding environmental problems;
- Production of press releases, materials for television and radio, pamphlets and booklets;
- Environmental symposia for public leaders.
- Development of a national environmental law.

2.1.1.2 Implementation: opportunities, modifications and initiatives

The Environmental Awareness strategy evolved from the work of EDUNAT I and II. EDUNAT I created a high level of public awareness regarding environmental problems in Ecuador. EDUNAT II continued this work.

This strategy provides all of the other strategies with information on the attitudes of the Ecuadoran public. It also supports the other strategies with its public-education campaigns. The relationship between strategy number one, environmental awareness, and strategy number three, environmental education, is particularly close.

2.1.1.3 Activities and products

Information distribution is the primary activity of this strategy. EDUNAT III has carried forth this work in four strategic components. This section describes the activities, successes and difficulties which EDUNAT III has encountered in each of these components.

2.1.1.3.1 A survey of the knowledge, attitudes and practices of the general population of Ecuador regarding environmental problems

In fiscal year (FY) 1989, EDUNAT III designed a survey to gather information on the knowledge, attitudes and practices of Ecuadorans regarding environmental problems. The purpose of the survey was to provide information to EDUNAT III staff for use in project activities. To that end, the survey design was modified in late 1989 to provide information to the project's Industrial Pollution strategy on the

attitudes of industrialists. EDUNAT III also planned to make the results of the survey available to other Fundación Natura staff and development professionals.

The survey was conducted in FY 1990. Analysis of the results began in that year and continued through 1991. While the final report on the survey has not been published, the raw data has provided information to EDUNAT III. The survey presents a great deal of information on environmental knowledge and attitudes of diverse segments of the population (heads of households, professors, union leaders, industrialists and politicians). The results indicate that knowledge about environmental problems is distributed in a normal, bell-shaped curve; the vast majority of the population surveyed had some knowledge of environmental problems, and relatively few having no knowledge or in-depth knowledge.

2.1.1.3.2 Production of press releases, materials for television and radio, pamphlets and booklets

During the first year of EDUNAT III, this strategy included a survey of mass-media outlets to determine their capability and desire to receive press materials produced by the project. EDUNAT III used the survey to identify appropriate communication systems to reach diverse groups.

With outlets identified, EDUNAT III began to write and distribute press releases. From 1989 through 1991, the project, in conjunction with other Fundación Natura programs, produced and distributed 328 press releases to major newspapers. The newspapers published 69 percent of the releases.

EDUNAT III has also used television and radio to send its message to the Ecuadoran people. As a part of the campaign to encourage the citizens of Quito to properly handle their garbage, EDUNAT III produced eight radio and five television spots. These spots were widely aired on Quito's radio and television stations. EDUNAT III also produced five, 40-second spots on environmental education. These advertisements appeared on television stations in Quito and Guayaquil. All of the stations donated at least some of the air-time for the spots as a contribution to EDUNAT III (Table A). Five of the seven stations donated all of the air-time.

In addition to television, EDUNAT III has produced radio programs. These programs have allowed the project to reach the vast rural population of Ecuador. EDUNAT III produced 30 programs, which were broadcast on 100 radio stations. As with television, radio stations have agreed to present EDUNAT III's programs free of charge. The project has received a great deal of positive feedback from the radio programs. The radio messages are distributed even further through a service of EDUNAT III, whereby copies of the programs can be obtained by schools at no charge if they send a blank cassettes with their request.

EDUNAT III has not been as successful in the production of written materials for environmental education of the general public. The project produced and distributed 50,000 copies of a pamphlet on garbage management in Quito. Near completion is *Defense of the Environment Using the Law*, a pamphlet that complements the activities of EDUNAT III to promote a national environmental law. But the publication of several other pamphlets was delayed. Production of *El Vivero Comunitario* has been canceled because the author could not complete the work. Due to the poor quality of a revision of the pamphlet, *The Family and the Environment*, publication of the pamphlet has also been delayed. A shortage of funds has caused the project to suspend production of *Behavior of Children Toward the Environment*, as well as to suspend production on a pamphlet on protected areas.

2.1.1.3.3 Environmental symposia for public leaders

To increase the environmental awareness of Ecuador's public leaders and to motivate them to take actions to protect the environment, EDUNAT III designed and presented 18 seminars attended by 410 public leaders. All of the seminars were conducted in Quito. Eight of the seminars dealt with specific environmental problems, such as industrial pollution, agriculture and the environment and contamination of the Manchangara River. Most of the other seminars were on development of a national environmental law.

All of the seminars followed a similar format. The participants first met in a plenary session to hear reports on the topic of the seminar. They were then divided into small groups to discuss various aspects of the topic and develop recommendations for solutions to problems. The seminars ended with reports by the small groups to a plenary session.

EDUNAT III used the information developed at the seminars to help shape its activities. It published eight individual reports and a summary report on the seminars dealing with specific environmental problems.

2.1.1.3.4 Development of a national environmental law

Fundación Natura began to work on a national, environmental law under EDUNAT II. Its work in this area culminated with a presentation in 1987 at the National Environmental Congress sponsored by EDUNAT II. An important Fundación Natura goal had been the establishment, at the Congress, of a consensus on a national environmental law. However, the consensus did not materialize.

Following the Congress, a group of NGOs and government employees established a Commission on Ecology, which undertook the task of producing a national environmental law. Fundación Natura did not actively participate in this commission. The Commission on Ecology eventually developed a proposal and presented it to the Special Commission on the Defense of the Environment, an official commission of the National Congress. This proposal died in the Commission in 1990.

In late 1990, Fundación Natura, through EDUNAT III, resurrected the idea of developing a national environmental law. EDUNAT III wrote a proposal to work with the Special Commission on the Defense of the Environment and other private and public parties to develop a new, national environmental law. In February 1991, the German government provided 80-percent funding for the proposal. The other 20 percent came from USAID through EDUNAT III.

In April 1991, the Special Commission agreed to develop a new proposal for a national environmental law and signed an agreement with Fundación Natura to help in its preparation. EDUNAT III prepared a draft law, based on the previous version of the law, as well as on its own database on environmental laws from other countries.

After internal, Fundación Natura review and revision, the draft was presented and discussed at eight seminars with different interested parties, including environmental NGOs, national government, local governments, universities and colleges, industry, churches, indigenous groups, unions and professional societies. From the information gathered at the workshops, EDUNAT III wrote a new draft law. By the end of the workshop process, the law was in its 13th version.

EDUNAT III then began a final round of reviews within the Fundación. This review involved both staff and the board of directors. By October 1991, the final version of the law was prepared (version 16). In November 1991, this version was sent to the Special Commission on Defense of the Environment. At the same time, the law was sent to Ecuadoran President Rodrigo Borja.

EDUNAT III is using a two-prong approach to get the law adopted. First, it continues to work through the special commission. The commission can send the law to Congress for its consideration. However, the commission was not expected to act until after the election in May 1992. The commission has not been successful in past attempts to pass a national environmental law, so EDUNAT III does not want to rely solely upon the commission.

The other avenue that EDUNAT III is pursuing is to have the President send the law to Congress as an emergency action before he leaves office in July 1992. President Borja sent the law to his ministers for comment, but to date, only two have responded. Several other laws are also competing for emergency designation, so EDUNAT III will have to put pressure on the President in order to get action.

2.1.1.4 Impacts of strategy

Direct measurement of the impacts of EDUNAT III's environmental-awareness strategy is not possible; the distribution of information has generally been nationwide, diverse and not directed toward one group. Discrete indicators are not available. Many organizations are involved in environmental activism in Ecuador today, and increased public interest and concern on environmental matters cannot be attributed to EDUNAT III alone.

The other strategies, however, have directly benefitted from strategy number one. These other strategies have used information developed in the survey and seminars for public leaders. These strategies have also benefitted from public-information campaigns launched by this strategy. These campaigns have helped to change the attitudes and behaviors of Ecuadorans.

The most significant impact of this strategy may be seen in the progress made towards adopting a national, environmental law. Although the law remains to be adopted, the fact that it is being considered by a commission of the Congress, as well as by President Borja, indicates a change in past attitudes about environmental issues. Many social factors enter into the national dialogue on environmental law, but EDUNAT III's environmental-awareness campaigns and leadership seminars, coupled with the prestige and activities of the Fundación Natura, have contributed substantially to the promotion of a national, environmental law.

The survey of the knowledge, attitudes and practices of the general population of Ecuador regarding environmental problems provides EDUNAT III with a potential indicator of the impacts of its Environmental Awareness strategy. Once the report on this survey is completed, survey results can be compared with previous surveys to measure changes in the public's awareness of environmental problems.

EDUNAT II conducted a public-awareness survey in 1984. Results of that survey could be compared to the 1990 survey results.

2.1.1.5 Conclusions

The survey of the knowledge, attitudes and practices of the general population of Ecuador regarding environmental problems is an important accomplishment of EDUNAT III. The survey not only provides

EDUNAT III with valuable information for program design, it also represents a potential evaluation indicator of the impacts of the project.

EDUNAT has used the results of the survey to help it produce and distribute 328 press releases, 13 television spots and 30 radio programs. The use of mass media has enabled EDUNAT to get its message on environmental protection to both urban and rural citizens. Although EDUNAT III has encountered some problems in the production of its own materials on environmental issues, it did produce and distribute 50,000 copies of a brochure on garbage management in Quito. To complement its promotion of a national, environmental law, the project will soon produce a pamphlet on environmental law.

The activism of the EDUNAT III regarding national, environmental legislation is an indication of how this strategy is closely linked with the overall work of Fundación Natura. The public-relations activities of this strategy is a further example of this linkage. Most of Fundación Natura's press needs have been met through the environmental-awareness strategy of EDUNAT III.

2.1.1.6 Recommendations

- At the end of the EDUNAT III project, Fundación Natura should incorporate environmental awareness into its core responsibilities and as a component of other projects.
- EDUNAT III should conduct a validity analysis of the survey of knowledge of environmental issues. Once the report on this survey is completed, its results can be compared with previous surveys to measure changes in the public's awareness of environmental problems. EDUNAT II conducted a public awareness survey in 1984. Its results could be compared to the 1990 survey results. Validity, however, may be questionable in this approach because the two surveys did not use the same research design. However, a great deal of data has been compiled and should be fully utilized. In order to determine the extent to which the data which has been collected can be utilized, a validity study of both surveys needs to be conducted to determine the following: relevance of information; consistency of research design; reliability of research design; and replicability of design.

Since a great deal of effort has gone into these studies, EDUNAT III could work with the executive level of Fundación Natura to plan and establish a communications division within the foundation and use the data from these surveys to launch strategies for public-policy agenda setting.

- Use of the survey of knowledge of environmental issues as an impact indicator should be explored by the project.

2.1.2 Industrial pollution

2.1.2.1 Description of strategy

In the original project description, the goal of this strategy was to develop and implement an information and assessment system for technologies related to environmental protection and conservation for public and private industries. The primary audiences for the strategy were managers and administrators of industry and, in some cases, industrial workers. Under this strategy, EDUNAT III would conduct studies of industrial pollution, identify information needs, compile and organize technical information, distribute

information to industries and implement follow-up activities to elicit industry's reactions to the information.

These activities were translated into three strategy components in the initial operation plan for the project:

- Analysis of environmental impacts from industrial activities and a survey of industries.
- Collection and organization of information on environmental impact and pollution control.
- Dissemination of information on environmental impact and pollution control.

With few changes, which are discussed below, the activities of the strategy have occurred under these three components.

2.1.2.2 Implementation: opportunities, modifications and initiatives

The basic assumption underlying the industrial-pollution strategy was that a major cause of industrial pollution in Ecuador was a lack of information in the industrial sector on sources of pollution, its impacts, its prevention and its control. Within the first year of the project, after contacts with industrialists, it became obvious that in addition to lack of information, industry lacked incentives and finances to address pollution problems. As a result, in FY 1990 EDUNAT III expanded the audiences for strategy number two to include government officials, research institutions and the general public. These groups were included to create pressure for environmental legislation, which in turn would create legal incentives for industrial-pollution control. The project also intended to expand its audience in order to stimulate research on financial strategies for funding pollution control.

EDUNAT III also underestimated the size of the data collection task it had undertaken. The initial project description called for an assessment of 1,000 industrial sites of various sizes and locations. During the first year of the project, however, the focus moved away from individual sites to industrial sectors. Ultimately, the project identified 25 industrial sectors encompassing 164 industrial processes, upon which it would gather information.

2.1.2.3 Activities and products

EDUNAT III has prepared four annual operation plans identifying specific activities and products for each component of strategy number two. This section describes the planned activities and evaluates the extent to which EDUNAT III accomplished those activities.

2.1.2.3.1 Analysis of environmental impacts from industrial activities and a survey of industries

The original purposes of this component were the following: to assess environmental impacts of industry; to determine environmental awareness of industrial managers and administrators; and to identify the technical-information needs of industry. Planned outputs included reports on environmental impacts of industry and a report on the results of a survey to determine the environmental awareness and information needs of managers and administrators.

During the first three and one half years of the project, most of the effort and all of the outputs of this component have focussed on assessment of environmental impacts. The survey of industrial managers and administrators was not conducted.

The initial plan called for a survey of 800 industrialists to determine their environmental awareness and need for pollution-control information. During the first year of the project, EDUNAT III discovered that because of the differences in industrial processes among industries, identifying specific information needs would require the development and administration of separate surveys for each industry. The cost of this approach greatly exceeded initial estimates for one general survey. In response, project management decided to drop the surveys from the industrial-pollution strategy.

However, EDUNAT III did not completely abandon the purposes of the survey. The survey of environmental awareness of industrial managers and administrators was incorporated into the general survey of public environmental awareness conducted under the environmental-awareness project strategy. In addition, EDUNAT III financially supported the work of a student who, for her bachelor thesis, conducted a survey of managers in the textiles industry to determine their environmental awareness and knowledge of pollution-control technologies. The survey determined that the managers were generally aware of the pollution caused by the textiles industry. Some of them had even taken steps to reduce contamination from their factories, including changing the types of dyes they used or switching to biodegradable detergents. The majority of the companies, however, had not taken such actions. When asked why they had not taken even these simple steps to reduce contamination, the managers cited costs and the lack of information as the major reasons.

In an effort to determine the information needs of industry, EDUNAT III also sponsored a leadership seminar on industry and the environment under the environmental-awareness project strategy. The seminar was held July 19, 1989 and was attended by 25 individuals, half of whom were from industry. During the four-hour seminar, participants were divided into small working groups and asked to identify the following: problems encountered by industry in addressing contamination; incentives needed to encourage control of industrial pollution; and individual companies that had successfully reduced contamination. The results of the seminar shaped activities in the industrial-pollution project strategy.

By the beginning of FY 1990, this component had been renamed "Preliminary Environmental Impact Assessment of Industry." The purpose of the component became producing assessments of potential environmental impacts and control alternatives for the industries creating the greatest environmental impact in Ecuador.

EDUNAT III identified the high-impact industries by applying the World Health Organization's list of the most contaminating industries in developing countries. EDUNAT III identified 25 industrial sectors on that have significant operations in Ecuador. These sectors encompass 164 industrial processes.

By April 1990, EDUNAT III had prepared a draft report on 76 of these industrial processes, representing 52 percent of total industrial production (measured in Sucres) for the nation. The operation plan for FY 1990 called for publication of the final report during that year. However, the report went through several technical and editorial revisions before it was finally sent to the printer in the Fall of 1991. The resulting 650 page book, *Potencial Impacto Ambiental de las Industrias en Ecuador*, was released at a press conference in December 1991.

The book, like most EDUNAT III material, was professionally produced. It contains 39 chapters on individual, industrial sectors or industrial processes. Each of these chapters, ranging in length from 10 pages to 36 pages, contain a description of the following: an industrial process or processes, including flow diagrams, a description of potential environmental impacts created at each point in the process and

pollution-control alternatives. These chapters conclude with tables that present general, quantitative and qualitative assessments of environmental impacts. The book also has a chapter on general technologies for controlling industrial pollution, a glossary of technical terms and an extensive bibliography.

The book is only the first step in providing information on controlling industrial contamination. It does not provide sufficient information on pollution control to guide a management decision. It provides no information on the costs of pollution control. This specific information will have to be compiled and disseminated under the other two components of this strategy.

Dissemination of the book is planned for FY 1992. The dissemination plan calls for sponsoring several seminars, co-hosted by government agencies and industrial organizations, to discuss the contents of the book and needs for responses. Each seminar will target a specific industry or group of industries in the book. The first seminar was held in April 1, 1992. This seminar targeted the textiles industry and will be co-hosted by EDUNAT III, the Municipalidad de Quito and the Instituto Ecuatoriano de Obras Sanitarias, the national government agency that sets environmental quality standards.

Nonetheless, this component did not completely meet its initial purposes. The shift away from determining the information needs of industry reduced the project's ability to identify, collect and disseminate critical information. It also eliminated an opportunity for EDUNAT III to develop and maintain contacts with industry early in project implementation. These contacts could have been valuable for disseminating information.

The production of *Potencial Impacto Ambiental de las Industrias en el Ecuador* is a major accomplishment. It is the first book of its kind produced in Ecuador. In an objective manner, it provides information on potential impacts, as well as alternatives for pollution prevention and control. The book has the potential to become a focal point for discussions among environmentalists and representatives of government and industry concerning industrial-pollution control. Such discussions could lead to actions to reduce industrial contamination. This potential is already being exploited by EDUNAT III in the seminars it is sponsoring for dissemination of the book.

EDUNAT III is addressing this issue through the industrial seminars it is co-hosting to disseminate *Potencial Impacto Ambiental de las Industrias en el Ecuador*. A portion of each seminar will be dedicated to soliciting information needs from industrialists. Results from the seminars will focus EDUNAT III's information-collection and dissemination activities.

2.1.2.3.2 Collection and organization of information on environmental impact and pollution control

The purpose of this component was to establish a system for the collection and retrieval of technical information. Since the beginning of EDUNAT III, the activities in this component included soliciting, securing and reviewing technical data. In the first years of the project, outputs of this component were to be forms (*fichas*) for collecting and organizing data. Beginning in FY 1990, a computerized database and retrieval system became a planned output. Also in FY 1990, this component added site visits to industrial facilities to visually verify information on production procedures and sources of wastes. These sources had been gathered through literature searches. (Beginning with the FY 1991 operation plan, site visits appear as a separate component.)

