Integrated Regional Development Planning: Guidelines and Case Studies from OAS Experience

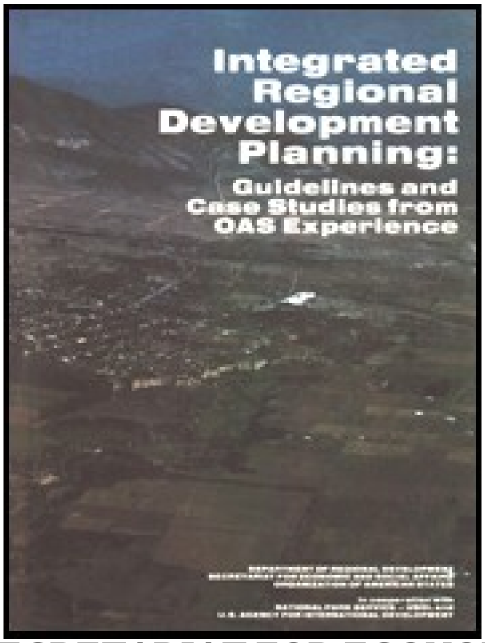

Table of Contents

**DEPARTMENT OF REGIONAL DEVELOPMENT
SECRETARIAT FOR ECONOMIC AND SOCIAL AFFAIRS ORGANIZATION OF AMERICAN STATES**

in cooperation with

**NATIONAL PARK SERVICE - USDI, and
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT**

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Cover:

Aerial reconnaissance of the Andean zone of the Esmeraldas River basin in Ecuador showing irrigated agriculture in the inter-Andean valley.

Table of Contents

Case studies

Preface

This book is a salute to the practitioners of integrated economic and social development planning. As a catalyst and participant in that process, the Department of Regional Development (DRD) of the Economic and Social Secretariat of the Organization of American States has learned to appreciate how routinely difficult, complex, and frustrating it is and how rarely things work out according to plan. Certainly, development professionals need not be told that there is no secret, no checklist, no single approach that triggers the development process and sustains its momentum. They know that even the best-laid development plans are fragile, temporary structures vulnerable to constantly changing conditions. They know also that good plans can direct wise investment decisions, which contribute to sustainable development that benefits large populations.

Reviewing 20 years of experience with integrated regional development planning is a humbling exercise. Mistakes and failed plans stand out clearly with the perspective of time, but so do the occasional successfully implemented projects that flowed from the plans. Less obvious but perhaps equally satisfying are the mistakes avoided because of the plans. DRD draws here exclusively on its own field experience in Latin America, leaving it to other technical assistance agencies to catalog theirs. Accordingly, the emphasis in this book is on the development of natural resources, energy, infrastructure, agriculture, industry, human settlements, and social services. In these accounts, we believe, are information and ideas of use to developing-country governments from the local to the national levels, sectoral agencies, river basin authorities, regional development corporations, other technical assistance groups, and - most of all - field study managers.

As a technical cooperation unit, DRD spends most of its efforts doing, not reflecting or theorizing. But after two decades, it has evolved a partially standardized approach to technical assistance in regional development. Although DRD's staff members have honest differences of opinion over technical issues, and the countries DRD has assisted have widely varying and constantly changing development needs, DRD does have a methodology and a philosophy. So that others can make use of both, they are synthesized here.

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Washington, D.C.
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Acknowledgements

Giving credit where it is due is difficult in any major collaborative project, particularly when the subject matter is the 20-year history of a department of a major international agency. When the effort also involves partnership with another development assistance agency, the number of participants becomes very large.

The perception of the need for a book on regional development planning experience evolved separately in the Department of Regional Development (DRD) of the Economic and Social Secretariat of the Organization of American States and the management staff of the U.S. Agency for International Development/National Park Service (AID/NPS) Project on Expanded Information Base for Environment and Natural Resources. Robert Blesch of DRD and Ken Thelen of NPS first put the two groups in contact, and their mutual interests eventually led to meetings between NPS staff and DRD, which culminated a decision to join forces to produce this book.

Caldwell Hahn and Stephen Bender helped prepare the initial proposal that became the basis for the Cooperative Agreement signed between DRD and NPS. Field research and initial writing of case studies was undertaken by Stephen Bender, Caldwell Hahn, Richard Meganck, and Eugenio Isla. Kathleen Courrier, Arthur Heyman, Newton Cordeiro, and Richard Meganck rewrote the case studies, while additional ideas were introduced by Robert Blesch, Oscar Pretell, Roberto Casañas, Miguel Petit, Arnold Kreisman, Jorge Blanco, Patricio Chellew, and Pedro Bona.

The guidelines were written by Kirk Rodgers, with assistance of a team composed of Newton Cordeiro, Brian Thomson, Richard Saunier, and Arthur Heyman. All senior staff members of DRD contributed in some way to the evolution of the ideas. The whole department and its national counterparts in Latin America and the Caribbean shared in the 20 years of experience that is the basis for what has been written.

Gary Wetterberg, Hugh Bell Muller, and Jeff Tschirley of the National Park Service and Molly Kux of AID reviewed various drafts of the introduction, the case studies, and the guidelines, and contributed valuable comments. Reviewers of the final draft included Marc Carroll, John dark, and Peggy Lipson of NPS; Michael Crosswell, Maria Hatziolas, David Joslyn, and Steven Lintner of AID; Michael Moran of the Inter-American Institute of Agricultural Sciences; Luis Ferrate of the Inter-American Development Bank, and Donald King of the World Bank.

Kathleen Courrier edited the field researchers' reports for the case studies and helped DRD draft the Introduction and the Guidelines. Lawrence Fahey, Gloria Martínez, and Gabriel Gross adapted the maps and graphics from the original OAS reports, which were the focus of the case studies. Teresa Angulo, Janice Bramson, and Mónica Müller took faithful charge of word processing, manuscript production, and logistics while Julio C. Reyes, Linda Starke and Betty Robinson copy edited the finished drafts.

Funding for this project came from the AID/NPS Natural Resources Expanded Information Base Project (which is financed by the Office of Forestry, Environment and Natural Resources of the Bureau for Science and Technology of AID) and from the Department of Regional Development of the OAS.

Executive summary

Introduction

This book documents experience in regional development planning and investment project formulation, including the incorporation of environmental considerations into these processes. It looks at actual implementation of development in relation to plans. Both successes and failures are recorded to help practitioners learn what has worked and what has not worked under different conditions in Latin America. Regional planning is defined as multisectoral planning of particular spaces - states, provinces, river basins or other areas - where governments have decided to promote investment and stimulate development. The methodologies described are applied by multidisciplinary teams of professionals.

The book addresses several audiences: managers of integrated development studies, government policy-makers, universities and training centers, international lending agencies, and development assistance agencies.

The Department of Regional Development (DRD) of the Organization of American States has been providing assistance to Latin America and the Caribbean in development planning and project formulation for 20 years. It has concluded that neither comprehensive planning nor purely sectoral approaches to planning and project formulation is appropriate for developing countries. DRD's approach involves the diagnosis of principal problems and potentials of a given area: the preparation of a development strategy; and the formulation of a coordinated package of projects of infrastructure, production, and supporting services projects within an action plan for implementing the strategy.

DRD believes that "environmental" problems usually occur when one sector competes with another for the use of natural goods and services. If resource management is considered early in the planning process, these sectoral conflicts can be minimized, obviating the need for costly environmental impact assessments.

The U.S. Agency for International Development (AID), and the U.S. National Park Service (NPS), through their joint Natural Resources Expanded Information Base Project, cooperated with the Department of Regional Development of the Organization of American States in the preparation and funding of the book.

Guidelines

I. Designing the Study

To begin designing a regional development study, a planning team needs a definition of the study area, a statement of the government's goals and intended investment level, a clear sense of the region's general problems and potentials, and knowledge of the agencies that will conduct the study and implement its results. DRD fields a preliminary mission to get this information and to examine other elements that condition the study design: the degree of application of the regional development process in the country, the relationship of the region's problems to broader national issues, and the relationship of the region's resource management practices to wider ecosystems.

Problems encountered in development planning usually require multisectoral solutions that, in turn, require an integrated, multidisciplinary approach. The central problem of study design is defining the technical focus broadly enough to make viable solutions possible while staying within time and resource limits. Put another way, a study's scope can be reduced without destroying the integral focus if goals and resources are wisely matched,

Regional development studies are managed jointly by national counterpart agencies and DRD. This coordinated management helps mobilize local participation, improves the likelihood that the study's recommendations will be implemented, and provides for efficient technology transfer.

The design phase culminates in an agreement stipulating the products of the study, the financial commitments of the participants, and the schedule of activities or work-plan. The workplan specifies which technicians must collaborate on each task and how the tasks relate to each other and to the study products.

II. Executing the Study

Study execution is divided into two phases: development diagnosis (Phase I) and project formulation and preparation of the action plan (Phase II).

Phase I consists of a diagnosis of the principal regional needs, problems, potentials, and constraints; the formulation of development strategies; and the identification of potential investment projects. In relatively developed areas, analysis of existing data can suffice for the diagnosis, which may be aimed at improving on-going activities. Where data is deficient, information on natural resources and other subjects is collected so that areas with high development potential can be selected rapidly. Study tasks are defined in terms of problems or spatial subdivisions rather than technical disciplines. Alternative strategies consistent with national goals are formulated to capture major opportunities, resolve critical problems, and unify subregions. Project possibilities are identified to implement the strategies and to minimize potential conflicts among users of natural goods and services. Local agencies and beneficiaries participate in this process. The Phase I report enables the government to select one of the strategy alternatives, as well as a group of projects to be formulated in Phase II.

In Phase II, the development strategy is refined and Phase I project proposals selected by the government are formulated (usually as pre-feasibility studies) with the participation of beneficiaries and implementing agencies. The projects are tailored to the criteria of prospective sources of financing and assembled into project "packages" consisting of coordinated, mutually reinforcing investments in production, infrastructure, and social services. The action plan prepared at this point provides the policy framework and rationale for the projects and recommendations for an investment timetable, institutional arrangements, and relevant legislation. Phase II ends with a final report composed of the proposed action plan and interrelated projects. (Table 1 is a synthesis of the process of study execution.) A fundamental objective of the process is to strenghten the national institutions that participate in the study.

III. Implementing the Recommendations

Even a technically and economically sound development proposal will not automatically be converted into action. The greatest development challenge is political - getting plans implemented under prevailing financial and institutional conditions. Measures that help to insure that recommendations will be heeded can be applied throughout the study process:

- In the design of the study, make the study compatible with the national system of project generation. Keep implementation agencies informed, if not intimately involved. Allow enough time and resources for project formulation.

- During execution of the study, use public meetings and the media to generate broad popular and political support. Solicit project ideas from local agencies and fit new project ideas into national sectoral plans, In multinational projects, create a high-level but informal forum for technical discussion. Initiate small projects during the study to build momentum for larger projects.

- After the study is completed, hold seminars with government officials to discuss technical findings and proposals. Ensure that funding for implementation is included in the appropriate regional or national budget. Conduct training on the use of the final report. As needed, help the government prepare loan applications for international financing agencies. Above all, try to keep the integrated package of projects from unravelling.

Table 1 - SYNTHESIS OF THE PROCESS OF EXECUTING A REGIONAL DEVELOPMENT PLANNING STUDY

	PHASE I **DEVELOPMENT DIAGNOSIS**	**PHASE II** **PROJECT FORMULATION AND PREPARATION OF ACTION PLAN**
Activities	Diagnosis of region	Project formulation (profile or prefeasibility) and evaluation
	• sectoral analysis	• production sectors (agriculture, forestry, agro-industry, industry, fishing, mining)
	• spatial analysis	• support services (marketing, credit, extension)

	• institutional analysis	• social development (housing, education, labor training, health)
	• environmental analysis	• infrastructure (energy, transportation, communications)
	• synthesis: needs, problems, potentials, constraints	• urban services
	Relation to national plans, strategies, priorities	• natural resources management
	Development strategies	Action plan preparation
	• formulation and analysis of alternatives	• formulation of packages of projects
	• identification of project Ideas	• policies for priority areas and sectors
		• enabling and incentive actions
		• investment timetable
		• evaluation of funding sources
		• institutional development and training
		• promotion
Products	Interim Report (Phase I Report)	Final Report
	• diagnosis of region	• development strategy
	• preliminary development strategy	• action plan
	• identified projects	• formulated projects
		• supporting actions
Timeframe	9 to 12 months (12 to 18 months historically)	12 to 18 months

Case Studies

The six case studies were selected to illustrate the guidelines. They represent a wide range of social, ecological, and institutional settings; typical regional development problems; and such various spatial planning units as political subdivisions, river basins, and frontier zones. These multidisciplinary studies represent the mainstream of DRD's experience and embody its current methodologies. (Tables 2 and 3 capsulize the case studies.)

Table 2 - SUMMARY OF CASE STUDY FACTS

Case Study	Country	Dates of Fieldwork	Area (1,000 km²)	Elevation (meters)	Physical Characteristics	Counterpart Agencies	Cost (US$1,000)		Total Proposed Project Investment (US$1,000)
							OAS	National	
Dominican Republic									
Natural Resource	Dominican Republic	1/65-5/66	48	0-3,175	Varied	Nat'l Planning	354	50	5,000
Inventory						Office			
DELNO		2/72-12/74	10	0-3,175	Dry woodland, marsh, montane humid forest	Min. of Agriculture	266	300	45,000
Eastern Cibao and		10/78-12/79	5	0-3,175	Subtropical dry to wet forest, montane wet forest	Technical Secretariat of the Presidency	701	1,000	332,000

Cibao Region		1/80-2/83	19						
Darien	Panama	2/75-7/78	17	0-1,800	Humid tropical forest	Ministries of Planning, Agriculture, Public Works	473	268	49,000
Pilcomayo Basin	Bolivia, (Argentina, Paraguay	2/75-10/77	272	52-5,000	Eastern Andes, piedmont, Chaco	Arg.: INCyTH* Bol.: Min. of Transportation Parag: Min. of Foreign Affairs	275	2,713**	1,072,000
Tripartite Area		1/79-12/80	71	52- 400	Piedmont, Chaco		307	447	348,000
Santiago-Mira	Ecuador	1/78-6/81	25	0-4,900	Paramo, steep tropical mountain forests, tropical coastlands	Nat'l Planning Board, Nat'l Water Resource Agency	500	960	984,000
Chapare	Bolivia	4/78-5/80	24	300-5,000	Humid tropical forest Andean piedmont and adjacent plain	Min. of Agric.; Institute of Colonization; Cochabamba, Develop. Corp.	296	147	15,000
San Lorenzo	Mexico	9/79-12/81	0.4	1,700-3,100	Chaparral, desert	Autonomous Agrarian Univ. "Antonio Narro"	142		

*** National Institute for Water Science and Technology.**
**** Includes US$750,000 from UNDP.**

Table 3 - NOTEWORTHY FEATURES OF CASE STUDIES

DOMINICAN REPUBLIC
- Describes a methodology for development-oriented national natural resource inventory.
- Detailed description of "agricultural zoning," a methodology for project identification and evaluation. - History of 18 years of technical assistance in regional development planning In one country, tracing evolution of the regional planning approach. Documents three types of problems (lack of natural resource data for planning and project Identification, lack of investment projects, and unsuitable formulation of investment projects).
- Pitfalls: excessive data collection and the loss of momentum in implementation resulting from the failure to study project proposals through pre-feasibility.
DARIEN, PANAMA
- Addresses the problem of limiting spontaneous settlement along a penetration road Into a humid tropical forest area.
- Identification of small areas suitable for colonization In a large undeveloped area.
- Reduction of the scope but not the Integral character of planning as investment capital becomes scarce.
- Preparation of a market/service center plan for a remote area.