With the information-collection and management systems in place, the ultimate output of this component was to be a complete database on environmental impacts and pollution-control technologies for the 25 significant, industrial sectors in Ecuador.

Information collection from national and international sources began in August 1988 and continues today. EDUNAT III secures copies of documents. Staff from EDUNAT III read the documents and record information on information forms.

In addition to collecting information, most of the work in this component during the first two years of the project focussed on developing the forms for recording information. To date, the project has developed and put into use five forms for compiling information on references (ficha referencial), five forms for compiling information in general subject areas (ficha mnemotecnica) and one form for compiling information on specific industrial sectors or processes (ficha global) (see Figure 1). Although most of the forms for recording references and general information were finalized by FY 1990, the ficha global was not finalized until FY 1991.

A completed ficha global can contain from 300 to 1,000 pages of detailed information. Figure 1 displays the structure of the ficha global, where generos industrial indicates an industrial sector (e.g., textiles), rama indicates a primary subdivision of the industrial sector (e.g., manufacture of cloth, manufacture of clothing) and especialidad indicates a further subdivision into industrial processes (e.g., manufacture of cloth is subdivided into wool cloth, cotton cloth and synthetic cloth). Fase indicates a production phase within an industrial process. In each production phase, information is recorded regarding the types, characteristics and impacts of the contaminants generated, opportunities for reducing and recycling waste products, alternative treatment technologies and costs of treatment technologies.

With the ficha system in place, EDUNAT III undertook a prioritization exercise to determine which industrial processes should receive initial attention. The project manager, chemical engineers and biologists participated in the process. Technical staff ranked industrial processes according to their potential impacts and number of factories. The project manager provided insights on political and institutional needs and constraints.

As with many data-collection efforts, EDUNAT III found that the task of collecting and organizing information was much larger than initially anticipated. To date, the project has completed eight fichas globales, with information on 20 industrial processes in seven industrial sectors. Fichas globales for three other industrial processes are near completion (Figure 1.) On average, each ficha global takes approximately six person months to complete.

In FY 1990, EDUNAT III initiated site visits to industrial facilities to visually confirm the information they had developed on production processes and sources of wastes. Since October 1989, project staff have conducted at least one site visit for each of the eight fichas globales completed. The response of industry to the site visits has been mixed. Some companies have welcomed the opportunity to show EDUNAT III their operations. Others have only reluctantly participated, and some have refused to participate, apparently fearing that the site visits would only lead to criticism of their operations. EDUNAT III has scheduled three additional site visits for FY 1992.

The computer system for storing and retrieving the information has not been completed. Development of the computer system was initially delayed because of a focus on development of the information forms.

It was further delayed because EDUNAT III could not find a computer expert with knowledge of environmental issues. They tried to secure outside assistance, but found that the quotes for development of a system were beyond the budget. Finally, in 1991, EDUNAT III contracted with a computer expert to develop a system for McIntosh computers. When staff began to enter information into the system, they identified some problems with the program. Unfortunately, the person who wrote the program was not available to revise it, so EDUNAT III contracted with another programmer. That programmer is making the revisions.

Figure 1. Fichas Globales Completed or In-Progress

| INDUSTRIAL SECTOR | INDUSTRIAL PROCESS |
|--------------------------|---|
| COMPLETED | |
| Basic Metals | Iron and Steel |
| Chemicals | Hydrochloric Acid -- Mannheim Method Hydrochloric Acid -- Cl ₂ and H ₂ Synthesis Sulfuric Acid -- Lead Beds Sulfuric Acid -- Platinum Catalysts Ammonia |
| Chemicals | Soaps Detergents |
| Processed Foods | Canned Fish Fish Meal Fish Oil |
| Leather | Chrome Processing Tannic Acid Processing |
| Metal Products | Metallic Galvanization Plastic Galvanization |
| Non-Metallic Minerals | Cement -- Dry Process Cement -- Wet Process |
| Textiles | Cotton Material Synthetic Material Wool Material |
| IN PROGRESS | |
| Mining and Extraction | Oil and Gas Production |
| Petroleum Refining | Refineries |
| Wood Products | Plywood |

In 1989, EDUNAT III became aware of the need for technical assistance to environmental organizations in El Oro Province regarding contamination from gold mining. The project responded to this need through this component of strategy number two, industrial pollution, as well as through strategy number four, community development. Under this component, EDUNAT III contracted an interdisciplinary team to investigate and report on the environmental and social impacts of gold mining in the province. The team's report was published by EDUNAT III in October 1990.

EDUNAT III has met many of the purposes of this component. It has developed a system for collecting and compiling information. The task of collecting information has, however, proven to be much larger than originally anticipated. EDUNAT III has completed or nearly completed fichas globales for only 14 percent of the 164 industrial processes identified for data collection. EDUNAT III will not complete data collection before the end of the project period.

It is critical at this point for EDUNAT III to prioritize the industries and types of information it will focus on during the next 15 months. Before beginning compilation of fichas globales, EDUNAT III staff undertook a prioritization exercise. The outcome of that exercise should be reviewed to determine if the priorities are still valid. EDUNAT should also consult with industry and the environmental department in the city government of Quito to see what their needs may be in the coming year and a quarter.

One purpose of this component which the project has not completely achieved is the development of a computerized data base. A system has been developed for McIntosh computers, but some programming problems have prevented it from becoming fully operational. The value of a McIntosh system is questionable. IBM computers are much more common in Ecuadoran industries, governments, research institutions and even Fundación Natura. If the system is developed for McIntosh, EDUNAT III will find distribution to be limited. A major assumption of the industrial strategy is that industry, government and research institutions need information about industrial pollution. Supplying that information through a technology which most industries do not have defeats the purpose of creating the system.

2.1.2.3.3 Dissemination of information on environmental impact and pollution control

The purpose of this component is to distribute the information to industry, government, research institutions, public-interest groups and to the general public. At the beginning of the project, it was believed that this component would produce packets of information for industries. This idea has evolved into the production of vademecos, loose-leaf reports on all facets of contamination and control for individual industrial sectors or processes. Each vademeco will contain the information found in the ficha global for the industry. The vademecos will be loose leaf so that they can be easily updated as new information becomes available.

In addition to the vademecos, this component is scheduled to produce and distribute summaries of the information in Potencial Impacto Ambiental de las Industrias en el Ecuador for use in schools. This component may also produce videos of treatment alternatives.

Actual production of vademecos materials for schools and videos are scheduled to begin in FY 1992. Prior to 1992, the only planned activities for this component were investigations into appropriate forms of distribution.

As planned, no vademecos have been produced under this component. However, in 1990, this component produced a general bibliography on environmental problems in Ecuador. In addition, EDUNAT III,

under other components of this strategy and under component 1-I of strategy number one, environmental awareness, has produced and distributed four publications with information about industrial pollution. These publications are the following: Industria y Medio Ambiente, Sistemas Productivos y Medio Ambiente en el Ecuador, Potencial Impacto Ambiental de las Industrias en el Ecuador, and Impacto Ambiental de la Minería en Zaruma y Portovelo.

EDUNAT III is developing the design for the vademecos, and the project includes plans to produce 10 of them by the end of project period.

EDUNAT III has just arrived at the point where the purpose of this component can be realized. The project has completed eight fichas globales and will soon complete three more. It is ready to begin production of vademecos, which will make the information available to industry, government, research institutions and public-interest groups. The planned production of 10 vademecos may be over ambitious, but until the first vademeco is produced, it will be difficult to set a realistic objective.

Distribution of the vademecos will be critical. EDUNAT III has experience distributing information to government agencies and the general public, but does not have a similar track record with distribution of information to industry. The project will need to use the industrial seminars it sponsors to develop mechanisms for distribution of the vademecos to industry.

The style of the vademecos implies an ongoing institutional structure for production and distribution of updated material. This cannot be accomplished under the current grant. EDUNAT III will have to investigate how it can create a structure to support the vademecos.

2.1.2.3.4 Monitoring industrial pollution

This component was added to the strategy in the FY-1992 operation plan. The component's purpose is to promote monitoring of industrial contamination and impacts by government agencies, research institutions and industries. To achieve this purpose, EDUNAT III plans to develop a monitoring form and a manual for using the form. The form will provide an instrument for periodically measuring and recording types and quantities of emissions, as well as their environmental impacts.

EDUNAT III staff are developing this form as an example of how monitoring can be conducted. They do not anticipate that government, researchers and industry will adopt the form. Rather, they hope that these groups will adapt the form to their needs or will develop their own forms.

During 1992, EDUNAT III is scheduled to develop and test the form and prepare a draft manual for its use. The only output of this component to date is the production of a first draft of the monitoring form.

2.1.2.4 Impacts of strategy

2.1.2.4.1 Impact indicators

As discussed in the introduction to this evaluation report, the initial design of EDUNAT III did not include impact indicators. As a result, no systematic effort has been made by the project to measure or quantify impacts.

The goal of this strategy is collect and distribute information on industrial pollution to industry, government, research institutions, public-interest groups and to the general public. This strategy supports the overall goal of EDUNAT III to protect and conserve the environment and natural resources.

One indicator of the strategy's impact is the extent to which target groups are aware of the strategy and have received information on industrial pollution from EDUNAT III. Another indicator of impact is the extent to which industry and government address industrial-pollution issues, both in terms of heightened awareness, including creation of institutional structures and articles in newsletters, and in terms of specific actions, such as government regulations and capital investments. Although assessing the direct impact of this strategy in the latter arena is difficult, EDUNAT III can probably share some of the credit for changes in this area since the inception of the project in 1988.

2.1.2.4.2 Impacts

To assess the impacts of the industrial-pollution strategy, the evaluators interviewed 10 industrialists or individuals associated with industry, representatives from five environmental groups and two municipal-government officials. The evaluators also reviewed industry publications.

Most of the individuals interviewed from the industrial sector were representatives of industrial organizations. All but one of the industrialists and those associated with industry were aware of *Potencial Impacto Ambiental de las Industrias en el Ecuador*. Those aware of the book were impressed with it. Several commented on how it presented the situation in an objective manner and provided information on solutions to problems. Many of the industrial representatives pointed out that the book was one of few examples (from their point of view) of environmentalists providing constructive criticism of industry.

Although the industrial representatives were generally aware of *Potencial Impacto Ambiental de las Industrias en el Ecuador*, they were not aware that EDUNAT III or Fundación Natura were conducting a program to compile and disseminate information on environmental impacts and control alternatives. Most had no idea that Fundación Natura was even working in this area until the book was released.

All of the industrial representatives interviewed in the course of this evaluation expressed interest in working with Fundación Natura to reduce industrial contamination. Generally, they felt that Fundación Natura, by itself, could not disseminate information on pollution control, primarily because companies would not go directly to Natura for information.

Although Fundación Natura has produced an objective book on industrial pollution, industrial representatives stressed that most industrialists still viewed the foundation with suspicion. This suspicion is warranted. Although EDUNAT III has worked to identify solutions to problems, other Fundación Natura programs have different objectives and modes of operations. Some of these programs have denounced industrial activities. From the outside, it is difficult for industrialists and others to make distinctions between EDUNAT III and other Fundación Natura programs for they are both Fundación Natura.

Since the inception of EDUNAT III, industry's attitude towards industrial contamination has made a positive shift. For instance, the Camara de Industrias de Pichincha has established an environmental commission within the Camara with representatives from industry and Fundación Natura. The Camara has also established a non-profit foundation, Tu y Yo. The foundation is pursuing funding for a program to reduce industrial contamination. Several industry publications have run articles on reducing industrial pollution. And in the course of the interviews for this evaluation, several industrial representatives cited examples of individual companies which had recently invested in pollution reduction at their factories. Although EDUNAT III cannot take direct responsibility for any of these actions, it certainly has contributed to a general change in the political and social climate which has supported such actions.

To assess the impacts on environmental groups, evaluators interviewed representatives from five groups, including the Quito Chapter of Fundación Natura. All of the groups' members expressed their impressions that Fundación Natura -- and they did not make a distinction between EDUNAT III and the Foundation -- had helped to change the general public's awareness of environmental issues. They were generally aware that Fundación Natura had information on industrial contamination, but only the Quito Chapter of Fundación Natura had worked directly on industrial issues.

The Quito Chapter has often used information from strategy number two, industrial pollution, to prepare denouncements of industrial contamination. The chapter has also used the information to help other community organizations concerned about industrial pollution. In one case, the chapter helped a group prepare an appeal of a municipal decision to site a factory in their neighborhood. The appeal was successful, largely because the quality of the technical information provided by EDUNAT III.

The impacts of EDUNAT III on municipal governments has occurred primarily in the context of strategy number four, community development. This strategy focussed on municipal governments. The only governmental impact discussed in this section of the report is the impact on Quito.

The evaluators interviewed two city officials from Quito. One is the director of the city's environmental department, and the other directs a major city program on solid-waste management. Both officials were aware of EDUNAT III's industrial activities. Indeed, the director of the city's environmental department had been staff coordinator for the project's industrial-pollution strategy during 1989 and 1990.

Since the inception of EDUNAT III, the municipal government of Quito has initiated a major program to reduce industrial pollution in the city. As with the environmental actions of industry, EDUNAT III is not directly responsible for this program, but the two programs are closely related. Several of the staff in the city department, including its director, first worked for EDUNAT III. Some of the environmental consultants to the city are also consultants to EDUNAT III. As a result, much of the information and techniques used by the department in its assessment of environmental problems are similar to those used by EDUNAT III.

2.1.2.5 Conclusions

During the first year of EDUNAT III, the focus of the industrial-pollution strategy shifted away from individual industrial sites to industrial sectors and processes. The audience for the strategy also shifted to include government, research institutions, public-interest groups and the general public, as well as industry. These changes strengthened the project's ability to gather information and to affect public policy.

Even with these changes in project design, the time and effort for data collection was underestimated. To date, the project has completed or nearly completed data collection for only 14 percent of the 164 industrial processes it identified as having significant impacts on the environment of Ecuador. EDUNAT III will not complete data collection before the end of the project period.

Nonetheless, strategy number two, industrial pollution, has compiled a wealth of information, and this information has had some impact on industry and government. The production of *Potencial Impacto Ambiental de las Industrias en el Ecuador* was a major accomplishment. It is the first such publication in Ecuador. It has created increased awareness of industrial-pollution problems in the country and,

through EDUNAT III seminars, is being used to stimulate debate and generate recommendations for reducing industrial contamination.

EDUNAT III has created systems for compiling and organizing information. It now faces the challenge of disseminating that information. Final development of the computerized database and production of the vademecos will move in this direction. It is clear, however, that under the existing grant, the project will not be able to complete publication of the vademecos or update them.

The greatest weakness in the industrial-pollution strategy has been its lack of contact with the industrial sector. It appears that until publication of *Potencial Impacto Ambiental de las Industrias en el Ecuador* in December 1991, most of the industrial sector was unaware of EDUNAT III's activities. Even with publication of the book, most industrialists remain unaware of the depth of information collected by the EDUNAT III project.

2.1.2.6 Recommendations

1. Industrial pollution is a high-profile topic nationally and, to an increasing degree, with USAID and other donors. Therefore, it has a strong potential for funding if presented in an appropriate framework. USAID, in cooperation with other donors, should continue to support this activity. Potential programs include the following:
 - (a) GEF (both pollution of international waters and ozone concerns);
 - (b) A.I.D. Environmental Pollution Prevention Project (EP3);
 - (c) World Environment Center industry-to-industry activities; and
 - (d) programs of national industries.Potential funding sources include the following:
 - (a) debt-for-development swaps;
 - (b) structural adjustment set-asides (see Paul Weatherly), (c) P.L.480 funds;
 - (d) USAID funds (new or old) and other donors.
2. EDUNAT III should continue to host seminars with industrial sectors to discuss the contents of *Potencial Impacto Ambiental de las Industrias en el Ecuador* and to identify information and economic and legal needs to address industrial contamination. The project should strive to secure industrial co-sponsorship of these seminars so that they become institutional partners in the process.
3. EDUNAT III should develop relationships with industrial organizations (e.g., Camaras de Industriales, Camaras de Industriales Pequeñas, INSOTEC, FEDEXPOR) to assist in the dissemination of information and the creation of solutions to industrial pollution.
4. EDUNAT III should review and revise priorities for compiling information. The project will not be able to complete collection on all industries within the project period, so it is important that it systematically prioritize its efforts for the remaining 15 months of the project.
5. The project should reassess the development of a McIntosh-dependent industrial database. IBM is the most common brand of computer used in government, industry and research organizations in Ecuador. It is also the most common system within Fundación Natura. A McIntosh-based system would not have as wide a distribution as would an IBM-based system. If a project goal

is to eventually make its information widely available, it will need to develop an IBM-compatible database.

6. EDUNAT III, in cooperation with the Ecuadoran industrial sector and USAID, should explore the establishment of an institutional mechanism for continuing collection, organization and dissemination of technical information on industrial contamination.

2.1.3 Environmental education

2.1.3.1 Description of strategy

The goal of this strategy is to develop a mechanism for strengthening and expanding environmental education in both the formal and informal educational systems. The educational levels involved in this strategy are nursery schools, kindergartens, primary and secondary schools, technical schools, normal schools and various adult-education programs. (Informal education has been placed in the operational plans of strategies for environmental awareness and community development.)

2.1.3.2 Implementation: opportunities, modifications and initiatives

Environmental education, as an innovation in the Ecuadoran school system, required the support of key people, but it was clear that innovation would only occur on paper if EDUNAT III used conventional approaches.

Planning for this strategy was initiated with a comprehensive study of the Ecuadoran school system. The study relied was based upon the perspective of introducing an innovative program. Since EDUNAT III was designed to expand the activities of EDUNAT II and strengthen environmental education, a clear understanding of the total education bureaucracy was necessary. From this study, a plan was developed for the Integrated Teacher Training Program. Subsequently a convenio was signed to conduct the training, and the agreement became operational.

In this strategy, operational plans have not become ends in themselves. Flexibility was required in order to cope with all the ministry offices in Quito and the administrative structures at the provincial level. Using a systems approach, EDUNAT III developed strategies based upon pragmatic decisions in the context of contingency analysis. The staff in EDUNAT III is the same staff as in EDUNAT II, and they had learned a great deal from this previous experience. Bottlenecks were inhibiting productivity of both projects in all project activities, including materials production and distribution, training activities, coordination and administration.