- Pitfalls: "after the fact" approaches to environmental management; a preferred approach is rapid and concentrated development of selected areas which would attract migrants away from marginal and ecologically fragile areas.
PILCOMAYO: ARGENTINA, BOLIVIA, PARAGUAY
- Addresses the challenges of planning development of a multinational river basin.
- Design of the management structure of a multinational study.
- A method for rapidly identifying "program areas" of high development potential in a large region.
- Establishment of regional accounts in such an area.
- The use of satellite imagery for reconnaissance mapping.
- Pitfalls: the danger of proposing creation of multinational Institutions or undertaking development actions before countries thoroughly understand all their options.
SANTIAGO-MIRA, ECUADOR
- Addresses the issue of development planning In a border area of extremely heterogeneous subregions.
- Detailed description of workplan preparation.
- Detailed description of the role of the environmental management specialist.
- Formulation of border projects that benefit from economy of scale through binational production and marketing.
- Pitfalls: The use of a sectoral agency as lead agency in Integrated development planning.
CHAPARE, BOLIVIA
- Addresses the difficulty of planning regional development in an area of established and new spontaneous colonization.
- Preparation of guidelines for settlement of new land.
- Identification and implementation of immediate actions to alleviate social problems.
- Use of local leaders as change agents.
- Early Involvement of beneficiaries and implementing agencies In preparation of an action plan.
- Identification and adjudication of conflicts between local interest groups.
- Pitfalls: the effects of political instability on project Implementation.
SAN LORENZO, MEXICO
- Addresses the problems of land use conflict in an area of rapidly growing urban population.
- Preparation of a land-management system, accommodating demands for urban water supply, recreation, research, and small-scale farming.
- Working with a university as a counterpart agency to redefine a study initially conceived In narrow sectoral terms, converting It to an Integrated development study.
- Mobilizing local interest and the media to promote political acceptance of recommendations.
- Pitfalls: use of a university as the counterpart in a practical development study.

Looking Ahead

Development planning must be as dynamic as development itself: thus, changing conditions in Latin America and the Caribbean will necessitate corresponding changes in planning methodology.

Economic constraints, natural resource constraints, and large population movements will affect development in the 1980s. Most likely, relatively developed areas (as opposed to undeveloped frontiers), urban centers and their surrounding rural hinterlands, and multinational regions will be the principal foci of planning. Given anticipated economic constraints, investment will be channelled toward improvements in the use of existing infrastructure, projects already under way, and low-cost alternatives to large projects. Institutional and legislative changes that cost little but make a significant difference, and projects that generate foreign exchange will be favored. Accordingly, diagnoses must be conducted more efficiently, and with more attention to existing plans and projects. Energy and food production and distribution will receive greater emphasis, as will problems associated with urbanization, conflicts over the use of natural resources, migration, and natural disaster mitigation. Long-range challenges for regional development planning include: (1) establishing functional links between regional planning and national and sectoral planning, and (2) coordinating subregional integration in such areas as multinational river basins and border zones.

Introduction

I. Background and objectives

The theorists of regional development planning are many, but relatively few practitioners have documented and systematized the process of preparing and implementing plans with the object of improving planning methodologies. Bringing accumulated successful experience with regional development planning to bear on planners' attempts to refine their methodologies and refocus their efforts is therefore a primary objective of this book.

There is a second reason to chronicle regional development planning experience. Since environmental issues first became development concerns, it has been recognized that an integral approach to development planning represents one of the best methods for properly treating those issues. It was widely hypothesized that if environmental concerns could be systematically integrated into development planning from the outset, many of the so-called negative environmental impacts of development projects could be avoided. It was also hypothesized that the multisectoral approach to development planning affords a useful framework for dealing with the many existing and potential resource-use conflicts that arise during planning and implementation. As in the case of basic regional development planning, however, theory has not been adequately checked against practice. The need for case studies on regional planning and environmental management was identified even before the United Nations Conference on the Human Environment in Stockholm in 1972. But in the decade since the Stockholm Conference, very little has been published.

A second objective of this book is therefore to review recent attempts to systematically incorporate environmental considerations into regional development planning.

II. The institutional setting

The Department of Regional Development (DRD) of the Economic and Social Secretariat of the Organization of American States provides assistance to Latin American governments in integrated development planning and project formulation. DRD offers professional services to member states upon receipt of requests for assistance that fall within its mandate and capabilities. It provides neither financial assistance for studies nor funds for development. All its efforts are undertaken in cooperation with national or regional agencies in the member countries, and the key objective of its assistance is institution building and technology transfer. Its perspective comes from many years of experience in regional planning, river-basin development planning, natural resource surveys, and environmental management.

Systematically recording its experience for the benefit of its member states has long been a DRD goal. In 1969, it produced a casebook of its experience over the preceding six years.[1] This book documented the methodologies successfully applied in integrated surveys of natural resources. Its central message is that natural resource surveys and data collection are expensive and that data collection should be "development oriented," not open-ended. It stresses the need for phased, integrated natural resource surveys that proceed rapidly from a general overview of a large area to specific investigations of a limited area with development potential. It emphasizes repeatedly that resource development projects are the end-products of the resource survey and the only true justification for investments in data collection. It cautions against systematically collecting detailed information for which no concrete need has been identified.

1. OAS, General Secretariat, *Physical Resource Investigation: A Casebook of OAS Field Experience in Latin America*, OAS, Washington, D.C., 1969.

The publication captured for the record an early state in the evolution of DRD methodologies. Subsequent experience and an enlarged technical mandate have expanded DRD's concern. The original technical interest in data and development possibilities has been broadened by a deep concern for the development needs of people. Thus, while maintaining its conviction that an area's natural resource base is a major determinant of its development potential, DRD expanded its focus from the collection of original basic data on natural resources to include the collection and analysis of regional economic and social data, all of which it now routinely brings to bear on the design of development strategies and the formulation of investment projects.

The current focus of DRD assistance is on planning the integral economic and social development of specific regions or areas within individual Latin American countries and on multinational regions (such as international river basins and frontier zones) where governments have decided to conduct cooperative development efforts. DRD helps governments implement policies designed to distribute the benefits of development among all territories and all segments of population, as well as to correct disequilibrium between regions. It supports efforts to accelerate development in marginal or depressed areas and to efficiently utilize the resources of relatively underdeveloped or empty regions. DRD is mandated to pay special attention to the development of conventional and nonconventional sources of energy. But it treats energy as a critical component of socio-economic development within a well defined spatial context, not as an independent sector. It also accords special attention to environmental management - a fundamental element of sustainable development. It does not treat environment as a sector.

Since 1969, DRD has assisted 25 Latin American and Caribbean governments in the execution of 75 major studies. These studies cost more than US$50 million and involved the formulation of approximately US$3.8 billion in development projects, about half of which are currently in or nearing execution.