For EDUNAT III, getting project activities into the hands of classroom teachers was of paramount importance as the fundamental step in the innovation. By working at the introduction of environmental education directly into classrooms, EDUNAT III has planned the crucial tactic in the adoption of educational innovation.

2.1.3.3 Activities and products

2.1.3.3.1 Institutionalization process

EDUNAT I, II and III can be seen as an interactive process of public education, with EDUNAT III being built upon the modular structure of EDUNAT I and II. Throughout the EDUNAT II project, a working relationship existed between EDUNAT and the Ministry of Education and Culture (MEC). However, it was not until the development of the Integrated Teacher Training Program with the Ministry of Health, Institute of Sanitary Public Works, the Ministry of Social Welfare and with the MEC Department of

Health and Environmental Education, Department of Teacher In-Service Training, Department of Planning, Department of Supervision, and Department of Rural Education that a legal, interministerial agreement was signed with EDUNAT III. This legal agreement (Convenio of June 1989) has become the de facto institutionalization of environmental education.

In order to establish the convenio a lengthy series of meetings, conferences and negotiations were held with all levels of the respective Ministries and public offices. The signing of the convenio took place at a high-level, formal ceremony that received a great deal of publicity. This first convenio was for a one-year period. It was later extended for two years.

In March 1992, MEC and EDUNAT III began negotiations for a new convenio. MEC wants this new convenio to cover a two-year period. Since EDUNAT III terminates before the end of this time period, a special clause will be needed in the convenio. This clause is under consideration as options are being discussed.

This interministerial agreement is the mechanism which EDUNAT III is using to institutionalize environmental education in Ecuador. Each Ministry contributes resources, and 21 offices have been established – one in each province. Emphasis has been placed on health and the environment, using MEC's health-education program as entry into the bureaucratic structure of the school system. This design has placed EDUNAT III within the government sector in a unique arrangement. EDUNAT III remains autonomous, but is recognized by government agencies as the expert source on environmental education.

The activities of EDUNAT III and its educational materials are accepted and utilized by the governmental coordinators in each province. Under the guidance of EDUNAT III, these coordinators are developing their staff and have made environmental education an operational reality throughout the country. Environmental educational activities are brought into the classrooms through a system of teacher training seminars and distribution of educational materials which use a multiplier mechanism. The teachers who receive training from EDUNAT III staff in Quito and in the provinces are taught to train others in their local schools. All participating teachers receive the training manuals with classroom lessons.

2.1.3.3.2 Curriculum development in environmental education

EDUNAT III has not attempted to develop a separate curriculum subject area in the school system for environmental education. To create a new subject would involve being trapped in a never-ending series of negotiations within the education bureaucracy. Instead, EDUNAT III has prepared teachers manuals and materials that redesign existing lessons to focus on environmental issues. International education organizations have commended the project for this decision. This approach was developed during EDUNAT II.

EDUNAT III has applied this approach in the following programs:

- Literacy programs of MEC, for which EDUNAT III produced 200,000 copies of a 16-page pamphlet on environmental education. The pamphlet was distributed to 80,000 literacy instructors.
- Pre-Kindergarten (3 yr - 4 yr) and kindergarten
- Technical secondary schools
- Teacher training institutes
- Supervisors in MEC

2.1.3.3.3 Preparation of educational materials

Staff of the EDUNAT III project have been preparing their materials in the same professional format as in their previous projects. The staff of the project and contractors study environmental information and the curriculum review. They design prototypes and correct them. Then teachers review the materials in a validation process. This process is a standard procedure in the preparation of educational materials, but due to a lack of sufficient time, people or funds, EDUNAT III does not give sufficient attention to revision. Research is lacking in the actual use of these materials. In the validation process, teachers read manuals and are tested on the content. Adjustments are made before publication. In the case of the manual on pre-kindergarten and kindergarten, many teachers had problems with comprehension of the reading material, and this problem was reported in the pre-production study that used the Spaulding Test of Readability.

During EDUNAT III, the following materials were produced and distributed:

- Manual for pre-school (kindergarten) teachers
- Instructional posters for pre-school students
- Classroom work sheets for pre-school students
- Manual for ecological clubs
- Manual for school environment fairs
- Manual for supervisors on supervision in MEC

Preparation of locally produced educational materials is just beginning. The first series of seminars have been conducted in the Amazonas region. The purpose of this activity is to develop an understanding of the environmental problems in particular communities and incorporate this information into the school lessons through well-designed, but simple materials.

2.1.3.3.4 Distribution of educational materials

Production and distribution of educational materials has been the major achievement of the EDUNAT projects. Through all three phases, the project has brought environmental education to all sectors of the Ecuadoran population and, in particular, has provided the school system with the information and lesson plans necessary to conduct an effective environmental-education program.

EDUNAT III uses 10 percent of its funds on distribution. Private carrier companies, local buses, air cargo and project and Fundación staff deliver material; in one emergency an ambulance was used.

The following is a list of tables, included in Annex three, enumerating the educational materials developed, produced and distributed by EDUNAT. A map, also included in Annex three, shows the distribution sites. It is clear from these tables that EDUNAT has reached all corners of the country, and the project has produced a wide and diverse range of educational materials.

| | | |
|---------|---|---|
| Table 1 | - | EDUNAT III Distribution of printed educational material, September 1989 - March 1992 |
| Table 2 | - | EDUNAT II 1983 - 1987 |
| Table 3 | - | EDUNAT I 1980 - 1982 (includes total production, including distribution in the public school system as well as in private institutions) |
| Table 4 | - | EDUNAT Radio programs |
| Table 5 | - | EDUNAT III Seminars |
| Table 6 | - | EDUNAT Audio-visual slide production |
| Table 7 | - | Audio-visual distribution |
| Map 1. | - | Distribution of educational materials |

2.1.3.3.5 Teacher training in formal school system

Teacher-training seminars are crucial for the introduction of environmental education into the formal school system. These seminars were initiated in EDUNAT II and continue to use the same technique for the multiplier effect. Unfortunately, time is insufficient in the operational plans of EDUNAT III to follow-up on the actual learning that occurs in these seminars. This lack of follow up is a weakness in the multiplier-effect system, and it adversely affects the quality of instruction. At the provincial level, increased pedagogical support is needed.

Even though the project will begin working with supervisors in the near future, this project activity cannot alleviate the problem. Supervisors are concerned with administrative duties and are not prepared to work on instructional matters. During the course of EDUNAT III, the project staff will undertake the following activities:

- continue and extend seminars for primary teachers;
- prepare and conduct pre-school seminars; and
- prepare and conduct secondary-school seminars.

2.1.3.3.6 Secondary-school scientific research

Scientific research in secondary schools is in need of substantial input in order to enable teachers to conduct worthwhile and viable activities. Scientific information and skills are seriously lacking at the provincial level. These schools lack the following elements:

- resources, such as scientific labs, libraries and an economic base to conduct research in many schools;
- preparation of teachers in many secondary schools to conduct scientific research; and
- a lack of access to relevant information in many secondary schools.

Rather than change this activity, EDUNAT III should reconsider other activities and give this area a priority. It is important for EDUNAT III and environmental education in Ecuador to develop environmental scientists. At this level, students can concentrate on community-level environmental problems and conduct basic studies that contribute to knowledge of real local needs. Throughout EDUNAT's current program, teachers and students are working in this field, but constraints call into question the utility of the research.

The staff of EDUNAT III includes few scientists, and these scientists' time is dedicated to a wide range of activities, not all of which are scientific. Closer linkages with institutions that concentrate on environmental science can offer support to EDUNAT III in this vital area.

2.1.3.3.7 Output of EDUNAT III formal school system strategy

At this mid-term evaluation, EDUNAT III has made progress toward the goal of strengthening environmental education throughout the country. The following outputs demonstrate this progress:

- an interministerial and NGO team of people developing an environmental- education program using an integrated approach, including environment, health and sanitation;
- autonomy of EDUNAT III as NGO component with environment expertise, working as a team member, but not subsumed in government bureaucracy;
- Decentralized organizational structure with 21 provincial offices with paid staff;
- Improved environmental conditions in communities where students "theses" have been in environmental studies;
- Teacher-training activities, school-level research projects and ecological clubs;
- Officially graded environmental-education lessons, including lessons on specific skills in analysis of water contamination;
- Multiplier effect, including the following,

Project teacher participants attend seminars, then in turn teach others, who are project recipients and who in turn teach students, who are project beneficiaries;

Project educational manuals and materials are used by many teachers in each school where environmental education is introduced;

Radio programs and newsletters

- Municipal cooperation, including UNICEF Campaign on health education in Quito

2.1.3.3.8 Constraints

Frequent teacher strikes have caused the EDUNAT III staff has to readjust their plans. When these strikes conflict with seminars, a change of venue is made.

Economic resources are seriously lacking in provincial offices. These economic constraints are demonstrated in the following ways:

- no office furniture or office material;
- no phones or transportation facilities; and
- a reliance upon friendship and bargaining for every acquisition.

Disbursement of funds:

- The interministerial *convenio* is fragile, and at times, funds from ministries are not readily available.

2.1.3.4 Impacts of strategy

The process of institutionalizing environmental education is one of the most significant results of EDUNAT III. However, education projects operate in complex political/administrative systems with large and varied power groups. Educational projects benefit diverse groups and must take into account sociocultural diversity and organizational instability. In order to study the impact of an educational innovation, an appropriate evaluation mechanism must be included in the project design. This evaluation did not occur in the EDUNAT III project.

Does consensus exist on what environmental education should achieve? What are the expectations of students who have been in environmental education programs? Are test results the best indicators of the success of an environmental-education program?

Is it valid to assume that well-informed people will use information to change behavior patterns that adversely affected the environment?

The impact of a total environmental-education effort will become apparent as Ecuadoran society changes the economic and social policies, priorities and practices that contribute to the loss of the nation's natural resources.

Conceptually, EDUNAT III is a worthy project with ambitious social goals and complex variables. But it is only one component of a total effort. Environmental education is not an end in itself. It is a means toward a well-managed ecosystem that generates economic growth; it is a vehicle to improve the lives of beneficiaries; and it is a means to affect national policies.

At mid-point in this stage of project implementation, the question is being raised as to the impact of environmental education. But prior to implementation, no objective standard for measuring the impact had been established, nor was a method established to determine a consensus of criteria for impact indicators.

2.1.3.5 Conclusions

These conclusions are based on information gathered on field visits to the provinces of Guayas, Manabi and Imbabura to observe educational programs and meet with the provincial coordinators, their staff, local teachers and community leaders. The evaluation team also held discussions with the MEC personnel in Quito and participated in negotiation sessions. They held discussions with personnel of international organizations involved in environmental-education programs, with staff of other environmental NGOs and with the project staff.

The goal of this strategy is to develop a mechanism for strengthening and expanding environmental education in the schools of Ecuador, and in large measure, the goal has been achieved. The mechanism for this success is the interministerial/NGO agreement which, by establishing 21 provincial offices for environmental education, has permitted EDUNAT III to expand throughout the country. For instance, in Tunaspamba, a rural village distant from Quito, EDUNAT III materials are being used.

Teachers are discussing environmental issues and students are motivated to participate in ecological clubs. Secondary students write theses on their local environmental problems. However, just as expansion is taking place, the other aspect of the strategy goal, to strengthen environmental education, is being hurt by limited resources. Paradoxically, EDUNAT III's success in developing interest in environmental education has increased demand to the point where it can no longer respond to all of the requests it receives for assistance.

The future of environmental education in the schools of Ecuador is uncertain. Through EDUNAT, the basis for a program has been established, and MEC is committed to continue a program. But the quality of the program is uncertain. The ministries face serious budgetary constraints. It is difficult to foresee how the urgent need to strengthen environmental education in the school system can occur without external funding. It is possible that the investment in environmental education made by EDUNAT I, II, and III could be lost.

2.1.3.6 Recommendations

1. Continued activities in support of environmental education in the formal school system are vital to ensure that the major advances achieved under EDUNAT III are sustained and augmented. Establishment and implementation of an interministerial/NGO environmental education *Convenio* with offices in the 21 provinces of the country is a major accomplishment and should receive continued assistance in order to reinforce this nationwide teaching network. An additional priority area should be support for professional education at the technical and university levels in order to provide Ecuador with the talent to resolve its environmental problems. USAID's continued funding of this activity is recommended, as is USAID's active collaboration with other donors in order to secure complementary funding from, for example, World Bank.
2. The formal-school-system strategy of EDUNAT III should continue. However, growth of this strategy needs to be studied for policy implications. The management system between EDUNAT III and Fundación Natura could make the current arrangement dysfunctional.
3. The decentralized, interministerial activities in the 21 provinces should be strengthened. Decisions regarding how to do this can be made only by understanding the options. A study should be made to learn the best course of action for capturing the growth potential which exists at the provincial level.
4. Secondary, vocational and technical-education institutes should receive more scientific support, both in terms of economic and human resources. This support is vital for the integrity of environmental education at this stage of its development.
5. Emphasis on environmental education should be placed on teacher training institutes for their potential multiplier effect. It is at these institutes that both pedagogical practices and environmental science can be merged into a strong program.

6. Every effort should be made to maintain positive results of the interministerial/NGO relationship established in EDUNAT III, which is in the process of institutionalization.
7. An evaluation and feedback system should be designed to assess learning which has occurred in the schools among teachers and coordinators. The information which comes out of this system should be used to revise existing materials.

The following should take place within the time frame of the existing project, and should also contribute to the final evaluation.

8. Two-way flows of communication should be actively encouraged by developing and institutionalizing mechanisms which encourage people in localities throughout the country to contribute ideas, articles for newsletters, oral reports on cassettes for radio programs and photos of activities. EDUNAT III can use its existing network to do this.
9. EDUNAT III should collect, quantify and categorize reactions and evaluations (both positive and negative) from all participants in project activities. Information from evaluations should be used to improve practices.
10. The final evaluation should include field visits to a substantial number of provincial offices of MEC/EDUNAT.

2.1.4 Community development

2.1.4.1 Description of strategy

The community-development strategy was intended to develop and implement the means to train and motivate public and private community-development organizations in both rural and urban areas in the field of environmental awareness, preservation, and problem solving. These activities were to occur in the following four components:

- Development of a database on community-development (CD) organizations throughout the country, assessing their efforts, needs and willingness to work with Fundación Natura.
- Development of training materials for use in courses for personnel of selected community-development organizations.
- Delivery of the training courses.
- Provision of special technical-assistance efforts to selected organizations within the country.

2.1.4.2 Implementation: opportunities, modifications and initiatives

This strategy was in some ways the most ambitious of the five. Together with the industrial-pollution strategy, it was furthest from previous EDUNAT efforts. Moreover, it was an innovative effort for EDUNAT, as well as for the country. No data or experience existed in the country to guide EDUNAT III efforts. Additionally, of the five strategies, only the document center received less funding.

During the early phase of implementation, this strategy confronted serious problems. It was impossible to hire new staff who could easily and rapidly begin to implement strategy efforts; it even took a long

time to find general staff to hire. The difficulty of the work, lack of useful and significant documentation within the country and the frustration of the work (among other factors) led to frequent turnover of strategy coordinators and other staff. In addition, significant review and revision was needed for many documents in order to make them adequate for the needs and reality of community development in Ecuador.

Several consequences, both negative and positive, resulted. On the negative side, the learning curve was very flat at the beginning, and some internal deadlines were not met. Materials had to be rewritten and revised regularly, and new staff were frequently sought. Some anticipated products simply could not be produced due to lack of information or personnel.

On the positive side, however, new ground was broken in the area relating to environmental education and community development and new knowledge was gained for Ecuador. The staff of the strategy were required to be agile, flexible and creative. In particular, organizations which allowed for the effective multiplication of this knowledge and its distribution throughout Ecuador were sought out for collaboration. Finally, special opportunities were targeted allowing for practical field testing of this experience and implementation of valuable pilot-project efforts.

The major principle in the strategy has always been to multiply all efforts made within it. This principle has been operationalized by working exclusively with major NGO and governmental community-development organizations, instead of working directly with communities or community representatives. Moreover, in order to make the strategy efforts as effective as possible, efforts were made to work with organizations and agencies which had the largest area of impact in terms of size, experience and geographic coverage.

Another major operating principle of the strategy was to be pragmatic and flexible so as to be able to take advantage of any opportunities that presented themselves in the course of strategy implementation. These basic principles were not deviated from significantly during the period under evaluation although shifts in tactics did occur from time to time, as well as significant learning and modification of products. Details are provided in the following sub-section, but several major changes are highlighted here.

First, leaders of community-development organizations were much less aware of environmental problems and environmental training needs than had been anticipated. As a consequence, two additional training sessions were scheduled specifically for leaders.

Second, participant evaluations determined that many of the materials developed for use in training and as references for those who were trained were inadequate. These materials had to be significantly revised.

Third, due to lack of knowledge about the relationship between community development and environmental protection, some activities could not be conducted.

Fourth, in working with institutions, particularly large ones, initial expectations often proved to be inappropriate or incorrect, leading to the need to shift and rethink approaches and to find new alliances and ways to work within the institutions.

Fifth, although some activities and proposed products could not be completed as initially anticipated, they could often be brought along to the point where they were ready for implementation, should additional funds allow for completion.

2.1.4.3 Activities and products

EDUNAT III believed that in order for this strategy to be conducted effectively, a much better understanding of the extent and nature of community-development organizations in Ecuador is required. Although lists of community-development organizations had previously been created elsewhere, none were adequate for EDUNAT's needs. Therefore, it was necessary to compile all available lists (five were discovered) into a single list to serve as the starting point for assessment. Of the approximately 500 organizations on the compiled list, some 120 were chosen for more in-depth evaluation. These organizations were chosen on the basis of the following criteria:

- whether the organization engaged in major community-development activities, such as agriculture, health, education, and direct work with communities;
- size and apparent national coverage of the organization;
- if the organizations were located in Quito, the effectiveness of their work in outlying areas;
- number of field and outreach workers.