For several years, DRD has felt the need for an up-to-date and more comprehensive document detailing its experience in regional development planning and the incorporation of environmental management considerations into the process. The Agency for International Development of the United States shares DRD's interest in documenting efforts to integrate economic, socio-cultural, and environmental factors into the design and implementation of development projects. Generating case histories about such efforts is one of the objectives of a major AID-financed project, "Environment and Natural Resources: Expanded Information Base," which the U.S. National Park Service is executing under contract to AID. A clear statement of AID's assessment of the overall problem appears in the "Environmental Strategy" it approved in November of 1983:

> The common critical need in all regions is more effective management of renewable natural resources using integrated approaches to regional planning and project design. The goal of integrated planning is the preparation of a rational plan in which all development sectors have been assessed for their effects on all the resources in a given geographic area. It implies significant coordination among sectors and flexibility to modify activities to avoid resource depletion and assure long-term economic productivity.

In October of 1981, shared interests and viewpoints led the OAS Department of Regional Development and the managers of the AID/National Park Service Project on an Expanded Information Base to sign the OAS/DRD-NPS Cooperative Agreement, which has resulted in this book.

III. Definition of integrated regional development planning

Definition of the terms "region," "development," "planning," and "integrated" are nearly as numerous as the people who use them. No attempt will be made here at general definitions, but readers must understand how the terms are used in this book.

The DRD defines a **REGION** as any subnational area that a country calls a region for purposes of planning or development. A region may also comprise parts of more than one country. It may be a geographic unit such as a river basin, or a political subdivision such as one or more *municipios*, provinces, or states. It may be the locus of a problem, as for example, an area of high unemployment, or an empty area losing its national identity due to an influx of foreign settlers, or it may even be an arbitrarily defined spatial planning unit. (Paraguay designated a triangular shaped development area for which a plan was prepared.) DRD has given assistance in regions ranging in area from a few hundred square kilometers to one million square kilometers, regions including metropolitan zones and frontier areas alike, and regions representing a wide range of cultural, ecological, and institutional conditions. In short, regions as study areas have no general distinguishing characteristics. But methodology for regional development planning does, and it is likely that what is described here will apply to a broad variety of study areas and problems.

The term **DEVELOPMENT** as it is used in this book carries with it the concept of sustainability. This goes beyond the controversy of "growth" vs. "growth with distribution." Indeed, sustainability requires dynamic stability achieved through change that is economically sound and socially just and that maintains the natural resource base. Development, according to this model, means change with growth and equity. The central development challenge is to initiate and sustain a process whereby the material and spiritual well-being of a population is improved and development proceeds are fairly distributed according to principles of social justice,

The term **PLANNING** as used here refers to the process by which the governments with DRD support produce plans and selected development projects. The final product is a report that contains the plan, the recommended development projects and programs, and relevant background material. The series of steps required to prepare the plan and projects is referred to throughout this book as a study. It is important to remember that regional development planning is an early step in the development process and that its final product is a report which contains a proposal for action, but that actual development may not occur for some time.

The word **INTEGRATED** when used in association with regional development planning is meant to stress the multisectoral and multidisciplinary character of this type of planning. It also sharply distinguishes it from more traditional sectoral planning, which is criticized throughout this book when it is the only basis for planning and project formulation. This book is about multisectoral planning in defined pieces of space.

IV. The message of this book

This book is a compendium of experience. While someone else's experience is no substitute for learning by doing, development planners cannot afford to keep repeating the same mistakes either. Even a subjective account of what has worked and what has not under different conditions in Latin America can save planners time, money, and frustration.

The brief sections on methodology, not intended as manual of regional planning, indicate the existence and applicability of a methodology. For the most part, readers should figure out for themselves how best to apply it.

Beyond these contributions, the book is underpinned by a few basic concepts that orient all DRD's work. These guiding principles make it possible to respond consistently to widely varying tasks and conditions. The core ideas that knit this book together are a phased approach to integrated regional planning, systematic incorporation of environmental issues in development planning, and the use of technical assistance as a means of institution-building.

AN INTEGRATED APPROACH TO REGIONAL DEVELOPMENT PLANNING: DIAGNOSIS/STRATEGY/PROJECTS. Hard **ex**perience counsels that comprehensive regional development plans are too expensive, too time-consuming, too detailed, and therefore too fragile to withstand the realities of Latin American development. They may be intellectually satisfying to create, but rarely are they converted into reality. There are simply too many uncontrolled variables and political vagaries to justify investment in highly detailed regional plans, Indeed, the expression "comprehensive regional development planning" has been banished from DRD's working vocabulary. On the other hand, a simple grouping of projects is no basis for planned development.

DRD has evolved an intermediate approach inspired by practical experience in Latin America and the interpretation of development expressed in the OAS Charter. This approach to integrated regional development is characterized by distinct phases emanating initially from an overview of the region within the context of the national plan and proceeding to more detailed analysis of promising development areas, The three essential elements are diagnosis, strategy, and project development.

> Diagnosis - A rapid analysis to determine the principal problems, potentials, and constraints of a region. The development diagnosis can include evaluation of natural resources and socio-economic conditions; delineation and analysis of subregions; identification of critical institutions, sectors, and geographic areas; generation of new information; and assembling ideas for investment projects.
>
> Strategy - Selection of pressing issues and opportunities for addressing them with the resources available. These opportunities suggest actions that are politically feasible within a time frame short enough to maintain momentum. (Less critical issues can be left for another round.) Alternative strategies can be presented so the government has a choice.
>
> Projects - Preparation of interrelated investment projects to implement the selected strategy. The projects, developed usually through pre-feasibility (see Glossary), provide a balance among infrastructure, production activities, and services. Collectively, their benefit-cost ratio must be acceptable to governments and funders. The projects are presented to the government, together with any ancillary actions required, in an action plan of short-to middle-term duration.

The case studies show how this approach has been used under a variety of conditions. By no means original, this approach draws partially on the experiences of other regional planners, some of them on other continents. (See, for example, *Action Oriented Approaches to Regional Development Planning*[1], drawn from the experiences of the German Development Institute based on experience in Africa, Asia, and Latin America.) But originality counts for less than the simplicity and flexibility of the DRD approach, which has been tested over 15 years throughout Latin America and the Caribbean.

> 1. *Action Oriented Approaches to Regional Development Planning*, edited by Avrom Bendavid-Val and Peter P. Walker, Praeger Publishers, New York, 1975.

ENVIRONMENTAL ISSUES IN DEVELOPMENT PLANNING. Development practitioners concerned with environmental issues will seek in vain here for mention of "environmental impact assessments" or frequent use of the word "environment." DRD holds that if resource management considerations are built into the planning process at an early stage, playing a role in the identification, selection, formulation, and harmonization of projects, then environmental impact assessments - with their high cost and adversary nature - can be avoided.

Frequently, the issues identified as "environmental" are, in fact, the result of one sector or interest group competing with another sector or interest group for the use of natural goods or services. Each group has its own idea of what it wants from its "environment," and these views inherently conflict. In the planning model DRD uses, the resource management specialist (or environmentalist) is not another advocate for this or that resource use or for conservation. Instead, this member of the planning team has three important tasks in the development process: identifying the natural goods and services available from the regional ecosystems, identifying potential conflicts in the use of these goods and services, and helping to resolve those conflicts given the socio-economic policies in force in the region. If the potential conflicts are identified early in the planning process, before much money is spent or positions are hardened, they tend to be easier to resolve.

This view of the environment and role of the environmentalist may strike some readers as controversial, or at least nondoctrinaire. But it has worked effectively where tested in Latin America and the Caribbean.

TECHNICAL ASSISTANCE AS A TOOL FOR INSTITUTION BUILDING. A recurrent theme of this book is that technical assistance must help to strengthen the institutions it is supporting. Technical assistance can be an effective mechanism for helping a national or regional development agency gain technical capability, increase administrative efficiency, and even influence in policy-making. The in-service training that takes place when local technicians work together with experienced outside personnel on practical local concerns can have much greater impact than more theoretical formal training. In addition, technical assistance frequently improves understanding between an agency's top management and its technical personnel, something that cannot be achieved by training individuals only.

Success at generating projects that attract outside funding has been found to enhance the agency's prestige as well as its budget. And, finally, technical assistance to conduct a study for a region's development should equip agencies to eventually conduct similar studies without assistance. An agency's capacity to identify, formulate, and evaluate projects all increase in collaborative technical assistance activities.

V. The intended audience

Several audiences can make use of this book. The most important is **THE MANAGER OF THE INTEGRATED DEVELOPMENT STUDY.** This pivotal professional occupies the difficult middle ground between the sectoral technicians and the policy-makers who direct the work. Whether an old hand or new to the job, the field manager of a regional development study takes responsibility for its technical quality and its success in influencing development decisions. Regardless of the type of study, the manager must help clarify its purpose, as well as identify and help mitigate conflicts between the participating agencies, study team members, and perhaps even the potential beneficiaries of the development activity. The study manager must figure out which tasks need to be carried out in what sequence, and should know which problems are likely to arise and how other planners have successfully dealt with them. Meantime, costs must be held down and deadlines met. This book is for the manager - not only for the tips that it may provide, but also for the consolation that it may afford by depicting seemingly insurmountable problems that others have faced.

The second important audience for this book is the **GOVERNMENT POLICY-MAKER** who decides whether an integrated planning study is needed and, if so, how it should be designed and what management structure would be most appropriate to execute it. Directors and senior officials of planning agencies, regional development corporations, sectoral ministries, and other government agencies in developing countries should all be able to benefit from some of the experiences and methods set forth here. The guidelines in particular are designed to fit their needs and their busy schedules.

The third audience comprises **UNIVERSITIES AND TRAINING CENTERS** that educate development planners and project managers. It is hoped that the case studies both illustrate the guidelines and provide raw material for classroom instruction.

A fourth audience is the **STAFF OF INTERNATIONAL LENDING AGENCIES** who may seethe proposed packages of investment projects and programs that are the output of regional development studies. If loan officers better understand the process by which these interrelated development projects were formulated, perhaps multi-sectoral or program lending will eventually expand and the planning process itself may improve.

And, finally, since this book is based on the experience of an agency engaged in technical cooperation, it carries a message for other **AGENCIES INVOLVED IN THE TECHNICAL ASSISTANCE PROCESS** Most broadly, the book offers guidance to international and bilateral agencies involved in technical cooperation with developing countries. Besides the agencies directly involved in regional development planning, this group includes agencies involved in physical resource studies, environmental management, integrated rural development, or local development. The intended audience within these agencies are executives, program officers and other professionals who assist in the design of development studies and provide the link to field study managers. All professionals engaged in helping countries in integrated development planning may find some wisdom or solace in these pages.

VI. The organization of the book

The book is comprised of four basic sections; the introduction, the guidelines, the case studies, and a concluding section about the future. It also includes bibliographies for the guidelines and the case studies as well as a glossary of terms.

The Introduction

The introduction, besides explaining the background and purpose of the undertaking, briefly defines integrated regional development planning as practiced by DRD and the history and evolution of its methodological approach.

The Guidelines

The guidelines, the second section of the book, represent a distillation of DRD's experience in regional development planning and project formulation. They take the form of management recommendations and summaries of methodologies for attacking major regional development issues. The guidelines are divided into parts that closely parallel the sequence of action in a typical regional development planning effort: designing the study, executing the study, and implementing the recommendations. This division facilitates cross-referencing between the guidelines (which contain summary ideas) and the case studies (which illustrate those ideas).

While the guidelines draw on the full experience of the DRD, the six case studies selected cannot possibly illustrate or even typify DRD's experience in conducting more than 85 major studies over 20 years. Consequently, some guidelines refer to studies that appear in the bibliography that follows. Reports of these studies can be obtained from DRD.

The Case Studies

The six case studies are drawn exclusively from DRD experience, but they illustrate commonplace challenges in development planning and cover methodology, recommendations, and results in some detail. Each case study is organized in the same sequence as the guidelines: designing the study, executing the study, and implementing the recommendations. Each concludes with a summary of the lessons that have contributed to the evolution of better methodologies. (The location of the six case studies is shown on Map 1.)

Looking Ahead

The concluding section attempts a look at the future, identifies some of the major challenges to regional development and suggests how regional development planning methodology may have to gradually evolve to respond to changing conditions of Latin American development.

VII. Criteria for selecting the case studies

The checklist that follows outlines some of the major criteria used to pick six case studies from the dozens in which DRD has participated:

1. Projects representative of the mainstream of the Department's experience, especially recent studies that embody current methodologies.

2. Comprehensive multidisciplinary projects that demonstrate integrated planning methods.

3. Projects that deal with major regional development problems, particularly those that OAS Member States are likely to face in the future.

4. Projects that were generally successful in meeting their objectives, the most important measure of which is that the recommendations and project proposals were implemented. The negative aspects of these projects are also analyzed.

5. Projects that collectively represent work done in various ecosystems, including lowland tropical forest, grasslands, mountainous areas, and coastal zones, etc.

6. Projects that together represent a variety of institutional settings, including multinational projects.

7. Projects that collectively represent the use of a variety of spatial planning units, including development regions, river basins, and frontier zones.

MAP 1 - Location of the Case Studies

VIII. Some disclaimers

Readers should understand that this book focusses on the beginning of the development project cycle - the early stage of studies, in which projects are initially identified and formulated. It does not cast much light on the vexing problems of implementing regional development, which in many ways is an even more important challenge. Since DRD is a technical assistance agency, it cannot implement recommendations. The section of the guidelines and of each case study entitled "Implementing the Recommendations" therefore concentrates on actions taken before, during, and after the study to help government ensure that the recommendations of the study are carried out.

It is unlikely that DRD planning practices can be replicated using only the information provided here.

Interested planners can assess the appropriateness of the techniques to their own development planning needs and then develop a skeleton format for action, filling in the details according to their own situation,

Doing justice to the wide variety of settings, methodologies, and time periods represented in the case studies required accenting - perhaps overemphasizing - process rather than product. The findings of planning studies are summarized only briefly, and the stress is on what the DRD has learned that others can put to use. Some important methodologies are described twice, once in passing and once in depth. A methodology for preliminary regional development diagnosis may be stressed in one study while the next may highlight techniques for agricultural zoning. A third may treat environmental considerations or project-formulation criteria in detail. Readers should view each case study as a showcase for two or three technical methodologies or administrative techniques.

No case study is perfectly balanced or comprehensive and no regional development study described in this book even approaches perfection - far from it. Throughout the case studies, failures are highlighted along with the successes. Emphasis is given to what DRD considers most significant from the viewpoint of a technical assistance agency. Clearly, there are many other perspectives.

In every case study, many pages are devoted to the development context in which the methodologies were applied. DRD believes that *ad hoc* sectoral planning must give way gradually to planning that takes greater account of factors of space and resources and that is based on the management of environmental as well as socio-economic systems. Applying the methods described here will be an uphill battle in a world organized primarily by sectors of economic activity.

Guidelines

I. Introduction to the guidelines

Understanding the following guidelines and their relationship to the six case studies requires visualizing the sequence of activities that comprise a major regional development study. Most of the integrated studies described in this book took from two to four years to complete, involved from 15 to 75 professionals (national and OAS), and cost anywhere from US$350,000 to US$1,000,000. For most studies, the final products were a regional development strategy and a package of interrelated development projects within a proposed action plan. Most investment programs proposed were for five- to ten-year periods and cost from a few million dollars to several hundred million. Following completion of the study, DRD was sometimes asked to help the government during implementation of the recommendations. (The sequence of activities involved in DRD assistance for regional development planning is shown in Figure 1.)