A firm was hired to then present an extensive questionnaire to all 120 of the CD organizations. Since many were located outside of Quito, this entailed significant travel into the provinces. Items of interest included size and scope of the organization, type of projects conducted, type of training courses given, as well as training needs, awareness of environmental problems and needs, relationship between organizational activities and environmental protection, awareness of Fundación Natura and its activities and willingness to work directly with Fundación Natura. As noted above, one of the major conclusions of the questionnaire was that many organizations did not do a great deal of work with environmental concerns and the leaders demonstrated a low level of understanding of environmental problems and needs. Of the organizations studied, only a handful did not wish to work with EDUNAT III. After the implementation of the survey and the preliminary evaluation of the answers given, EDUNAT III began to develop its training materials, including both internal support material to be used by trainers and final products to be distributed to trainees, organizations and others throughout Ecuador. A permanent database of CD organizations is maintained and updated.

2.1.4.3.1 Development of training and support material

EDUNAT III soon discovered an almost total absence of basic training material in the field of community development and environment. It also found very few people, if any, could be hired to create appropriate training documents. As trainers were already on staff and because training sessions were scheduled, it became necessary to improvise and utilize the creative energies of the trainers. Since the design for training, as well as hand-out material was being created by the trainers in consultation with other staff persons at EDUNAT III (especially the director, and the biological advisors who provided assistance to all of the different strategies areas), it was decided that the most logical course was for the trainers themselves to write the training-support documents.

Over a three-year period in which training took place, four basic orientation documents were created: *The Dynamic Determination of Factors Involved in the Environment; A Manual for Self Diagnosis of Community Environmental Concerns; Environmental Education for Community Development; and The Urban Environmental Problems*. The first three documents were primarily used as philosophical and methodological underpinnings of the training. Major emphasis was placed upon the importance of participants actively working – both by themselves and in groups – to evaluate environmental problems in their own area and with their own particular agencies to examine the interrelationships between the problems and community and economic development factors and to use the information to develop workable and valuable conclusions about problem priorities and project or program approaches that might be employed in order to overcome the identified problems. The last document was a mostly straightforward presentation of specific, urban environmental problems. In addition to providing didactic material for the trainers, portions of some documents were delivered to trainees during the seminars.

EDUNAT III was aware, however, of a further need for practical materials. One of the biggest gaps was in the area of rural environmental problems, and a great deal of attention and care was directed to this end. EDUNAT III staff extensively researched potential problems and alternative solutions. An initial list of more than 300 different problems/solutions was generated. This list was presented and discussed fully in many of the different seminars, leading to significant refinement and improvement in its utility and specific applicability to Ecuadoran conditions. As a result of the give and take within the many different seminars, a final document was produced, *Rural Environmental Deterioration -- Some Alternatives for Solution*. This document was then made available to all trainees after the fact. A second major document utilized and distributed was *Principal Environmental Problems of Public Health and Sanitation in Ecuador*. Developed for the formal education program, it was considered to have equal applicability for community-development purposes.

Another planned document was a compilation of short pieces relating environment to community development. This document was written by major authorities on different elements of community development. Unfortunately, after extensive outreach and contact efforts with these individuals, only two out of a total of ten different themes were ever written. Leaders in community development simply did not have the background knowledge and/or the interest to make the necessary connections between their specialty and environmental protection. Ultimately, the effort had to be abandoned.

A different task was to publish a series of press clipping from the past decade. These press clips dealt with a number of community-development and environmental problems. From an initial listing of more than 300, the material was evaluated and winnowed down to some 150 press reports. The document has been prepared for printing, but as of yet, no funds have been located for its publication.

A primary purpose of document development was to support and reinforce formal training. Many of the CD organizations were not chosen to receive training, but all the groups on the EDUNAT III registry were given complete sets of all documents produced.

2.1.4.3.2 Formal training sessions

The initial goal was to provide training for at least two employees of each of the 120 selected development organizations. Training sessions were held in a cloistered atmosphere, with all lodging and meals provided. Sessions were conducted for either two or three days, with three trainers usually participating in the event. Training would either be conducted exclusively by EDUNAT III staff or by the personnel of firms hired for the training. Efforts were made to ensure that training was as varied,

dynamic and interesting as possible. Training was a mix of formal presentations -- either lectures or appropriate audio-visual material available from other EDUNAT III activities -- and participatory activities.

A typical training session might begin with the presentation of audio-visuals to initiate participants into thinking in environmental terms, follow by presentations on major problems in the trainee's geographic area and the role of community-development organizations and their staff in overall development and environmental protection. Among topics proposed for discussion were the following:

- What are the principal environmental problems in the work area of each participant?
- What is the participant's agency doing to solve those problems?
- What else could be done to resolve the problem?

Results from individual work groups were fed back and discussed within the entire group. Afterwards, additional talks would be given about community self diagnosis about environmental problems and causes and guidelines for project development. Further individual-group discussion would examine the themes presented in the talks to determine how to best implement community self diagnosis and project development. After presenting the results of work groups back to a plenary session and discussing the proposed projects developed in the work group, another formal presentation would be made on the basic document relating rural environmental degradation to alternative solutions.

Initially, participation in training sessions was not nearly so extensive as EDUNAT III had anticipated, with only some 50 percent of the 120 community-development organizations represented. Often only one instead of two persons would attend, and too often the attendees would be relatively low-level staffers. EDUNAT III was unable to exercise control over participation because invitations were directed to heads of the organizations, who had the discretion of choosing whom to send and whether or not to send anyone at all. Staff redoubled efforts, did further outreach and established more training sessions. The efforts paid off, and a final total of 22 seminars were held, training more than 500 staff of 270 of the community-development NGOs. In general, most attendees were men. Probably no more than 25 to 30 percent of the attendees were women.

2.1.4.3.3 Special technical assistance efforts to institutions

The third line of action chosen by EDUNAT III was special technical assistance. Out of the nearly 500 community-development organizations, a limited few were selected for direct assistance in meeting and resolving environmental problems. Two major institutions were chosen, together with two small environmental organizations, which although not qualifying as community-development organizations, were felt to be worthy of assistance. The two institutions were the Ilustre Municipio de Quito (IMQ) and the Ecuadoran Municipal Association (AME).

The IMQ was identified and targeted from the very beginning of the project. Several reasons dictated this choice. The IMQ has always enjoyed both the reputation and the record of major achievement and innovation among all municipalities of the country. Environmental concerns have recently risen to near the top of the municipality's priorities. Relations with EDUNAT III were positive. It was believed that a great deal might be accomplished in working closely with the municipality, as well as with some of its different organizations and dependencies. In more than three and one half years of EDUNAT III, the focus and direction of EDUNAT III technical-assistance efforts with the municipality have shifted according to interest shown in the municipality for different activities. The shift in emphasis was also

due to the municipality's ability to support Fundación efforts, and due to the probability of success of different ideas.

A training program working with community leaders of different, marginal *barrios*, kicked-off collaboration with the municipality. This activity helped them to identify environmental problems and project staff worked with them to develop solutions. In the course of working with the municipality to develop a Memorandum of Understanding (MOU), it became clear that this type of activity was not of high concern for the municipality and that without municipal support, the probability of success was low. Consequently, the idea of working with a marginal population was shelved until it could be more effectively developed and sold.

In its place, a number of different activities were identified for joint implementation with the municipality. These varied efforts resulted from collaborative planning with two different groups within the IMQ, the Municipal Training Institute and the Hygiene Department. The largest and most visible activity was a major campaign for education and outreach to improve citizen understanding and practices concerning garbage. A second effort involved working with the Health and Hygiene Department to provide better training within municipal markets. Finally, a formal training component addressed both the municipality's social promoters, who worked with *barrio* residents, and primary and secondary teachers in the municipal schools.

Over a period of years, the garbage situation had been a major concern of the IMQ. The situation had slowly improved, and the Municipality recently implemented a program for construction of a sanitary landfill. Nonetheless, littering and ineffective garbage-pickup programs have remained serious concerns. To meet these concerns, EDUNAT III developed a major campaign to be conducted in different neighborhoods of the city. To help fill the knowledge gap about the garbage problems and its importance, a book for lay persons was prepared explaining the dimensions and importance of the garbage problem. The style of the book was a mixture of comic-book characters and detailed information about garbage and its impact. The project printed and distributed some 50,000 copies of this 60-page document throughout many of Quito's neighborhoods.

Knowing that the book by itself might not be read nor its suggestions adopted, an innovative book-delivery system was developed. Secondary-school students, *colegios*, were enlisted to participate in a small training session that discussed the contents of the book -- the importance of garbage and the best way to present this information to residents. Each participating student was assigned a section of a street or a section of a *barrio* near the school that the student attended. The assigned areas usually included no more than 10 different houses. After participating in the training, each student then committed him or herself to going out into the neighborhood and taking the book to the selected households and presenting the information to one of the adult members of the house and discussing its contents for a period of 10 to 15 minutes. Initially female *colegio* students participated exclusively in the program although at the end, male students also joined the effort. It is estimated that at least 30,000 houses individually received copies of the book; a minimum of 3,000 students participated in this massive effort.

This activity occurred at the beginning of the three-and-one-half-year life of EDUNAT III, and no objective measures were determined to evaluate the impact of the effort. Nonetheless, personnel of the Municipal Department of Hygiene expressed their sense that the effort made an important impact. Inspectors reported that following the campaign, population behavior changed significantly, primarily

involving a major decrease in garbage thrown onto the streets and a new practice of putting out garbage only at scheduled pickup times. Both changes resulted in a significant decrease in trash and litter.

Training of personnel at municipal markets was oriented toward both improved sanitation and hygiene within markets and toward the optimal utilization of organic garbage produced in them -- believed to be the largest source of organic garbage for the entire city of Quito. As part of the training, all eight of the municipality's health-promotion staff were trained in basic environmental concerns and the relationship of environment to health. Beyond this, special training was conducted for administrative staff for three of the municipality's 23 markets and for a number of the women who rented stalls within the markets. Again, training was oriented toward basic principles of environment and its relationship to public health and sanitation with particular emphasis on what to do with disposal of organic material. Produce comes to market directly from the country without a great deal of preprocessing. Much processing takes place in the market itself, such as leaves stripped off vegetables and fish beheaded and cleaned. Although personnel of the Hygiene Department reported that participant response to the training was positive and that a number of the stall renters made efforts to improve the presentation of their produce and employed more sanitary practices, the basic problem of disposing effectively of the organic garbage was not resolved.

EDUNAT III's intention was to establish a mechanism whereby organic garbage could be collected and taken to a central processing point, where it would be composted and then sold for use in developing family vegetable or fruit-tree plots. Unfortunately, at the time when this activity would have merged reasonably into the market training schedule, the project's strategy coordinator left. The Fundación was unable to enlist support of any additional persons or microenterprise-development organizations to conduct the necessary market research and organizational work to make this plan a reality. Nonetheless, in an effort to salvage some benefit from the effort and to keep alive the basic idea, a brochure was developed that addressed how individual home owners can compose material and utilized it in vegetable gardens or family orchards. As with most EDUNAT III publications, the quality is very high and presents the material in depth and with extensive detail. A camera-ready copy is now complete, and EDUNAT III is seeking a source of funds for its publication.

The teacher-training program within the municipality was essentially identical to teacher training offered through the formal-education strategy work with teachers from the Ministry of Education. Training of social *promotores* was identical to that provided for staff of other CD organizations.

The bulk of the activities with the IMQ were conducted within the first two years of EDUNAT III. Most activities have now concluded although an effort continues to implement training for leaders of marginal neighborhoods. Scope had been extended from Quito to also include Guayaquil, and the proposal is working its way through UNICEF in an attempt to develop significant institutional support and funding.

In the last year and a half of activities for special technical assistance in the municipal sphere, the Ecuadoran Municipal Association (AME) has been the focus of attention. EDUNAT III staff determined that working with AME would be one of the most effective ways to leverage and multiply the impact of informational materials. AME is just beginning a phase of intensive training of municipalities to participate in World Bank/Inter-American Development Bank-funded activity for construction of a variety of municipal public works. A major requirement of the Ecuadoran implementing agency (The Banco Ecuatoriano de Desarrollo, BEDE) is to ensure that adequate environmental-impact assessments are made

before any funds are provided to municipalities. EDUNAT III responded to this situation in two ways.

First, the project worked closely with staff of AME in order to learn their level of environmental awareness and understanding and to provide a beginning level of training for them. This allowed AME to begin to assess its own programs and to determine ways in which environmental concerns should best be incorporated.

Second, EDUNAT III undertook a series of training programs for municipal functionaries and elected officials. These training programs were implemented in conjunction and coordination with AME itself. Of a total 167 municipalities, a goal was set for environmental training for 100 representatives of 50 municipalities. EDUNAT III provided the project materials and staff to do the training; AME provided funding for travel, room and board and for distribution of materials.

The initial MOU between EDUNAT III and AME contemplated training for representatives of 45 different municipalities, to be conducted in three separate sessions, one for each of the three major regions of the country -- highland, coast and Amazonia. Unfortunately, attendance at all three sessions was extremely limited, so that only 19 municipalities were represented. Accordingly, EDUNAT III assumed responsibility for organizing two final training seminars that would cover the entire country and would run consecutively for six days in the resort town of Baños. With a total representation of 30 municipalities in the two training sessions, the goal of reaching 45 municipalities was met and exceeded by four, with a total attendance of 107 persons.

The structure of the training sessions was quite similar to those conducted for staff of community-development organizations, except that a higher level of technical information and input related to the obligations, responsibilities and range of municipal powers. Nonetheless, a major component of the training was oriented towards encouraging and stimulating the creative thinking of the trainees so that they better understood environmental dynamics and were able to play more active roles in developing environmentally sensitive activities within the municipalities.

In order to provide additional assistance to all municipalities in the area of *environmental-impact analysis (EIA)*, EDUNAT III undertook an additional activity. One of its ongoing projects, separate from EDUNAT, is an Andean regional impact assessment effort. The person in charge of this project was hired to develop a manual for impact assessment which would be provided to all of the municipalities. The document underwent extensive review and revision both within EDUNAT III, as well as within the municipal training sessions and with personnel of AME so that the final product represented a major advance in available information. This document is available to all of Ecuador's municipalities.

To complement work with major institutions, EDUNAT III undertook efforts to foster and assist institutional effectiveness of two small regional environmental groups, one in the Southern gold-mining region of El Oro, around the small city of Zaruma, the other in the tourist town of Otavalo, located in the north of the country.

Zaruma and its surroundings represent one of the country's most compelling and concrete cases of widespread environmental deterioration due to uncontrolled gold mining and refining. Throughout the urban and rural areas of Zaruma and its neighboring city, Portovelo, small-scale miners have dug scattered holes and tunnels into hillsides. Excavated ore-bearing rock is transported to more than 100 different processing plants, which, likewise, are scattered in and about the two cities. Preliminary processing, grinding and mercury treatment, is conducted at the onset of processing plants, and the

resulting gold and mercury amalgam is returned to the miners, who then take it to gold buyers in Zaruma. The buyers then drive out the mercury by heating the amalgam. This activity occurs almost exclusively in town, sometimes in commercial buildings, sometimes on street corners and sidewalks. The mercury vapors are generalized throughout the city.

Secondary treatment to recover remaining gold in the crushed ore relies upon a cyanide process. The ore is delivered to processors, who put it in open cement tanks that are flooded with a mixture of water and cyanide. This mixture is cycled several times through the ore to leach out as much gold as possible. Evaporating cyanide affects anyone in the immediate vicinity. Additionally, once the ore has been treated as much as possible, the cyanide-rich waters are immediately dumped into the nearest river or ravine.

Although the problems occurring in Zaruma and Portovelo are not that different from environmental problems found in many other mining areas in Ecuador, the mining-related environmental problems of these two cities are perhaps more dramatic because of the urban setting.

EDUNAT III staff decided upon a three-part strategy for maximum effectiveness in improving the situation. First, a study was commissioned to document the existing situation, to demonstrate the extent and scale of health and environmental problems, to identify the technical processes involved, generate alternative solutions and to make available in one document all known information about the gold-mining-related problem in that area. The project's resulting document, *Environmental Impact of Mining in Zaruma and Portovelo*, is an excellent synthesis of available information.

Aware that simply making information available is not necessarily sufficient to bring about problem resolution, EDUNAT III decided to also make a major effort to train local people and to build up the institutional strength of local environmental groups. To that end, three separate training sessions were scheduled for the area -- one for teachers of the primary and secondary schools of the affected cities and towns, another for students in the local branch of the University of Loja, and the third, and probably most important, one for members of the developing environmental groups.

In addition, the strongest of the environmental groups, Corporación Ecológica located in Zaruma, was strengthened in two major ways. First a MOU was established with the group and agreement was reached to hire one of its members, a local secondary-school teacher, to work part-time as coordinator for a period of 15 months. Second, EDUNAT III undertook all necessary steps in Quito to ensure that the environmental group become legally established under Ecuadoran law as an environmental corporation. These two elements assisted significantly in improving the effectiveness and efficiency of the environmental group, enabling it to be much more active in outreach to communities, to governmental organizations and to the press.

A second environmental group assisted by EDUNAT III was the fledgling Arrayán, located in the town of Otavalo. Contacted by representatives of the group who requested all possible assistance from EDUNAT III, the project decided to offer a training program in Otavalo specifically for members of the organization. An on-site, two-day weekend workshop used standard training materials and practices. Follow-up assistance to the group is facilitated by frequent interaction of one of its officers with staff at EDUNAT III; the officer works in Quito during the week. The potential utility of such training is clear in the requests of other organizations for similar, personalized training efforts. Unfortunately, funding limitations have prevented further provision of this training.

2.1.4.4 Impacts of strategy

As with most of the strategies, the community-development effort did not lend itself to easy impact measurement. No impact indicators were established at the beginning of the project; none, in fact, were required by A.I.D. And it is impossible in most cases to develop realistic indicators after the fact; most often the data does not exist to provide measurement for indicators. Accordingly, the impact of the project is assessed through its accomplishments and achievements. These are identified in the above section on strategy activities and products and further analyzed below in conclusions.