Throughout the guidelines, regional development planning is described in three stages: designing the study, executing the study, and implementing the recommendations. The **DESIGN STAGE** begins with a request for assistance. It includes analysis of the request and the fielding of a preliminary mission to make a quick pre-diagnosis of the region, define an expected product with the government, outline the workplan and the contributions of the respective parties and prepare a draft version of a technical cooperation document. It ends when the government and the OAS sign a technical cooperation agreement.

Figure 1 - Key Elements in the Process of DRD Assistance for Regional Development Planning

The study **EXECUTION STAGE** is divided into two phases: development diagnosis (Phase I) and project formulation and preparation of the action plan (Phase II). Phase I contains a diagnosis of the principal needs and problems of the region and its main development potentials and constraints. It ends with an Interim Report that proposes alternative development strategies and identifies potential investment projects. The investment projects include some which had already been planned and are about to be undertaken as well as new ones which are identified during the study. The Phase I report enables the government to select one of the strategy alternatives and a group of projects to be formulated in Phase

II. In Phase II, the development strategy is refined, the interrelated investment projects are formulated and combined into a package, and an action plan is created. Phase II ends with a Final Report, which contains the proposed action plan and interrelated projects with an investment timetable for their execution, as well as policy recommendations by areas and priority sectors. This report is presented to the government, for its approval, which completes the execution stage of regional development planning.

The third stage, **IMPLEMENTING THE RECOMMENDATIONS,** includes both planning for implementation and giving support to the government in the implementation process. While implementing the recommendations is not part of the planning process, planning for implementation and building in assurances that it will take place definitely are. (Figure 2, an expanded version of Figure 1, synthesizes the DRD process of technical assistance and serves as a skeleton summary of the guidelines.)

As any practitioner knows, regional development studies are seldom conducted in a simple linear sequence. Since the steps tend to be iterative - with many feedback loops - these guidelines may be oversimplified. For example, study design may continue into the execution stage since the diagnosis may reveal information that substantially changes ideas about the region and forces redesign of the study. Formulation of projects may be conducted simultaneously with the diagnosis, and governments may begin implementing small projects while large projects are still being formulated and evaluated,

Another variable is emphasis. While any regional development study incorporates most of the elements of Phases I and II, the time and resources spent on each activity can vary greatly. In a sparsely populated, relatively undeveloped region, where the data base is deficient, a natural resource inventory, a census, and socioeconomic data collection may be of primary importance. Formulating new development projects may also be a central focus. In a highly developed and populated region, on the other hand, information may be readily available and the principal problem will be understanding and coordinating the development activities already taking place or planned. Regional development studies are inherently complex, as the six case studies that follow will show. Accordingly, these guidelines are generalized and must be adapted to fit prevailing circumstances.

Finally, to understand the guidelines readers must also recognize that the fundamental objective of DRD efforts is to strengthen national institutions and promote technology transfer. Everything that follows was derived from the partnership experience of technical cooperation with Latin American government agencies. The subject of this book is integrated regional development planning, but the focus is assisting governments in preparing plans.

II. Designing the study

A. The preliminary mission

All regional development studies undertaken with the support of DRD begin with a formal request for technical assistance from a member country of the Organization of American States. When this request has been approved, the first step in most major studies is to send a preliminary mission to the country. In consultation with appropriate officials of the interested country or countries, the preliminary mission further defines the development problems and prospects, designs the management structure for the study, and drafts a preliminary workplan and other material from which a formal agreement between the country and the OAS is made. Assumptions made at the time of preparation of the government's request for assistance are frequently modified. Sometimes even the definition of the region is adjusted during these consultations. **EXPERIENCE HAS SHOWN THAT THE WORK OF THE PRELIMINARY MISSION IS FREQUENTLY THE MOST CRITICAL SINGLE EVENT IN THE ENTIRE STUDY.**

A key role of the preliminary mission is to define the technical content of the study. By determining with national personnel the principal problems and potentials of the study area and estimating which are most amenable to treatment, the preliminary mission can establish which subject areas should be emphasized and which should be treated lightly or eliminated. Similarly, the preliminary mission identifies development actions that are more or less inevitable or that are already taking place in the area and insures that they are given due consideration early in the study. All these elements are then built into the preliminary workplan. The tentative conclusions reached by the preliminary mission are examined by a policy committee of the DRD and by the government, and the detailed workplan is then prepared and revised as necessary. (See "The Detailed Workplan" in the Guidelines.)

Design of the management structure is contingent in large part on which agencies take part in the study, another subject that the preliminary mission negotiates with the government. (For details, see "Designing the Management Structure" in the Guidelines.)

Figure 2 - SYNTHESIS OF THE PROCESS OF DRD ASSISTANCE FOR REGIONAL DEVELOPMENT PLANNING

Stages	**STUDY DESIGN**	**STUDY EXECUTION**		**IMPLEMENTATION OF RECOMMENDATIONS**
		PHASE 1 DEVELOPMENT DIAGNOSIS	**PHASE II PROJECT FORMULATION AND PREPARATION OF ACTION PLAN**	
Activities	Receipt and analysis of request for cooperation	Diagnosis of region	Project formulation (profile or prefeasibility) and evaluation	Assistance for specific programs and projects

	Preliminary Mission	• sectoral analysis	• production sectors (agriculture, forestry, agroindustry, industry, fishing, mining)	Assistance in incorporating proposed investments into national budget
	• pre-diagnosis	• spatial analysis	• support services (marketing, credit, extension)	Advisory services for private sector actions
	• preparation of cooperation agreement	• institutional analysis	• social development (housing, education, labor training, health)	Support to executing agencies
		• environmental analysis	• infrastructure (energy, transportation, communications)	Support in inter-institutional coordination
		• synthesis: needs, problems, potentials, constraints	• urban services	
		Relation to national plans, strategies, priorities	• natural resources management	
		Development strategies	Action plan preparation	
		• formulation and analysis of alternatives	• formulation of packages of projects	
		• identification of project ideas	• policies for priority areas and sectors	
			• enabling and incentive actions	
			• investment timetable	
			• evaluation of funding sources	
			• institutional development and training	

			• promotion	
Products	Signed cooperation agreement	Interim Report (Phase 1 Report)	Final Report	Government execution of
	• definition of products of study	• diagnosis of region	• development strategy	• feasibility and final design studies
	• financial commitments of participants	• preliminary development strategy	• action plan	• implementation of projects
	• preliminary workplan	• identified projects	• formulated projects	• changes in legislation and regulations
			• supporting actions	Improved operational capability of institutions
Time Frame	3 to 6 months	9 to 12 months (12 to 18 months historically)	12 to 18 months	Variable

The preliminary mission must also determine such fundamental parameters of the study as the order of magnitude of investment possible in the study area, which in turn requires some idea of the financial resources the government can allocate to the study area over a defined period. (Needless to say, governments hesitate to make quantitative commitments, but may be willing to give an indication in relative or qualitative terms. See "Limiting the Study Goals While Retaining an Integral Focus" in the Guidelines.) The preliminary mission, working with the highest levels of government, begins a dialog on this sensitive subject that continues throughout the study.

It may take months to work out all the fine points of a formal agreement, including the contributions and responsibilities of all parties. But the essential elements of the agreement are usually negotiated during the preliminary mission.

These add up to a tall order for a short mission. Not all preliminary missions undertake all these activities, and for various reasons the preliminary mission may decide that some issues should be addressed later in the study. Nevertheless, the degree to which the. preliminary mission and the government can agree on the effective institutional arrangements and sound technical orientation is a controlling factor in conducting the study and implementing its recommendations. The following are some practical guidelines regarding the preliminary mission:

1. Composition of the Preliminary Mission

a. Staff the preliminary mission with experienced international professionals with extensive practical knowledge of Latin America, The DRD normally relies on its core headquarters professional staff (including division directors); occasionally, however, it also employs high-level consultants. Usually, three professionals are sent to the field for two to three weeks. The composition of the team depends, of course, on the region's nature, problems, and potentials. But a typical team will include a regional planner, an economist, and a natural resource specialist. Whenever possible, the prospective candidate for study manager is included. This was done, for example, in the Santiago-Mira (Ecuador) and Chapare (Bolivia) studies.

b. When there are serious problems with assembling data for the preliminary mission or delicate institutional issues to be treated, use a senior headquarters staff member as the advance person for the preliminary mission (as was done, for example, in the Santiago-Mira study). On rare occasions, a single professional constitutes the preliminary mission. In the San Lorenzo study (Mexico), a "one-man" team proved inexpensive and administratively agile.

Aerial reconnaissance of the Andean zone of the Esmeraldas River basin in Ecuador showing irrigated agriculture in the inter Andean valley. Such low altitude flights provide valuable environmental overviews.

2. Field Activities and Data Collection

a. Undertake field travel in and "overflights" of the study area. In the Santiago-Mira study, the initial assessment of the region undertaken during the preliminary mission was particularly comprehensive.

b. Contact local officials and community leaders in the study area. In the Chapare study, for example, the preliminary mission learned a great deal from local officials and this information influenced the design of the study.

c. Maintain contact with appropriate officials of the national planning agency to ascertain in the context of the national development plan the goals that the national government has set for the region. In the Chapare and Santiago-Mira studies, perceptions about the development focus differed among the local residents and the national government.

d. Hold dialogs with national counterparts. "Brain-storming sessions" are useful in defining problems and agreeing on the content and orientation of the study. Since the study will be a team effort of nationals and DRD staff, it is important to begin the dialog between the probable actors as soon as possible. This happened in the Santiago-Mira study when the preliminary workplan was thrashed out during prolonged "brainstorming" with staff of the eventual counterpart agencies who participated in the study.

e. Use an experienced staff member or consultant to get an overview of the natural environment of the study area and its surroundings. This specialist must understand how natural systems work and know enough about regional planning and economics to be able to communicate this understanding to the regional planner and economist. (See "The Role of the Environmental Management Advisor" in the Guidelines.)

f. Determine the availability of existing data about the study area. Data availability will condition the scope, content, and final product of the regional development study. Existing maps containing natural resources information (such as that on geology, vegetation, soils, land capability, hydrology, hydrogeology, climatology, and so forth) may be critical. Without them, a careful check of available aerial photographic coverage, satellite imagery, and base maps will be necessary. Check also the availability of socio-economic data about the area, including population and migration statistics, economic data, etc. Estimate the needs and availability of information, and initiate the design of the study accordingly. Although some data will almost certainly have to be collected, a distinction must be made between planning and scientific studies. In the Santiago-Mira study, a DRD specialist spent several months in the inventory and collection of existing basic data before the study began.

B. Defining the problem

1. Defining the Regional Planning Framework

Regional development planning is accepted as a concept in many Latin American countries. The stage of its practical application, however, varies greatly. Many countries, especially in South America, have now formally defined development regions within their overall national development strategies. In a few cases, these regional definitions exist only on paper. Some countries carry out regional planning mainly within national planning agencies. Some countries have regional development institutions engaged in planning. Others have evolved strong institutions both for planning and implementing regional development. A few have chosen to utilize states, provinces, or other existing political subdivisions to carry out subnational planning and implementation.

Obviously, any study of regional development is strongly influenced by the economic, institutional, and spatial context of planning, which is determined in part by the extent to which each country has applied a regional development planning approach. The Dominican Republic case study charts the 15-year evolution of the regional development approach in one country.

1. OEA, Secretaría General, y República del Ecuador, *Estudio de las Cuencas Noroccidentales, Cuenca del Río Esmeraldas: Estudio para la Planificación del Desarrollo de los Recursos de Aguas y Tierras,* OEA, Washington, D.C., 1976.

The design of the study is powerfully affected not only by the evolutionary stage of the regional development process but also by shifting political winds. As an example, support for the Panama-Darien study waned as the national government became preoccupied with Canal Zone development proposals.

Some guidelines with examples follow:

a. When a country has not yet formally defined regions for development planning or when the study area is not a standard physical planning unit (such as a river basin), conduct sustained dialogs with national planning institutions and formally involve the national planning agency in the study. Otherwise, detailed studies of specific areas are frequently plagued by uncertainties about development goals and relationships to national priorities. In the Esmeraldas River basin study[1] in Ecuador, which immediately preceded the Santiago-Mira study, the process of regionalization of the country was not yet complete. Confusion over what would constitute the official planning region in which the Esmeraldas and Santiago River basins would be located caused great difficulty in setting the development objectives for the area within the framework of the national plan.

b. When the country is regionalized and has clearly defined regional goals that harmonize with its national plan, but no formal regional development institution exists, design the study to facilitate the eventual creation of such an institution. Here too, the active participation of the national planning agency is mandatory.

c. When the region being studied is a recognized planning unit and an appropriate regional development institution is the counterpart, incorporate a much more comprehensive implementation phase and include a larger component of institutional development assistance than in the two previous cases. Seminars, workshops, training courses, and on-the-job training are particularly cost-effective for institution building, In the study of the Zulia Region[1] of Venezuela, for instance, the counterpart was the State Planning Agency of Zulia (CONZUPLAN) and the powerful regional development corporation (CORPOZULIA). Short courses on project formulation methodology and seminars on regional planning were highly effective. In these circumstances, the role of the region in the national economy can be clearly defined and the final regional development strategy can be much more precise.

d. Whatever approach to regional development planning a country has established, make certain that the new regional planning studies are done within the framework of the national plan. If the national economic and social development plan is out of date or too generalized to help orient regional planning, provide for sustained dialog with the national planning agency throughout the study.

1. OEA, Secretaría General, *Región Zuliana, República de Venezuela: Estudio para el Aprovechamiento Racional de los Recursos Naturales*, OEA, Washington, D.C. 1975.

2. Defining the Proper Spatial and Environmental Context

No subnational area is a closed system; thus, rarely do the solutions to a region's socio-economic problems exist solely within the region itself. Likewise, a region's problems, including environmental constraints and opportunities, may be part of a much larger fabric. Defining the proper geographic and environmental context for study is therefore quite difficult. Long-term solutions to development problems may involve the movement of people into or out of a region, so a wide geographic view is essential. Similarly, a region's environmental problems may be better understood by viewing them in the context of the larger ecosystem in which they are occurring. For instance, planning the development of the Upper Paraguay river basin[1] (the Pantanal region of Brazil) required detailed knowledge of the rainfall region in the Andes, which together with the Pantanal controlled seasonal fluctuations of the Lower Paraguay river. In the Panama-Darien study, cooperation with Colombia was essential to the border-integration and disease-barrier schemes.