2.1.4.5 Conclusions

The project encountered a series of obstacles in its efforts to develop materials and train the staff of community-development agencies. These efforts were hindered by an absence within Ecuador of written material or knowledge about community development and environment, as well as by a lack of individuals skilled or trained in the field. In spite of these major problems, the project overcame them to produce a very creditable series of training materials and reference documents, both for use by trainers and by staff of community-development organizations. In the process of document development, project staff were sensitive to comments and recommendations made by trainees, and they adjusted material to meet these expressed concerns. Based on evaluation of training by trainees, the project succeeded in presenting material believed to be both interesting and useful. Materials created were of high quality. Material geared specifically to citizens is likewise of high quality, but usually long and often technically complex.

Nonetheless, some participants have indicated a desire for more training and a need for assistance to develop environmental projects. EDUNAT III needs to follow-up on the work of this strategy to determine what has been learned, whether any attempts have been made to incorporate knowledge and concerns into day-to-day agency operation and what the prospects and needs are for further training and assistance. In particular, no means exists to determine additional projects of which EDUNAT III, Fundación Natura and other organizations should be aware.

In a number of different settings, the project attempted to implement training and environmental protection activities with the City of Quito. Results were mixed, indicative of both work within different administrative units of the IMQ and different types of activities. Significant experience was gained in working with a large and active institution, and the groundwork laid for future efforts.

Conventional training components were successful. Training courses for municipal market administrators and renters of stalls within market buildings went well. But it did not culminate in the desired development of a city-wide, organic-waste-composting program for the market.

Efforts to work with leaders in marginal communities foundered due to lack of municipal support. But work with these leaders in both Guayaquil and Quito may begin in the coming year with support from UNICEF.

Finally, a massive outreach and educational campaign in selected areas of the city succeeded in involving more than 3,000 secondary-school students in distributing and explaining an educational document on the importance of proper garbage handling. Municipal employees report that, after the campaign, citizens dealt with their garbage more positively and the appearance of city streets improved.

The effort to assist AME, the Ecuadoran Association of Municipalities, met its training objectives in terms of number of municipalities whose staff received training. Trainee evaluations of the courses were

positive. Like training of social and health promoters, the extent to which this training has changed the way the municipalities conduct work affecting the environment cannot be determined on the basis of existing knowledge. There is no mechanism of follow through with the trainees.

EDUNAT III's efforts have, however, changed the behavior of AME. New and independent training efforts by AME for municipal functionaries is very sensitive to environmental factors. Almost all of the training modules include some discussion of environmental factors. The report produced under EDUNAT III on environmental-impact assessment (EIA) is being used as a basis for training in several modules. Additionally, data generated under the industrial-pollution strategy is being presented for the four most common industrial activities in the country.

In spite of this, the information EDUNAT III and AME provide on environmental-impact assessment is extremely general. It presents only methodologies originating in the developed world. Although assessment is given of the pros and cons of each methodology, EIA activities and information should be brought down to the level of the "possible." In Ecuador, data is often scarce or exists only at a very large scale. Often, data is available only in Quito or in the provincial capitals. Additional work in developing EIA approaches that take these factors into consideration is critical to having a positive effect in municipal project design, selection and implementation.

One effort to concentrate EDUNAT III resources within the small region of Zaruma and Portovelo is an interesting pilot project. This project bears serious consideration in future, technical-assistance efforts. By focusing research, training and institutional-development efforts in this small area over a period of several years, the project enabled the citizen group to have a much greater effect. Although many obstacles must be overcome to meet citizens' goals, many positive gains have resulted. Through the formal incorporation of Corporación Ecológica, citizens are accorded more respect. They are also being listened to and have succeeded in generating significant press coverage of mining and processing problems. Finally, Corporación Ecológica has been able to coordinate local and provincial-government officials into a working group that has issued a position paper on the problem and made serious recommendations for improvement.

Unfortunately, the response from officials of the central government has not been supportive. They have denied citizen access to the results of water-quality sampling, even though these citizens facilitated and made possible the sampling conducted by Guayaquil University. Citizens and citizen groups are still not accorded much respect by many central-government figures, who view these individuals and groups as either extremists or alarmists, not as partners in problem assessment or in the development of alternative solutions.

Project efforts to help other fledgling citizen and environmental groups have not been so extensive. Financial limitations have curtailed additional work in this area. The exception was the assistance given to an environmental group in the tourist market town of Otavalo. EDUNAT III assisted the group, Arrayán, by providing a weekend training session for group members. The group remains active and has moved beyond its initial, stated concerns of serious water-quality and quantity decline in a principal lake. The course has led other fledgling groups to make similar requests of EDUNAT III. Regrettably, these requests were declined due to lack of funds.

2.1.4.6 Recommendations

1. **EDUNAT III broke new ground with its efforts to advance the state of awareness and knowledge about environmental problems and needs within community-development organizations. This important project strategy merits additional support to consolidate and reinforce the efforts to date.**
2. **Both a mechanism and funding are needed for continuing contact and follow through with training-program participants. This follow up is needed for the following reasons: to meet desires of trainees for continuing contact and further education; to determine whether the goals of training are being met; and to determine opportunities for future environmental projects with community-development organizations.**
3. **Fundación Natura and EDUNAT III should develop additional continuing-education techniques that do not depend upon EDUNAT III staff to provide formal training sessions. These techniques should be developed in conjunction with efforts to obtain and distribute low-cost audio/visual devices.**
4. **Additional efforts to adapt impact-assessment procedures to the Ecuadoran context are essential if this important tool is not to remain a mere paper exercise.**
5. **The Zaruma pilot project has demonstrated potential for success in this strategy. It is critical that resources be located to help continue this effort so that it can evolve into a more mature model of effective citizen action.**
6. **Dependent upon additional research and funding, further opportunities for citizen involvement in environmental problem resolution should be located and targeted for concentrated support.**
7. **Pending projects or publications are worthy of completion. EDUNAT III should simplify publications for citizens or produce simpler versions of existing publications.**

2.1.5 Document center

2.1.5.1 Description of strategy

The goal of the document-center strategy is to develop and maintain a system for collecting, processing and disseminating scientific and technical information regarding environmental and natural-resource management. The primary audiences for the strategy are EDUNAT III and Fundación Natura, as well as other private and public institutions and the general public. The initial project plan identified the following four strategic components for achieving the goal of this strategy:

- **determination of information needs;**
- **collection of documents;**
- **processing of documents; and**
- **dissemination of information.**

These four components have appeared in every annual operation plan.

2.1.5.2 Implementation: opportunities, modifications and initiatives

The goal of this strategy and planned activities has not changed in the course of implementation.

2.1.5.3 Activities and products

The major output of this strategy has been creation of the Fundación Natura document center. Fundación Natura used resources from EDUNAT III, as well as its other programs to create this central library where all documents collected by Fundación Natura are cataloged and housed.

EDUNAT III contributed and continues to contribute to the Fundación Natura document center through the four strategic components of this strategy. This section describes the planned activities of each component and evaluates the extent to which EDUNAT III accomplished the activities.

2.1.5.3.1 Determination of information needs

Only the initial operation plan included activities in this component. That plan called for interviews with EDUNAT III staff to determine their needs and to compile a thesaurus of environmental terms to be used in cataloging material.

All of the planned activities of this component were accomplished in the first year of operation. During FY 1989, the document center also determined the information needs of other Fundación Natura programs.

2.1.5.3.2 Collection of documents

During the first year of the project, this component was to design a program for collecting documents, identifying institutions from which documents could be secured and soliciting and training volunteers to collect documents. In subsequent years, the collection system was to be activated.

The development of the collection system took more than one year, primarily because all Fundación Natura programs participated in the establishment of the document center. The involvement of other programs insured that document collection would be consistent throughout Fundación Natura, but it also required more coordination and review in the development of the collection system.

By the middle of FY 1990, the collection system was established and acquisitions began in earnest. By the end of FY 1991, major acquisitions for EDUNAT III were completed. Since then, acquisitions for EDUNAT III have continued, but at a reduced rate.

2.1.5.3.3 Processing documents

The purposes of this component were to develop a system which would allow users to locate documents by subject, key words, author or title and to put the system into use. To achieve this end, the initial operation plan called for the development of a form (*ficha*) on which to record information about each document and the development of a computerized system for storing and retrieving information. Subsequent plans called for processing documents through the system.

By the end of FY 1989, the document center had developed the form for recording information and had adopted Micro-ISIS, a standardized computer database for storing and retrieving bibliographic information. Micro-ISIS is a widely used library database. It allows for searches by subjects and key words as well as by author and title. Each Micro-ISIS entry also includes an abstract of the document. The key words used in the database are those in the environmental thesaurus.

EDUNAT III hired five freelance catalogers to complete the forms for documents used by the project. The work of the freelancers was supervised by the director of the document center. Other Fundación

Natura projects also completed forms for their documents. All of these forms were entered into the Micro-ISIS system, which contains entries for more than 15,000 documents and 770 periodicals.

2.1.5.3.4 Dissemination of information

Under this component, the project was to develop a list of institutions which could potentially use the collected documents and to then inform those institutions of the availability of documents. To inform potential users about the information in the document center, EDUNAT III would publish pamphlets and produce videos. To extend the use of the documents, the project would produce specialized bibliographies.

During FY 1989, EDUNAT III developed a list of institutions which could use the documents it collected. In 1990, EDUNAT III published a bibliography of documents in the document center on general environmental problems. The bibliography categorized the documents by subject matter.

Outside of these two activities, EDUNAT III has done little to formally disseminate information about the environmental documents in the document center. However, the project has informally promoted the document center by informing seminar participants about the center's existence as well as training events.

The document center itself has also undertaken some promotional activities. The director of the center has published articles in national, professional magazines describing the document center and its services. And, in what may be the first in a series of specialized bibliographies, the center has also published a bibliography on pesticides.

Although this strategy was initially designed as an exclusive activity of EDUNAT III, it soon became a part of a larger effort by Fundación Natura to combine and rationalize the separate libraries of its individual programs. By including the EDUNAT III component in this broader project, development of an EDUNAT III document center was slowed. But ultimately, the broader purpose strengthened the project by reducing duplication with other programs. By preventing duplication, more resources were in turn made available for acquiring technical documents.

The only weakness in this component has been in dissemination of information about the availability of documents. EDUNAT III has only published one bibliography of available documents. None of the promotional materials called for in the operational plans -- pamphlets and videos -- have been produced.

2.1.5.4 Impacts of strategy

2.1.5.4.1 Impact indicators

The project design for EDUNAT III did not include impact indicators for this strategy. The goal of the strategy is to create a document center and to make the documents available to Fundación Natura staff, to private and public institutions and to the general public. The most obvious impact indicator for this goal is whether the document center was indeed created. Other indicators include knowledge of the center by potential users, as well as actual use.

2.1.5.4.2 Impacts

Clearly, EDUNAT III contributed to the development of the Fundación Natura document center. Before the summer of 1987, Natura had at least three separate libraries located in individual programs. Consolidation of these libraries began in late 1987, but got its first big boost with EDUNAT III. Now, Natura has one consolidated document center that operates as an independent unit with two full-time staff,

plus periodic support from Natura programs. It already houses more than 15,000 documents and 770 periodicals and continues to grow.

In preparation of this evaluation, evaluators interviewed several environmental groups in Quito. All of the groups were aware of and had used the Fundación Natura document center.

The document center is "public," in that it may be used by anyone. It is open from 9 a.m. to 5 p.m., Monday through Friday. In December 1991, 350 individuals used the document center. The majority of the users are high school and university students, but university professors, national and international researchers, government employees and staff from other environmental groups also use the center.

2.1.5 Conclusions

Development of the Fundación Natura document center is one of the successes of EDUNAT III. The document center is now a permanent feature of Fundación Natura. It is a valuable resource for those concerned with environmental protection in Ecuador and will remain so even after the termination of EDUNAT III. Although EDUNAT III did not accomplish all of the promotional activities it had planned, the document center has become well known and is being used by more than 300 people each month.

The only shortfall of this component has been formal promotion of the document center. Ongoing substantial use of the center indicates that informal promotion has been effective. However, development of a pamphlet and poster advertising the document center, as well as periodic publications on new holdings would further disseminate information about the center and make it even more useful to researchers and government employees.

2.1.6 Recommendations

1. At the end of the EDUNAT III project, Fundación Natura should take responsibility for the operation of the document center, funded from its various programs.
2. EDUNAT III should cooperate with the document center and other Fundación Natura programs to develop and distribute a pamphlet and poster advertising the services provided by the document center.
3. The document center should pursue the creation of a mechanism to regularly inform individuals in private and public institutions about its new acquisitions.

2.2 Policy dialogue

Mid-term evaluation concerns regarding policy dialogue are as follows:

- whether EDUNAT activities have enabled EDUNAT and the Fundación to better represent and promote environmental concerns before the country as a whole and before specific institutions;
- whether EDUNAT III activities have resulted in development of broad institutional policies at high levels to positively affect the Ecuadoran environment;
- whether EDUNAT activities have encouraged or led other organizations, both NGOs and governmental agencies, to share in EDUNAT activities or to undertake similar activities on their own; and
- whether EDUNAT activities have applicability for environmental education elsewhere in Ecuador and in Latin America as a whole and to what extent these activities are directly transferrable or replicable.

2.2.1. Industrial pollution

Before EDUNAT III, Fundación had very limited knowledge about industrial pollution and would have been unwise to attempt to comment on or to promote pollution control except in the most general terms. Through materials produced to date in this strategy, the Fundación has the basis for a much more informed intervention. Nonetheless, the information does have limitations. While extensive, it is based primarily upon measurements of pollution in other, mostly developed countries. Pollution by Ecuadoran industry may well be different, both qualitatively and quantitatively. Additionally, the information relating to control alternatives is general and does not enter deeply into costs of control. Statements about feasibility and affordability of pollution control should be carefully worded. In short, the material in this strategy has strengthened many fold the Fundación's ability to be an informed and effective advocate. Implementation of this role should be carefully thought out. Public statements should be carefully reviewed with experts in the field. Development of EDUNAT work in the strategy has come at a time of increased concern and effort in pollution control. Legal decisions requiring control and a vastly stepped-up municipal program of control help to complement the EDUNAT work and make more likely some level of compliance with existing, national pollution-control laws and standards.

Ideally, others in either Ecuador or elsewhere in Latin America would not replicate the work conducted under this strategy. It is a massive informational effort that needs not to be repeated, but to be continued and updated. This continuation could be done either within Ecuador or in another country. As yet, no similar efforts are known. Refining the work and transferring the information from EDUNAT files and archives to potential users, including industries and industrial associations, is just beginning.

2.2.2. Formal education

EDUNAT's efforts in formal education have long been a major component of Fundación's environmental education. As a result of careful structuring of agreements and working arrangements with the Ministry of Education, both in Quito and in the 21 provinces, significant strengthening of the Ministry's commitment to environmental education has been achieved. Although results necessarily vary at the provincial level, the effect at the national level is clearly evidenced by both the desire of the

administration to sign an extended *convenio* with EDUNAT and the administration's intentions to institute a Sub-Secretariat of Environmental Education. Although much remains to be done to further institutionalize environmental education into the total educational process and curriculum, a major step has been taken.

Materials developed in this strategy have been used for training and distribution through the community-development strategy. These materials are in demand by other organizations and groups. To the extent that additional materials are available for distribution, outside groups will undoubtedly engage in further educational activities. Unfortunately, limited funds for publication prevent significant delivery of material to others. Both the material developed and the approach for delivery of environmental education in the educational system are suitable for export to other countries. Materials are easily exportable, particularly in the Andean region, although any other program would clearly want to do some rewriting to make it more applicable to a specific country, region or locality. Although the strategy EDUNAT used to insert environmental education into the formal system is a valid one, which worked well in Ecuador, it is not necessarily the only one that will work elsewhere.

2.2.3. Community development

Before initiation of EDUNAT's efforts in this strategy, contact with community-development organizations took place only on a random basis. As a result of systematic contact and training with these organizations, they are now much more aware of the effect that their efforts and concerns have on the environment and vice versa. It is too early to say how much effect they have had on changing the way these groups conduct their work or their adoption of new policies that take the environment into greater consideration. Once the extent is known to which past efforts have influenced CD organizations, as well as any other efforts that may be taken in the future, it would be appropriate to indicate whether or not activities and approach are suitable models for other countries. At present, it is clear that most of the materials developed would have applicability.

2.2.4. EDUNAT III and Fundación Natura

At the global level, separating EDUNAT III from the Fundación is difficult. With regard to almost all environmental education, EDUNAT is essentially Fundación. Before EDUNAT III, Fundación already had a very high regard and standing within the country. However, EDUNAT III efforts have helped to expand and consolidate that high standing. This position does not mean that either EDUNAT or the Fundación are able to move environmental policy further or faster than other institutions are willing to take it. The ability of EDUNAT and some of the Fundación's directors to draft a national environmental protection law and bring it before the Congress did not mean that it could persuade the Congress's environmental committee to adopt the draft. It is clear, however, that the whole of the EDUNAT III activities have further enhanced Natura's reputation and ability to shape and influence policy.

From the beginning, Fundación has stimulated others to become involved in environmental advocacy and protection work. The Fundación provided an example, a model of action that others can emulate or use. And Fundación provided a place and programs for people to gain knowledge and experience. Evidence of Fundación's influence includes the many new groups that have developed over the past decade, both in Quito and in the provinces. Much is to be learned from the totality of EDUNAT and Natura experience, and much can be transferred to other groups and countries. This transferral must obviously take place on a relatively small scale, activity by activity or, at most, on the basis of small project transfer. After almost a decade and a half of experience and development, no institution is appropriate for wholesale transfer. None can serve as a total model for some other nation's reality.

2.3 Organizational development

This section focuses on the relationship between EDUNAT activities and Fundación Natura, highlighting some of the principal ways in which EDUNAT has supported Natura in its development and identifying concerns affecting the future and require additional analysis.

As mentioned previously in the report, for many, EDUNAT and Natura are synonymous and interchangeable. In the early years of Natura, at the time of EDUNAT I, this interchangeability was almost true. For many years, the EDUNAT projects provided the vast majority of Natura's budget and dominated programmatic efforts. EDUNAT led Natura's rise to its position as Ecuador's premier environmental NGO. No longer, however, is EDUNAT even roughly equivalent to Natura. Nor has it been for at least five years. Independently from EDUNAT, Natura has developed a series of additional research, communication and conservation projects.

The high level of performance of EDUNAT I and II were instrumental in Fundación success in branching out into other areas and developing project funding separate from EDUNAT. Whether EDUNAT III is similarly constructive in promoting Natura's change and development deserves consideration.

EDUNAT of old assisted through simultaneously spreading the environmental message and creating awareness of Natura. EDUNAT III still performs these functions, but its effect is undoubtedly less. Natura is doing so much that its name and reputation are being maintained, expanded and disseminated in many different ways, particularly in Quito. In provincial areas, however, EDUNAT activities are still the most widely known. And the many training sessions implemented outside of Quito through the community-development strategy have reinforced public awareness of EDUNAT in the provincial areas. Expanded awareness of Natura and its increased contacts with a series of new institutions, including municipalities and NGOs, provide new opportunities to Natura to diversify and expand its efforts.

EDUNAT III's efforts in researching, compiling and disseminating information on industrial pollution, its effects and control alternatives similarly thrusts Natura into direct contact and work with a completely new set of institutional actors -- industrialists and professionals of the private sector. This opportunity is double edged. It enables Natura to undertake a new and more sophisticated role as disseminator of sound technical information for industry and in support of mutually desirable goals of pollution control. The potentially cooperative relationship with industry and with government agencies trying to control pollution may, however, provoke internal tensions.

A primary function of the Natura chapters is identifying major sources of pollution and publicizing them - - issuing *denuncias*. Data on pollution and its effects, data resulting from the EDUNAT effort, can be effective in support of the chapter's efforts. The more it plays this role, however, the less credible the EDUNAT effort may seem to industry, and the less willing it will be to cooperate with EDUNAT or to use its data. Industrial use of this data, however, is the principal objective of the project's industrial-pollution strategy. On the other hand, if the data is not applied in support of publicizing pollution, EDUNAT loses credibility, both internally and with other environmental NGOs that are more "radical" than Natura.

Matching funds must be obtained in order to implement EDUNAT III activities. One means of obtaining these funds has been to solicit industry support for information dissemination, particularly on television, which is an expensive medium. Industrial sponsorship of EDUNAT III television spots and programs has led to condemnation by other environmental NGOs.

These examples are indicative not so much of problems with either Natura or EDUNAT. Rather, they demonstrate clearly the increasing institutional complexity of Fundación Natura. Natura, a blend of environmental advocacy and increasingly sophisticated technical skills, will be increasingly susceptible to attack and internal question as to its proper role.

In light of this situation, where should EDUNAT activities or even an EDUNAT project be situated? This vital question demands serious attention. Its examination and response, however, goes far beyond EDUNAT and beyond the role of this evaluation. Future decisions on other EDUNATs must, however, address this issue if they are to be successful.

2.4 Administration

2.4.1.1 Organizational structure

EDUNAT III uses a compartmentalized organizational structure to implement its five strategies. The project has one director and a central administrative staff. Each strategy has its own technical staff, one of whom is designated as the strategy coordinator. In addition to the technical staffs in each strategy, the project has two biologists which provide technical assistance to all five strategies.

All of EDUNAT III's managerial, technical and administrative staff are on contract. By employing staff as contractors, rather than as full-time employees, EDUNAT III is able to reduce staffing costs. This approach also has allowed the project to expand and contract staffing with strategy needs.

At the time of the evaluation, EDUNAT III only had technical staffs for two strategies, environmental education and industrial pollution. Work in the other three strategies had been largely completed. Any current activities in these strategies are accomplished by the director or the two biologists.

The compartmentalized organization of EDUNAT III has facilitated project implementation. Each strategy has its own distinct purpose and audiences. Organizing along strategy lines has allowed each strategy to develop a program to meet its distinct needs.

The major potential limitation of a compartmentalized structure is the creation of inefficiencies through duplication of efforts. EDUNAT III has avoided this limitation by having weekly coordinator meetings, where the activities of each strategy are discussed and the project director and biologists work with all of the strategies.

As a result of these mechanisms, EDUNAT III provides several examples of cross-strategy coordination. The Quito solid-waste campaign is an example of cooperation between the environmental-awareness strategy and the community-development strategy. The industrial pollution strategy supported the community development strategy in its work on mining issues in Zaruma and Portovelo. The industrial-pollution strategy is also supporting the environmental-education strategy in the preparation of summaries of *Potencial Impacto Ambiental de las Industrias en el Ecuador* for use in secondary schools. And the community-development strategy, in its training events, used materials developed under the environmental-education strategy.

The practice of hiring technical staff as consultants, rather than as full-time employees has given EDUNAT III flexibility in meeting strategy needs, but it has also created some problems. EDUNAT III has not developed and maintained high-level technical expertise other than in the area of ecology and

biology. EDUNAT III has only limited staff in its environmental-awareness and community-development strategies. As work in these areas declined, contracts for these staff were not renewed. The lack of job security with EDUNAT III has also led to several staff of the industrial-pollution strategy moving on to jobs in industry and government. Although the movement of staff out of the project can be viewed positively as providing trained staff to other institutions, it has also had the negative impact of reducing the technical expertise of EDUNAT III.

In the environmental-education strategy, the size of the staff has also caused some implementation problems. As the education program developed, staff became responsible for working with 21 offices in the provinces. However, the size of the staff in this strategy did not grow accordingly, so that staff is now insufficient to continue to produce materials, maintain contacts with the Ministry of Education and to support the work of the province coordinators.

2.4.1.2 Work plans

EDUNAT III prepares two levels of work plans -- annual operation plans and quarterly work plans. The quarterly work plans are derived from the annual operation plans and are produced at the same time as the quarterly progress reports. Progress towards achieving work-plan objectives is reviewed in the quarterly progress reports, as well as at the weekly coordinators' meetings.

During the first three and a half years of implementation, EDUNAT III has prepared work plans and progress reports in a timely manner. The USAID project manager for EDUNAT III, during an interview with the evaluation team, commended the project on its well-prepared and timely reports.

Annual operation plans have at times been over optimistic. However, the quarterly progress reports and work plans have allowed for adjustments. In addition, when adjustments were made, the need for the adjustments were explained in the quarterly reports.

By and large, the work plan, reporting and review system established by EDUNAT III allowed the project to steadily progress towards meeting its goals in an efficient manner. The process has also been flexible enough to allow EDUNAT III to respond to opportunities, such as it did in the case of the solid-waste program in Quito and the mining-contamination project in Zaruma and Portovelo.

2.4.1.3 Feed-back systems

EDUNAT III does not have a formal feed-back system for overall program implementation. It does have evaluation mechanisms in the environmental education and community-development strategies for the formal training programs. Informal, but effective feedback in the community-development strategy has led to significant product modification. EDUNAT III is initiating a feed-back system for the industrial-pollution strategy. Individual feedback mechanisms and approaches and their effectiveness are discussed in the sections of this report which deal with each strategy.

2.4.1.4 In-service training

EDUNAT III has no systematic program of in-service training. Most of the training which staff have received has been on-the-job. However, technical staff have been allowed to attend conferences and workshops in their respective fields.

3. Conclusions

3.1 General conclusions

EDUNAT III has been cost effective and largely successful in its contribution to greater environmental awareness and knowledge about problems and their solutions. The environmental-education and documentation strategies were particularly successful. The evaluation team also found the environmental-awareness strategy successful although its success was difficult to document. Industrial pollution has high promise with design modifications. Community development would require significantly greater resources to achieve its potential.

Grant funds allocated were insufficient to conduct all five distinct and complex strategies on the scale for which they were designed. Achievement of project goals was hampered by the thin spread of funds, by the diverse nature of the activities, some of which were new to Fundación Natura, and by a scarcity of experienced personnel willing to work for long under insecure contracting arrangements. Assuming that continued USAID funding will be limited if available at all, an in-depth focus on fewer strategies will likely have greater potential for funding, whether by USAID or other sources. Specific recommendations derive from this conclusion.

3.2 Conclusions for individual strategies

3.2.1 Environmental awareness

The survey of the knowledge, attitudes and practices of the general population of Ecuador regarding environmental problems is an important accomplishment of EDUNAT III. The survey not only provides EDUNAT III with valuable information for program design, it also represents a potential evaluation indicator of the impacts of the project.

EDUNAT used the results of the survey to help it produce and distribute 328 press releases, 13 television spots and 30 radio programs. The use of mass media has enabled EDUNAT to get its message on environmental protection to both urban and rural citizens. Despite EDUNAT III's problems in the production of its materials on environmental issues, it was able to produce and distribute 50,000 copies of a brochure on garbage management in Quito and will soon produce a pamphlet on environmental law. This pamphlet will complement promotion of a national environmental law.

The activism of EDUNAT III regarding national environmental legislation is one indication of how this strategy is closely linked with the overall work of Fundación Natura. The public relations activities of this strategy are further example of this linkage. Most of Fundación Natura's press needs have been met through the environmental-awareness strategy of EDUNAT III.

3.2.2 Industrial pollution

During the first year of EDUNAT III, the focus of this strategy shifted away from individual industrial sites to industrial sectors and processes. The audience for the strategy also shifted to include government, research institutions, public-interest groups and the general public, as well as industry. These changes strengthened the project's ability to gather information and to affect public policy.

Even with these changes in project design, however, the time and effort for data collection was underestimated. To date, the project has completed or nearly completed data collection for only 14

percent of the 164 industrial processes it identified as having significant impacts on the environment of Ecuador. EDUNAT III will not complete data collection before the end of the project period.

Nonetheless, the industrial-pollution strategy has compiled a wealth of information, which has had some impact on industry and government. The production of *Potencial Impacto Ambiental de las Industrias en el Ecuador* was a major accomplishment. It is the first such publication in Ecuador and has created increased awareness of industrial-pollution problems in the country. Through its use in EDUNAT III seminars, the book is stimulating debate and generating recommendations for reducing industrial-contamination.

EDUNAT III has created systems for compiling and organizing information. It now faces the challenge of disseminating that information. Final development of the computerized database and production of the *vademecos* will move the project in this direction. Under the existing grant, however, the project will not be able to complete publication of the *vademecos*, nor to update them.

The greatest weakness in this strategy has been its lack of contact with the industrial sector. Until publication of *Potencial Impacto Ambiental de las Industrias en el Ecuador* in December 1991, most of the industrial sector was unaware of EDUNAT III's activities. Even with publication of the book, most industrialists remain unaware of the depth of information EDUNAT III has collected.

3.2.3 Environmental education

The goal of this strategy is to develop a mechanism for strengthening and expanding environmental education in the schools of Ecuador, and in large measure, the goal has been achieved. The mechanism is the interministerial/NGO agreement which, by establishing 21 environmental-education offices in the provinces, has permitted EDUNAT III to expand throughout the country. For instance, in Tunaspambama, a rural village distant from Quito, EDUNAT III materials are being used.

Teachers are discussing environmental issues, and students are motivated to participate in ecological clubs. Secondary students write theses on their local environmental problems. However, just as expansion is taking place, the other aspect of the strategy goal, to strengthen environmental education, is being hurt by limited resources. Paradoxically, EDUNAT III's success in developing interest in environmental education has increased the demand to the point where it can no longer respond to all of the requests it receives for assistance.

The future of environmental education in the schools of Ecuador is uncertain. Through EDUNAT, the basis for a program has been established, and MEC is committed to continue a program. But the quality of the program is uncertain. The ministries face serious budgetary constraints. It is difficult to foresee how the urgent need to strengthen environmental education in the school system can occur without external funding. The investment in environmental education made by EDUNAT I, II, and III could be lost.

3.2.4 Community development

In its efforts to develop materials and train the staff of community-development agencies, the project encountered a series of obstacles. Efforts were hindered by an absence within Ecuador of written material or knowledge about community development and environment and by a lack of individuals skilled or trained in the field. In spite of these major problems, the project overcame them to produce a very creditable series of training materials and reference documents for use by both trainers and staff

of community-development organizations. In the process of document development, staff were sensitive to comments and recommendations made by trainees, and they adjusted material to meet these concerns. Based on trainee evaluation of training, the project succeeded in presenting material believed to be both interesting and useful. Materials created were of high quality. Material geared specifically to citizens was, likewise, of high quality, but usually long and often technically complex.

Nonetheless, some participants have indicated a desire for more training and a need for assistance to develop environmental projects. EDUNAT III needs to follow-up on the work of this strategy to determine what has been learned, whether any attempts have been made to incorporate knowledge and concerns into day-to-day agency operation and what are the prospects and needs for further training and assistance. In particular, any other important needs and potential, additional projects that EDUNAT III, Fundacion Natura and other organizations should address remain unknown.

The project attempted to implement training and environmental-protection activities with the City of Quito in a number of different settings. Results were mixed, indicative of both work within different administrative units of the IMQ and different types of activities. EDUNAT staff gained significant experience in working with a large and active institution; this experience will be beneficial in similar, future efforts and the groundwork laid for future efforts.

Conventional training components were successful. Training courses for municipal-market administrators and renters of stalls within market buildings went well. But it did not culminate in the desired development of a city-wide market composting program for organic waste.

Efforts to work with leaders in marginal communities foundered due to lack of municipal support, but may be implemented in the coming year in both Guayaquil and Quito and with the support of UNICEF.

Finally, a massive outreach and educational campaign in selected areas of the city succeeded in involving more than 3,000 secondary school students in distributing and explaining an educational document on the importance of proper garbage handling. Municipal employees report that after the campaign citizens dealt more positively with their garbage and the appearance of city streets improved.

The effort to assist AME, the Ecuadoran Association of Municipalities, met its training objectives in terms of number of municipalities whose staff received training. Trainee evaluations of the courses were as positive. Like training of social and health promoters, the extent to which this training has changed the way the municipalities conduct work affecting the environment cannot yet be determined. There is no mechanism of follow through with the trainees.

EDUNAT III's efforts have, however, changed the behavior of AME. New and independent training efforts by AME for municipal functionaries is very sensitive to environmental factors and includes some discussion of them in almost all of the training modules being presented. The report produced under EDUNAT III on environmental impact assessment (EIA) is being used as a basis for training in several modules. Additionally, the data generated under the industrial-pollution strategy is being presented for the four most common industrial activities in the country.

In spite of this, the level of information available through EDUNAT III and AME on environmental-impact assessment is extremely general. It presents only methodologies originating in the developed

world. Although the pros and cons of each methodology is assessed, the EIA activities and information should be brought down to the level of the "possible." In Ecuador, data is often scarce or exists only at a very large scale. Often, data is available only in Quito or in some provincial capitals. Additional work in developing EIA approaches that take these factors into consideration is critical to having a positive effect in municipal project design, selection and implementation.

The effort to concentrate EDUNAT III resources within the small region of Zaruma and Portovelo is an interesting pilot project that bears serious consideration in future technical-assistance efforts. By focusing research, training and institutional development efforts in this small area over several years, the project enabled the citizen group to have a much greater effect. Although many obstacles block achievement of citizens' goals, many positive gains have also resulted. Through the formal incorporation of Corporación Ecológica, citizens are accorded more respect. They are also being heard and have succeeded in generating significant press coverage of mining and processing problems. Finally, Corporación Ecológica has been able to coordinate local and provincial government officials into a working group that issued a position paper on the problem and made serious recommendations for improvement.

Unfortunately, response by central-government officials has not been so supportive. Access to results of water-quality sampling has been denied to citizens, even though they facilitated and made possible the sampling efforts by Guayaquil University. Citizens and citizen groups are still not accorded much respect by many central-government figures, who view them as either extremists or alarmists, and not as partners in problem assessment and development of alternative solutions.

Project efforts to help other fledgling citizen and environmental groups have not been so extensive. Financial limitations have curtailed efforts to do additional work in this area. The exception was the assistance given to an environmental group in the tourist-market town of Otavalo. EDUNAT III assisted the group, Arrayán, by providing a weekend training session for group members. The group remains active and has moved beyond its initial stated concerns of water quality and quantity decline in a principal lake. The course has led other fledgling groups to make similar requests of EDUNAT III. Regrettably, however, these requests have been declined for lack of funds.

3.2.5 Document center

Development of the Fundación Natura document center is one of the successes of EDUNAT III. The document center is a permanent feature of Fundación Natura. It is a valuable resource for those concerned with environmental protection in Ecuador, and will remain so even after the termination of EDUNAT III. Although EDUNAT III did not accomplish all of the promotional activities it had planned, the document center has become well known and more than 300 people use it each month.

The only shortfall of this component has been formal promotion of the document center. The substantial use which the center already receives indicates that informal promotion has been effective. However, development of a pamphlet and poster advertising the document center, as well as periodic publications on new holdings would further disseminate information about the center and make it even more useful to researchers and government employees.

4. Recommendations

4.1 General recommendations

1. Grant projects, as much as contracted activities, are well served by having verifiable indicators of accomplishment and an integral monitoring and evaluation component. While the evaluators are intuitively certain that EDUNAT III has been successful, the lack of measurable benchmarks has made providing solid evidence of this success difficult. USAID should explore the possibility of working with Fundación Natura to develop a monitoring and evaluation plan for EDUNAT III and other Natura programs.
2. In order to function efficiently and competitively, NGOs should consider offering employment conditions that attract and hold experienced professionals. This implies convergence with the private for-profit sector in the areas of management and entrepreneurial pursuit of funding.

4.2 Recommendations for individual strategies

4.2.1 Environmental awareness

1. At the end of the EDUNAT III project, Fundación Natura should incorporate environmental awareness into its core responsibilities and as a component of other projects.
2. EDUNAT III should conduct a validity analysis of the survey of knowledge of environmental issues.
3. The use of the survey of knowledge of environmental issues as an impact indicator should be explored by the project.

4.2.2 Industrial pollution

1. This topic has a high profile nationally and to an increasing degree with USAID and other donors. Therefore, it has a strong potential for funding if presented in an appropriate framework. USAID in, cooperation with other donors, should continue to support this activity. Potential programs include the following:
 - (a) GEF (both pollution of international waters and ozone concerns);
 - (b) A.I.D. Environmental Pollution Prevention Project (EP3);
 - (c) World Environment Center industry-to-industry activities; and
 - (d) programs of national industries.

Potential funding sources include the following:

- (a) debt-for-development swaps,
 - (b) structural adjustment set-asides (see Paul Weatherly),
 - (c) P.L.480 funds,
 - (d) USAID funds (new or old) and other donors.
2. EDUNAT III should continue to host seminars with industrial sectors to discuss the contents of *Potencial Impacto Ambiental de las Industrias en el Ecuador* and identify information and economic and legal needs to address industrial contamination. The project should strive to secure

industrial co-sponsorship of these seminars so that they become institutional partners in the process.

3. EDUNAT III should develop relationships with industrial organizations (e.g., Cámaras de Industriales, Cámaras de la Pequeña Industria, INSOTEC, FEDEXPOR) to assist in the dissemination of information and the creation of solutions to industrial pollution.
4. EDUNAT III should review and revise priorities for compiling information. The project will not be able to complete collection on all industries within the project period, so it is important that it systematically prioritize its efforts for the remaining 15 months of the project. EDUNAT III should consult with the department of environment in the Quito city government in establishing its priorities.
5. The project should reassess the development of a McIntosh-dependent industrial database. IBM is the most common brand of computer used in government, industry and research organizations in Ecuador. It is also the most common system within Fundación Natura. A McIntosh-based system would not have as wide a distribution as an IBM based system. If the project wants to eventually make its information widely available, it will need to develop an IBM-compatible database.
6. EDUNAT III, in cooperation with the Ecuadoran industrial sector and USAID, should explore the establishment of an institutional mechanism for continuing collection, organization and dissemination of technical information on industrial contamination.

4.2.3 Environmental education

1. Continued activities in support of environmental education in the formal school system are vital to ensure that major advances achieved under EDUNAT III are sustained and augmented. The establishment and implementation of an interministerial/NGO environmental-education *Convenio* with offices in the 21 provinces of the country is a major accomplishment. This effort should receive continued assistance in order to reinforce this nationwide teaching network. An additional priority area should be added: support for professional education at the technical and university levels to provide Ecuador with the talent to resolve its environmental problems. It is recommended that USAID continue funding this activity and actively collaborate with other donors in order to secure complementary funding with, for example, World Bank.
2. The formal school system strategy of EDUNAT III should continue. However, growth of this strategy needs to be studied for policy implications. The management system between EDUNAT III and Fundación Natura could make this arrangement dysfunctional.
3. The decentralized, interministerial activities in the 21 provinces should be strengthened. Decisions regarding how to do this can be made only by understanding the options. A study should be made to learn the best course of action for capturing the growth potential which exists at the provincial level.
4. Secondary, vocational and technical-education institutes should receive more scientific support, both in terms of economic and human resources. This support is vital for the integrity of environmental education at this stage of its development.

5. **Emphasis on environmental education should be placed on teacher training institutes for their potential multiplier effect. At these institutes, both pedagogical practices and environmental science can be merged into a strong program.**
6. **Every effort should be made to maintain the positive results of the interministerial/NGO relationship established in EDUNAT III, which is in the process of institutionalization.**
7. **An evaluation and feedback system should be designed to assess the learning which has occurred in the schools, among teachers and coordinators. The information which comes out of this system should be used to revise existing materials.**

The following should take place within the time frame of the existing project and should contribute to the final evaluation.

8. **Two-way flows of communication should be actively encouraged by developing and institutionalizing mechanisms which encourage people in localities throughout the country to contribute ideas, articles for newsletters, oral reports on cassettes for radio programs and photos of activities. EDUNAT III can use its existing network to do this.**
9. **EDUNAT III should collect, quantify and categorize the reactions and evaluations (positive and negative) from all participants in project activities. Information from evaluations should be used to improve practices.**
10. **The final evaluation should include field visits to a substantial number of provincial offices of MEC/EDUNAT.**

4.2.4 Community development

1. **EDUNAT III's efforts to advance the state of awareness and knowledge about environmental problems and needs within community-development organizations has broken important new ground. This important strategy merits additional support to consolidate and reinforce the efforts to date.**
2. **A mechanism, as well as funding is needed for continuing contact and follow through with training-program participants. This support is needed for the following reasons: to meet desires of trainees for continuing contact and further education, to determine whether the goals of training are occurring, and to determine important opportunities for future environmental projects with some community-development organizations.**
3. **Fundación Natura and EDUNAT III should develop additional continuing-education techniques that do not depend upon EDUNAT III staff to provide formal training sessions. Development of these techniques in conjunction with obtaining and distributing low cost audio/visual devices would be useful.**
4. **Additional efforts to adapt impact-assessment procedures to the Ecuadoran context are essential if this important tool is not to remain a mere paper exercise.**

5. **The Zaruma pilot project has demonstrated the potential for success in this strategy. It is critical that resources be located to help continue this effort so that it can evolve into a more mature model of effective citizen action.**
6. **Dependent upon additional research and funding, further opportunities for citizen involvement in environmental problem resolution should be located and targeted for concentrated support.**
7. **Pending projects or publications are worthy of completion. EDUNAT III should simplify publications for citizens or produce simpler versions of existing publications.**

4.2.5 Document center

1. **At the end of the EDUNAT III project, Fundación Natura should take responsibility for the operation of the document center, funded from its various programs.**
2. **EDUNAT III should cooperate with the document center and other Fundación Natura programs to develop and distribute a pamphlet and poster advertising services provided by the document center.**
3. **The document center should pursue the creation of a mechanism to regularly inform individuals in private and public institutions about new acquisitions.**

**Annex one:
List of persons contacted**

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**Annex two:
Documents reviewed**

EDUNAT III

Annual Operation Plans, FY 1988 - 1992.

Quarterly Reports, FY 1988 - 1992.

Miscellaneous Seminar/Training Reports, 1988 - 1991.

Miscellaneous AME Training Documents, 1991.

Diane Walton Wood, EDUNAT II Final Evaluation of Environmental Education Project, 1988.

Sistemas Productivos y Medio Ambiente en el Ecuador, 1990.

Potencial Impacto Ambiental de las Industrias en el Ecuador, 1991.

Impacto Ambiental de la Minería en Zaruma y Portovelo, 1991.

Proyecto de Ley Nacional del Medio Ambiente, 1991.

Bibliografía básica sobre los Principales Problemas Ambientales del Ecuador, 1990.

Dr. Fernando Ortiz Crespo, Los Recursos Naturales del Ecuador, 1990.

Lcdo. Teodoro Bustamante, Debates, Discusiones y Alternativas Planteadas en torno a la Amazonía, 1990.

Dr. Jorge Soria, Agricultura y Medio Ambiente, 1990

Ing. Jorge Jurado, Industria y Medio Ambiente, 1990

Ing. Ignacio Schreckinger V., Minería y Medio Ambiente, 1990

Juan Carlos Cuéllar, La Problemática Ambiental y el Desarrollo Económico Social, 1990

Gonzalo Oviedo y Ing. Jorge Jurado, Consideraciones sobre la Explotación Petrolera en las Areas Protegidas del Estado en el Ecuador. Petróleo y Medio Ambiente, 1990.

Ing. Efrén Galárraga S., Diagnóstico del Río Machángara de Quito, 1990.

EDUNAT III

Sistemas Productivos y Medio Ambiente en el Ecuador - Memorias del Ciclo de Seminarios de Reflexión para Líderes del Ecuador, 1990.

Marco Encalada, Estrategia de Opinión Pública. Encuesta sobre el Nivel de Información, Actitudes y Prácticas de la Población Ecuatoriana acerca de los problemas del Medio Ambiente, 1990.

Determinación Dinámica de los factores de un Problema Ambiental - Teoría de la Prospectiva (ND)

Carlos Vacacela y Sergio Lasso, Los Problemas Ambientales Urbanos, 1990.

Maritza Balderrama C., Manual de Autodiagnóstico Ambiental, 1990.

Jaime Crespo Toral, La Educación Ambiental para el Desarrollo Comunitario, 1990.

Esaúd Osojo C., Informe del Sondeo a Instituciones de Desarrollo, (ND).

Manual de Estudios de Diagnóstico de los Problemas Ambientales en las Provincias del País, 1991.

Juan Carlos Paéz, Introducción a los Métodos de Evaluación de Impactos Ambientales, 1991.

MINISTRO OF EDUCATION AND CULTURE

Programa de Capacitación Integrada, 1989.

Convenio Intersectorial entre los Ministerios de Educación y Cultura, Salud Pública y Fundación Natura, June 1989.

Informe sobre las Actividades cumplidas del Convenio MEC - MSP - Fundación Natura, 1990.

Informe de Actividades, Educación Ambiental, Educación para la Salud, Bienestar Estudiantil, 1990.

Enfoque Sistemático de Educación para la Salud, 1989.

Plan Piloto para la ejecución del Programa Salud Integral, 1989.

OTHER DOCUMENTS

Visión Industrial, newsletter of the Cámara de la Pequeña y Mediana Industria de Pichincha.

Prioridad Empresarial, newsletter of the Instituto de Investigaciones Socio-Económicas (INSOTEC).

Gestión Empresarial, magazine of the Instituto de Investigaciones Socio-Económicas (INSOTEC).

Lizett Torres Zapata and Soledad Zurita Becerra, Universidad Católica, Modelo de Control de la Contaminación Medio Ambiental Provocada por la Industria Textil Algodonera de la Provincia de Pichincha, 1991.

Marco A. Encalada, La Educación Ambiental en el Continente, Rutas para una Revolución Espiritual. Organization of American States, 1991.

A Cross Sectoral Evaluation of Sustainability for USAID / Ecuador, Management Systems International, September, 1990.

Fundación Nuestros Jóvenes, Development Associates, USAID Evaluation - Drug Education, August 1991.

UNDP, Directory of Development Cooperation in Ecuador Annual Report on All Technical Assistance, 1991.

**Annex three:
Tables**

FUNDACION NATURA
 EDUNAT III

DISTRIBUTION OF PRINTED
 EDUCATIONAL MATERIAL
 SEPTEMBER 1989 - MARCH 1992

Table 1.

| TITLE | PRODUCTION | SCHOOL SYSTEM | COMMUNITY DEVELOPMENT DISTRIBUTION | PRIVATE INSTITUTIONS DISTRIBUTION |
|--|------------|---------------|------------------------------------|-----------------------------------|
| EDUNAT II | | | | |
| GUIAS DE EDUCACION AMBIENTAL PARA PRIMARIA (SETS)* | | 4,650 | | |
| GUIAS CICLO BASICO* | | 2,945 | 109 | |
| AFICHES DIDACTICO DE PRIMARIA* | | 8,250 | | |
| COMICS 1 Y 2* | | 10,580 | | |
| | | 26,425 | 109 | 0 |
| EDUNAT III | | | | |
| AFICHE QUE HACEMOS CON LA BASURA | 2,000 | | 2,000 | |
| PLANTAS NATIVAS PARA REFORESTACION EN EL ECUADOR | 3,000.00 | 156 | 450 | 967 |
| BIBLIOGRAFIA BASICA SOBRE LOS PRINCIPALES PROB. | 2,620.00 | 2,497 | 202 | |
| AMB. DE SALUD PUBLICA Y SANEAMIENTO DEL ECUADOR | | | | |
| LIDERES NO. 8 | 1,000 | | 480 | 449 |
| LIDERES NO. 7 | 1,000 | | 560 | 440 |
| LIDERES NO. 6 | 1,000 | | 525 | 403 |
| LIDERES NO. 5 | 1,000 | | 418 | 475 |
| LIDERES NO. 4 | 1,000 | | 405 | 331 |
| LIDERES NO. 3 | 1,000 | | 545 | 455 |
| LIDERES NO. 2 | 2,000 | | 590 | 511 |
| LIDERES NO. 1 | 1,000 | | 405 | 484 |
| SISTEMAS PRODUCTIVOS Y MEDIO AMBIENTE | 2,000 | | 1,110 | 230 |
| OIKOS 8 | 30,000 | 30,000 | | |
| OIKOS 9 | 30,000 | 30,000 | | |
| OIKOS 10 | 30,000 | 30,000 | | |
| OIKOS 11 | 50,000 | 31,304 | | |
| PLEGABLE PRESTAMO Y ROTACION MATERIAL | 50,000 | 49,011 | | 899 |
| MANUAL PRESTAMO Y ROTACION MATERIAL | 500 | 500 | | |
| MANUAL DE AGUAS | 2,500 | 1,397 | 50 | 727 |
| AFICHE DE PROMOCION DE LA CAPACITACION | 10,000 | 9,090 | | 89 |
| MANUAL CLUBES ECOLOGICOS | 2,327 | 1,267 | | 247 |
| PLEGABLE CLUBES ECOLOGICOS | 48,515 | 45,718 | | 357 |
| GUIAS DE EDUCACION AMBIENTAL PRE-PRIMARIA | 5,764 | 3,756 | 40 | 430 |
| PROBLEMAS AMBIENTALES URBANOS | 400 | | 220 | 1 |

DISTRIBUTION OF AUDIOVISUAL MATERIAL
(AÑO 1990)

| QUANTITY COPIES | TITLE | PROVINCIA | GUAYABUIL | MEMBERSHIP | FUNDACION NATURA |
|--------------------|--|-----------|-----------|------------|---------------------|
| 25 | 1. LA GOTERA | 21 | 1 | 1 | 2 |
| 25 | 2. EL BOSQUE TROPICAL RESERVA GENETICA | 21 | 1 | 1 | 2 |
| 25 | 3. NUESTRO PLANETA ESTA EN PELIGRO | 21 | 1 | 1 | 2 |
| 25 | 4. A QUIEN LE SIRVEN ESTOS BOSQUES | 21 | 1 | 1 | 2 |
| 25 | 5. NUESTRA NATURALEZA ESTA EN PELIGRO | 21 | 1 | 1 | 2 |
| 25 | 6. LA EROSION | 21 | 1 | 1 | 2 |
| 25 | 7. EL BOSQUE LA CASA DE LA VIDA | 21 | 1 | 1 | 2 |
| 25 | 8. LOS MANGLARES | 21 | 1 | 1 | 2 |
| 25 | 9. RECURSOS HIDRICOS | 21 | 1 | 1 | 2 |
| 25 | 10. EXISTE EL DESIERTO ENTRE NOSOTROS | 21 | 1 | 1 | 2 |
| 250 SETS | | 210 | 10 | 10 | 20 |

(AÑO 1991)

| QUANTITY OF COPIES | TITLE | ZARUMA | PROVINCIA | GUAYABUIL | AZOGUES | GENERAL PUBLIC | EDUCAT III | LOST | CENTRO PRESTAMO COLEGIO BENALCAZAR | CEN PRES ESCU ESP |
|-----------------------|--|--------|-----------|-----------|---------|-------------------|---------------|------|---|----------------------------|
| 60 | 1. FINCA DE PANCHITO | 1 | 40 | 2 | 2 | 2 | 6 | | 2 | |
| 60 | 2. CLETA EN APUROS | 1 | 40 | 2 | 2 | 2 | 9 | | 2 | |
| 60 | 3. VUELO DE MARIPOSAS | 1 | 40 | 2 | 2 | 2 | 9 | | 2 | |
| 60 | 4. LAS TRAVESURAS DE MIGUEL | 1 | 40 | 2 | 2 | 2 | 6 | | 2 | |
| 60 | 5. VIAJEMOS CON LAS SEMILLAS | 1 | 40 | 2 | 2 | 2 | 9 | | 2 | |
| 33 | 6. LA GOTERA | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 7. EL BOSQUE TROPICAL RESERVA GENETICA | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 8. NUESTRO PLANETA ESTA EN PELIGRO | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 9. A QUIEN LE SIRVEN ESTOS BOSQUES | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 10. NUESTRA NATURALEZA ESTA EN PELIGRO | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 11. LA EROSION | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 34 | 12. EL BOSQUE LA CASA DE LA VIDA | 1 | 20 | 1 | 1 | 1 | 5 | 1 | 2 | |
| 33 | 13. LOS MANGLARES | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 14. RECURSOS HIDRICOS | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 33 | 15. EXISTE EL DESIERTO ENTRE NOSOTROS | 1 | 20 | 1 | 1 | 1 | 5 | | 2 | |
| 631 SETS | | 15.00 | 400.00 | 20.00 | 20.00 | 20.00 | 89.00 | 1.00 | 0.00 | |

NOTE: SIX COPIES ARE SENT WORLD WILDLIFE FUND, WASHINGTON

Table 2.

EDUNAT II 1983 - 87

| PRINTED MATERIAL | PRODUCTION | DISTRIBUTION |
|---|---------------|--|
| - Guías Didácticas de Educación Ambiental para primaria. 3 Vol. | 75,000 | Maestros de primaria |
| - Guías Didácticas de Educación Ambiental para ciclo básico. 250 pág. | 10,000 | Maestros de secundaria |
| - Sugerencias para tesis de grado sobre medio ambiente. 24 pág. | | Alumnos de sexto curso c secundaria |
| - OIKOS. trimestal. 7 números | 30,000 | Maestros |
| - Periódico Natura. 8 pág. Mensual | 2,500 c/u | Socios y público genera |
| - Evidencias del deterioro ambiental. 2da. edición | 5,000 | |
| - Cartilla Forestal. 59 págs. | | Colegios Técnicos de agricultura |
| - Los amigos de la naturaleza. 30 págs. Vol 1 y 2 | 15,000 c/u | Niños |
| - Afiches didácticos de apoyo a las guías didácticas. 15 afiches | 10,000 c/u | Escuelas primarias |
| - El fogón de Lorena | | Todo público * |
| - Efecto dañino de los plaguicidas | 30,000 | |
| - Aves de Quito y sus alrededores | | |
| - Animales en peligro de extinción | | Todo público |
| - Carteles de promoción de las guías didácticas de primaria | | |
| - Catálogo de información de las guías didácticas 8 pág. | | Maestros |
| - Bosque Protector Pasochoa. Plegable. 1 pág. | | Todo público * |
| - El pez y la vida. Plegable. 1 pág. | | Todo público * |
| - Posters naturaleza ecuatoriana. 7 posters | 2,000 c/u | |
| AUDIOVISUALS | | |
| - 15 audiovisuales. 60 slides c/u y cassette de apoyo | 30 copias c/u | Escuelas |
| - 1 Audiovisual las voces de bosque. 72 slides | | Escuelas |

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| | | | | |
|--|----------------|----------------|---------------|---------------|
| IMPACTO AMB.DE LA MINERIA EN ZARUMA Y PORTOVELO | 990 | 26 | 278 | 227 |
| DETERIORO AMBIENTAL RURAL | 30,000 | 3,346 | 1,435 | 683 |
| AFICHE RECURSOS NATURALES AMENAZADOS | 20,000 | 15,634 | 12 | 182 |
| MANUAL DE INVESTIGACION DIAGNOSTICA | 2,600 | 2,264 | | |
| JUEGO DE CARTELES DIDACTICOS SOBRE PROBLEMAS AMBIENTALES Y CLUBES ECOLOGICOS | 300 | 190 | | |
| INSTRUMENTOS DE LA INVESTIGACION DIAGNOSTICA | 2,550 | 2,264 | | |
| GUIA DE PLAN DE INVESTIGACION POR TEMA | 2,550 | 2,264 | | |
| GUIA DE ELABORACION MONOGRAFIA | 2,550 | 2,264 | | |
| ROTAFOLIO AFICHES PRE-PRIMARIA | 3,000 | 1,404 | | 16 |
| HOJAS DE TRABAJO PARA PRE-PRIMARIA | 15,000 | 6,000 | | 99 |
| MANUAL USO DE CARTELES DIDACTICOS | 1,492 | 1,370 | | 122 |
| PRINCIPALES PROBLEMAS AMBIENTALES DE SALUD PUBLICA Y SANEAMIENTO DEL ECUADOR | 50,000 | 34,394 | 575 | 836 |
| FOLLETO QUE HACEMOS CON LA BASURA | 50,000 | 98 | 45,744 | 1,551 |
| POTENCIAL IMPACTO AMBIENTAL DE LAS INDUSTRIAS EN ECUADOR | 1,830 | | | 117 |
| REGLAMENTO DE FERIAS | 2,000 | | | 50 |
| T O T A L | 463,488 | 306,214 | 56,044 | 11,378 |

‡ MATERIAL LEFT FROM EDUNAT II
AND DISTRIBUTED IN EDUNAT III

| | |
|-----------------------------|---------------|
| NOTE: EDUNAT III PRODUCTION | 463.488 |
| DISTRIBUTION | 373.636 |
| | <u>89.852</u> |
| | ===== |

Table 3

EDUNAT I 1980 - 82

| PRINTED MATERIAL | PRODUCTION | DISTRIBUTION |
|---|--------------|---|
| - Problemas Ambientales del Ecuador. 190 pág. | 3.000 | 100% socios, autoridades, organismos del Gobierno. |
| - Evidencias del Deterioro Ambiental del Ecuador. 32 pág. | 6.000 | 100% todo público. * |
| - Artículos de Prensa. | 2 por semana | Medios de Comunicación. |
| - Circular para socios, 4 pág. | 1 mensual | |
| - Artículos sobre medio ambiente. 2 pág. 80 artículos. | | |
| - Reportajes sobre investigaciones realizadas. | | |
| - 7 Afiches sobre Problemas Ambientales. | 450 | Escuelas y Colegios. |
| RADIO PROGRAMS | | |
| - 12 Programas de 10' "Ecuador y su Naturaleza" | | |
| Guiones de Programas | 300 | Emisoras de Radio. |
| Cassettes de Programas | 15 | Emisoras. |
| - 8 Programas de radio teatro. | 50 copias | 100% |
| TELEVISION | | |
| - 5 filmes cortos de 16 mm. | | |
| - 5 spots de 30' | | 2 Canales de TV en Quito y 2 Canales de TV en Guayaquil |

* Escuelas, instituciones, oficinas

| TELEVISION | TIRAJE | DISTRIBUCION |
|--|--------|--|
| <ul style="list-style-type: none"> - 5 módulos audiovisuales de 15' c/u. - Transparencias para conferencias, nivel escolar. | | <p>Presentado en Escuelas y Colegios.</p> <p>Apoyo para conferencias en escuelas y colegios.</p> |
| <p style="text-align: center;">INQUIRY</p> <p>Instituciones con un posible papel conservacionista:</p> <p>127 Quito 72 Guayaquil 41 Cuenca</p> | | |
| <p>SEMINAR FOR JOURNALISTS</p> <p>Sobre Problemas Ambientales, una semana de duración, 30 participantes.</p> | | |

FUNDACION NATURA

EDUNAT III

RADIO PROGRAMS

Table 4

| No. | NAME | TIME |
|-----|--|---------|
| 1. | IMPACTOS AMBIENTALES PRODUCIDOS POR LOS MATADEROS | |
| 2. | CONSECUENCIAS NEGATIVAS DE LA EXTINCION DE ESPECIES VEGETALES | 5'7'' |
| 3. | EXTINCION DE ESPECIES ANIMALES | 9'40'' |
| 4. | CUIDADO DE LAS RESERVAS NATURALES | 8'27'' |
| 5. | LAS COMPARIAS PETROLERAS EN LAS AREAS DE RESERVA | 7'44'' |
| 6. | ZONAS DE RESERVA | 7'13'' |
| 7. | IMPACTO DE LA COLONIZACION EN EL MEDIO AMBIENTE | 7'28'' |
| 8. | IMPACTO DEL CRECIMIENTO DE LA POBLACION EN EL MEDIO AMBIENTE | 80'01'' |
| 9. | MEDIO AMBIENTE Y PLANIFICACION FAMILIAR | 7'58'' |
| 10. | DETERIORO AMBIENTAL Y DESARROLLO NACIONAL | 6'15'' |
| 11. | DESASTRES NATURALES Y SU IMPACTO EN EL MEDIO AMBIENTE | 9'10'' |
| 12. | CONTAMINACION POR RUIDO | 9'20'' |
| 13. | CONTAMINACION DEL AIRE POR PLOMO | 9'9'' |
| 14. | CONTAMINACION POR PLAGUICIDAS | 6'22'' |

| No. | NAME | TIME |
|-----|---|---------|
| 15. | INTOXICACION POR PLAGUICIDAS | 7'30'' |
| 16. | PLAGUICIDAS EN CULTIVOS AGRICOLAS | 8'02'' |
| 17. | CONTAMINACION DE ALIMENTOS PROCESADOS INDUSTRIALMENTE | 7'14'' |
| 18. | INTOXICACION POR PLAGUICIDAS | 7'30'' |
| 19. | PLAGUICIDAS EN CULTIVOS AGRICOLAS | 8'02'' |
| 20. | CONTAMINACION DE ALIMENTOS PROCESADOS INDUSTRIALMENTE | 7'14'' |
| 21. | IMPACTOS AMBIENTALES PROVOCADO POR LOS MATADEROS | 9'20'' |
| 22. | LA INDUSTRIA DE LA CERAMICA Y SUS IMPACTOS AMBIENTALES | 9'32'' |
| 23. | CONSTRUCCION DE CARRETERAS Y MEDIO AMBIENTE | 10'02'' |
| 24. | MEDIO AMBIENTE Y MEDIOS DE COMUNICACION | 4'56'' |
| 25. | INSTITUCIONES PUBLICAS Y MEDIO AMBIENTE | 7'33'' |
| 26. | LAS INSTITUCIONES PRIVADAS EN LOS PROBLEMAS DEL MEDIO AMBIENTE | 6'06'' |
| 27. | MEDIO AMBIENTE Y MEDIOS DE COMUNICACION | 4'56'' |
| 28. | MAL USO DE LOS PLAGUICIDAS EN EL ECUADOR | 9'10'' |
| 29. | IMPACTOS AMBIENTALES POR LA INDUSTRIA DEL CUERO | 5'26'' |
| 30. | LOS POLITICOS Y LOS PROBLEMAS DEL MEDIO AMBIENTE | 9'36'' |
| 31. | CONSECUENCIAS NEGATIVAS DE LA EXTINCION DE LAS ESPECIES VEGETALES | 5'7'' |
| 32. | CONTAMINACION DEL AIRE POR MONOXIDO DE CARBONO | 9'13'' |

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SEMINARS OF EDUNAT III
 1989 - 1991

Table 5

| ESTRATEGIA STRATEGY | No. EVENTS | PARTICIPANTS | COVERAGE |
|-----------------------------------|------------|--------------|----------|
| PUBLIC OPINION | 18 | 410 | NATIONAL |
| INDUSTRIAL TECHNICAL INFORMATION | | | |
| SCHOOL SYSTEM | 211 | 8097 | NATIONAL |
| COMMUNITY DEVELOPMENT | 43 | 940 | NATIONAL |
| DOCUMENTATION CENTER | | | |

SEMINARS REQUESTED BY OTHER INSTITUTIONS

| ESTRATEGIA STRATEGY | No. EVENTS | PARTICIPANTS | COVERAGE |
|-----------------------------------|------------|--------------|----------|
| PUBLIC OPINION | 12 | | NATIONAL |
| INDUSTRIAL TECHNICAL INFORMATION | | | |
| SCHOOL SYSTEM | 21 | | NATIONAL |
| COMMUNITY DEVELOPMENT | 12 | | NATIONAL |
| DOCUMENTATION CENTER | | | |

* SEMINARS HELD IN 1990 - 1991
THESE WILL BE DOUBLED IN 1991-92

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AUDIOVISUAL - SLIDES WITH SOUND
 1989 - 91

Table 6

| Nb. | Nb. SLIDES | PUBLIC | TITLE |
|-----|------------|---------------|--------------------------------------|
| 001 | 76 | 15 - 8 YEARS | LA GOTERA |
| 002 | 79 | 12 - 18 YEARS | EL BOSQUE TROPICAL: RESERVA GENETICA |
| 003 | 61 | 6 - 9 YEARS | NUESTRO PLANETA ESTA EN PELIGRO |
| 004 | 80 | 9 - 12 YEARS | A QUIEN LE SIRVEN ESTOS BOSQUES |
| 005 | 80 | 9 - 12 YEARS | NUESTRA NATURALEZA EN PELIGRO |
| 006 | 78 | 9 - 15 YEARS | LA EROSION |
| 007 | 37 | 9 - 15 YEARS | EL BOSQUE, LA CASA DE LA VIDA |
| 008 | 49 | 9 - 15 YEARS | LOS MANGLARES |
| 009 | 44 | 9 - 16 YEARS | RECURSOS HIDRICOS DEL ECUADOR |
| 010 | 45 | 9 - 16 YEARS | EXISTE EL DESIERTO ENTRE NOSOTROS |
| 011 | 54 | 7 - 10 YEARS | VIAJEMOS CON LA SEMILLA |
| 012 | 55 | 8 - 10 YEARS | LA FINCA DE FANCHITO |
| 013 | 54 | 6 - 10 YEARS | LAS TRAVESURAS DE MIGUEL |
| 014 | 60 | 6 - 10 YEARS | OLETA EN APUROS |
| 015 | 60 | 8 - 12 YEARS | VUELO DE MARIFOSAS |

Table 7

| | CANAL 8 ECUAVISA | | | | CANAL 10 TELECENTRO | | | |
|----------------|---|---------------|--|--------------|---|---------------|--|---------------|
| | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | |
| | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL |
| | | (SUCRES) | | (SUCRES) | | (SUCRES) | | (SUCRES) |
| July 89-Aug 89 | | 18,288,000.00 | | | | 18,288,000.00 | | |
| Aug 90 | | 41,788,144.00 | | | | | | |
| Jan-April 91 | | 14,907,692.00 | | 2,942,308.00 | | | | 10,200,000.00 |
| May-Aug 91 | | | | 39,725.00 | | | | 8,620,000.00 |
| Sep 90-Jan 91 | | | | | | | | |
| TOTAL | 0.00 | 74,983,836.00 | 0.00 | 2,982,033.00 | 0.00 | 18,288,000.00 | 0.00 | 18,820,000.00 |

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Table 7

| EDUNAT III CONTRIBUTION OF TV INDUSTRY 1989 - 1991 (SUCRES) | | | | | | | | |
|--|---|----------------------|--|-------------------|---|----------------------|--|----------------------|
| | CANAL 5 ORTEL | | | | CANAL 2 GAMAVISION | | | |
| | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | |
| | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL |
| | | (SUCRES) | | (SUCRES) | | (SUCRES) | | (SUCRES) |
| July-Aug 89 | | 18,288,000.00 | | | | 18,288,000.00 | | |
| Aug 90 | | | | | | | 6,193,799.00 | 16,147,597.00 |
| Jan-April 91 | | 1,400,000.00 | | 600,000.00 | | | | 1,683,780.00 |
| May-Aug 91 | | | | | | | | |
| Sep 90-Jan 91 | | | | | | | 2,306,201.00 | 6,012,403.00 |
| TOTAL | 0.00 | 19,688,000.00 | 0.00 | 600,000.00 | 0.00 | 18,288,000.00 | 8,500,000.00 | 23,843,780.00 |

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Table 7

| | CANAL 13 TELETRECE | | | | CANAL 4 TELEAMAZONAS | | | |
|----------------|---|---------------|--|--------------|---|---------------|--|---------------|
| | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | |
| | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL |
| | | (SUCRES) | | (SUCRES) | | (SUCRES) | | (SUCRES) |
| July 90-Aug 89 | | 18,288,000.00 | | | | 18,288,000.00 | | |
| Aug 90 | | | | | | | | |
| Jan-April 91 | | | | 3,980,699.00 | | | | 28,819,400.00 |
| May-Aug 91 | | | | 3,150,000.00 | | | | 61,632,000.00 |
| Sep 90-Jan 91 | | | | | | | | |
| TOTAL | 0.00 | 18,288,000.00 | 0.00 | 7,130,699.00 | 0.00 | 18,288,000.00 | 0.00 | 90,451,400.00 |

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Table 7

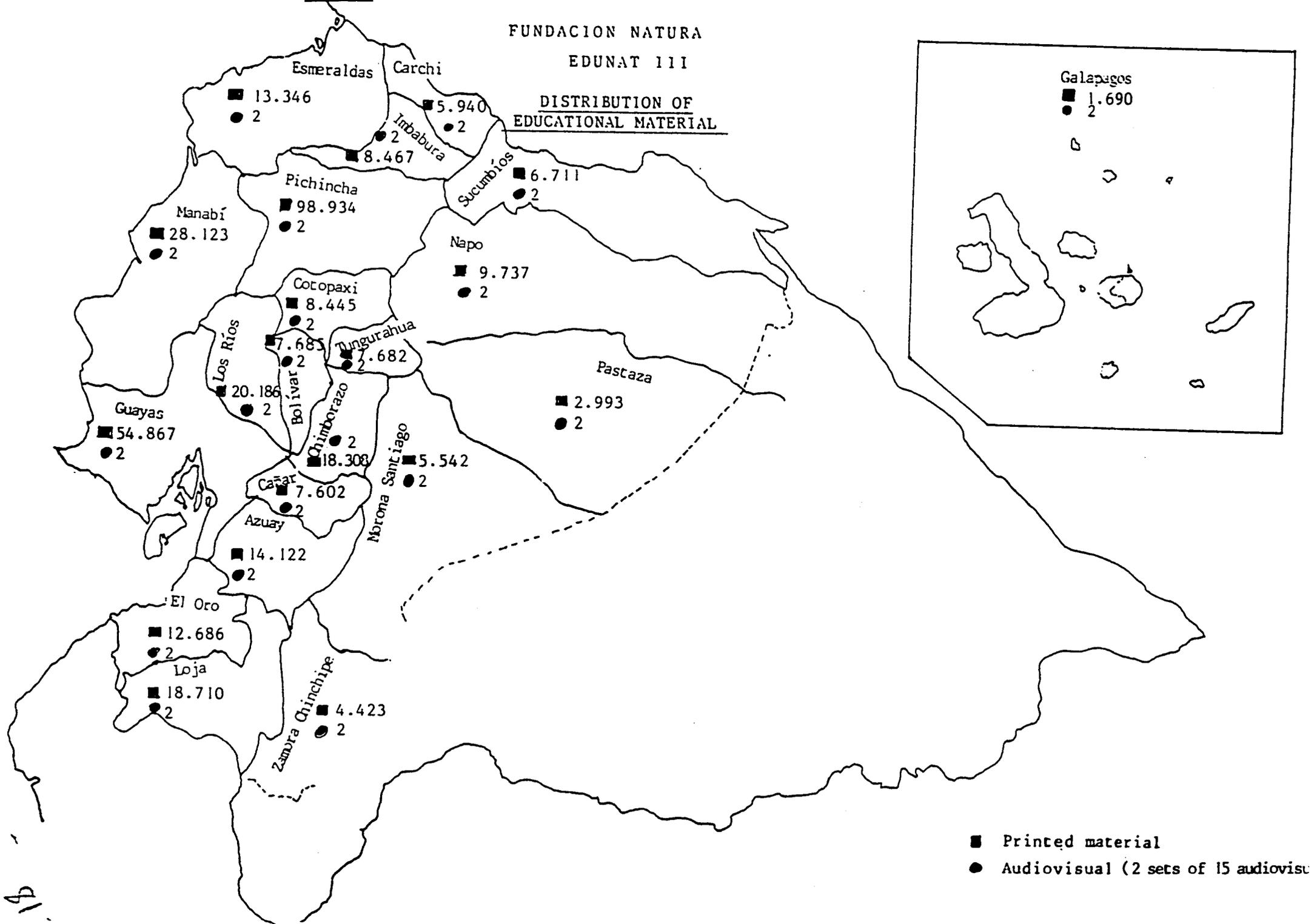
| | CANAL 4 TELESISTEMAS | | | | TOTAL |
|----------------|---|----------|--|--------------|----------------|
| | CAMPAIGN GARBAGE CLEAN UP 8 SPOTS OF 30 SECONDS | | ENVIRONMENT EDUCATION 5 SPOTS OF 40 SECONDS | | |
| | FUNDACION NATURA | CANAL | FUNDACION NATURA | CANAL | |
| | | (SUCRES) | | (SUCRES) | |
| July 89-Aug 89 | | | | | 109,728,000.00 |
| Aug 90 | | | 3,322,785.00 | 2,030,157.00 | 69,482,482.00 |
| Jan - April 91 | | | | 400,000.00 | 64,933,879.00 |
| May-Aug 91 | | | | 100,000.00 | 73,541,725.00 |
| Sep 90-Jan 91 | | | 3,132,910.00 | 3,944,304.00 | 15,395,818.00 |
| TOTAL | 0.00 | 0.00 | 6,455,695.00 | 6,474,461.00 | 333,081,904.00 |

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FUNDACION NATURA

EDUNAT 111

DISTRIBUTION OF
EDUCATIONAL MATERIAL



■ Printed material
● Audiovisual (2 sets of 15 audiovisu)

1/b