1. OEA, Secretaria Geral, e República Federativa do Brasil, *Plano de Desenvolvimiento Integrado da Bacia do Alto Paraguai - EDIBAP Piano Básico, República Federativa do Brasil*, Brasilia, D.F., agosto, 1981

Some procedures for defining the spatial and environmental context include:

a. Carry out rapid surveys of the resource development potentials of surrounding areas to assess the broader geographic and environmental context of the area selected for study. In the study of the Jatoba region[2] in Northeast Brazil, an analysis was made of the physical conditions and development realities of the whole Sertão, a large arid ecosystem. Understanding this broad geographic context helped target the study's focus on some modest but practical solutions to agricultural development that could later be replicated in a larger area.

b. Identify the major ecosystems of the region so as to understand the broader ecological context. In the Santiago-Mira study, the preliminary mission invested ample time in a survey of the major ecosystems, which helped orient the study design.

c. Determine the boundaries of economic and market systems. In the Santiago-Mira region, for example, the powerful influence of market systems and communications in the Andean portion of the study region conditioned many aspects of the study design.

d. Define the primary, secondary, and tertiary urban centers of the region. Analyze them within the context of the hierarchy of urban centers of the whole country. In Panama-Darien, despite the fact that the region is nearly empty of population, the definition of the probable hierarchy of urban settlements helped focus the planning efforts (especially agroindustrial development) along practical lines.

e. Assess demographic patterns and migration trends to understand the population dynamics that will influence the region's development. In Chapare and Panama-Darien, both of which are relatively empty regions, the projection of migration trends was a key factor in planning the region's development.

2. OEA, Secretaria Geral, e Ministerio do Interior, *República Federativa do Brasil, Projeto Bacia do Jatobá,* Recife, março, 1980.

3. Determining the Optimal Multi-Sectoral Focus

Development problems are frequently defined by countries in a narrow sectoral context that obscures causal relationships. Because sectoral problems frequently turn out to require multi-sectoral solutions, the challenge is to design studies with a sufficiently broad technical focus. Severe soil erosion may be viewed as a local agricultural management problem when, in fact, it is the product of national economic policies or land tenure relationships. Jamaica asked DRD to help it develop its forestry sector to take advantage of available World Bank financing. But solving the forestry development problem ultimately required conducting an integrated survey of the natural resources of this small island and preparation of a multi-sectoral development plan. Without such an integrated plan, forestry development would probably have had a negative effect on other economic sectors and vice versa. The San Lorenzo study started with a narrow purpose (university research) and ended with many development goals (including agricultural development, recreational development, and university-based research). Often, water resource development problems are most effectively treated within the broader framework of integrated river basin development. Many DRD river-basin studies (such as the Santiago-Mira study) began with a country's sectoral concern about water resource planning. Invariably, land and water resource development are intertwined,

To put such problems in focus, several kinds of analysis are required:

a. Determine which sectors are involved in the problem and in its solution so that the study can be designed to include all relevant aspects. The San Lorenzo study, for example, was redesigned when it was seen that the issue was far more complex than simply the establishment of an ecologic reserve for use by a university. Mexico's recreational needs had to be weighed alongside the local university's research needs and the local farmers' economic priorities.

b. Analyze sectoral cause and effect relationships carefully so project recommendations can later be directed at first causes instead of symptoms. In the study of northwest Parana in Brazil,[1] a severe problem of soil erosion was initially perceived as an agricultural and urban development problem requiring primarily engineering solutions. A broad analysis revealed that the erosion was a symptom of inadequate multi-sectoral planning, and very comprehensive solutions involving many sectors were required.

c. Encourage sectoral institutions to supply information, feedback, and political support. Involving sectoral interests early in the planning process may defuse potential conflicts and reveal false assumptions that can misorient the study. In the Bolivia Chapare study, the early involvement of the powerful truckers cooperative led to a clear identification of their problems with the farmers over freight rates, and an eventual solution was negotiated within the framework of the study.

1. OEA, Secretaria Geral, Bacia do *Rio do Prata: Estudo para sua Planificação e Desenvolvimento, República Federativa do Brasil, Noreste do Estado do Paraná,* OEA, Washington, D.C., 1973.

4. Limiting the Study Goals While Retaining an Integral Focus

One common problem in designing regional development studies involves stretching limited financial resources to cover the study objectives the country defines. Since the initial study goals tend to far outstrip the financial means, the usual challenge is to cut the problem down to fit the money available for the study. (In the Panama-Darien study, changes in both funding levels and funding schedules had to be accommodated.) The trick is to do this without losing the integral focus of the study or producing plans and proposals too general to be implemented. Some devices include:

a. Limit the overall size of the geographic area. This is often the least practical means of cutting the study down to size. Regions may be political units, official planning units, or river basins - none of which can be modified. Occasionally, institutional or political jurisdictions opt out of the study, as the Bayano Region in the Panama-Darien study did. But usually the pressures are in the opposite direction: jurisdictions left out of the study lobby to be included.

b. Study the region at different levels of detail, phasing the investigation from the general to the specific. The phased integrated approach to the study of regions goes deep into the history and traditions of the DRD. (See the introduction to Physical Resource Investigations for Economic Development, OAS, 1969.[1]) Conducting rapid, inexpensive reconnaissance surveys of the region under study to identify priority areas or development zones for further study has long been standard practice in DRD-assisted studies. Phased investigation was a cornerstone of the Panama-Darien, Pilcomayo, and Chapare studies.

1. OAS, General Secretariat, *Physical Resource Investigations for Economic Development: A Casebook of OAS Field Experience in Latin America,* OAS, Washington, D.C., 1969.

c. Limit the time horizon of the proposed development plan and projects. An effective means for adapting a development planning effort to limited financial resources is to reduce the time frame of the proposals. Expensive long-range planning efforts (10 years or more) with elaborate economic projections of the sort popular during the Alliance for Progress era are no longer highly regarded. The tendency now is to concentrate on four- or five-year periods for detailed plans and projects. Limiting the time horizon saves time and money during data collection and analysis and allows the team to concentrate on defining the regional development strategy and formulating a limited number of development projects consistent with longer-range goals, thereby increasing the chances of implementation. This was the case in the Chapare and Panama-Darien studies.

d. Tailor the development planning conservatively in relation to the development financing available in the short term. Work with government and private agencies to determine the development financing that can be expected to be available for implementing new projects and programs. In the Panama-Darien study, plans were continually adjusted as government financing shrank.

e. Limit the sectoral focus of the proposed development after a rapid integrated overview of the various options. An integrated survey of natural resource development potentials coupled with socio-economic studies may pinpoint certain sectors with major development potential. Subsequent investigations may then be concentrated on just a few types of development projects. In the Jatoba Region in northeast Brazil,[1] initial investigations confirmed that the only significant development potentials were in the agricultural sector and that social services were sorely needed. The study was then focused on these aspects.

1. OEA, Secretaria Geral e Ministerio do Interior, *Projeto Bacia do Jatobá, República Federativa do Brasil,* Recife, março, 1980

f. Focus the study on a particular target population within a designated geographical area, Many studies of integrated rural development are directed at improving the living conditions of target populations of poor farmers rather than all inhabitants of a region. Thus the integral focus is retained but the study's scope is limited. A principal focus of the Santiago-Mira study, for example, were the Andean small farmers for whom irrigated agricultural cooperatives and associated agroindustries were designed in the intermountain area and the migrant to the coastal area, for whom colonization projects were created.

C. Designing the management structure

Regional development planning - one of the most complex of all multi-disciplinary activities - can be accomplished only through teamwork. The management structures for carrying out regional development planning with the support of an international technical assistance agency are complicated and delicate.

Since effective technical assistance should be a partnership, the management structures described here may confuse those familiar with public administration principles, which reject most forms of dual authority, Because the objectives of a technical cooperation project are temporary, the organization that carries them out must change with changing development needs. Given that in many cases a project is established precisely because standard organizations cannot handle the activity, the project management will not resemble a typical government or corporation. In particular, it will be drawn up by task rather than by function.

While the following points are derived from the experience of a technical assistance agency, the ideas should also be of use to national or regional development planning institutions, inter-ministerial task forces, and consulting firms working with government.

1. The Basic Management System Used by DRD

The core of the management structure that has emerged from DRD experience is a technical unit composed of national and international development professionals and support personnel who jointly execute the regional development study. (See Figure 3.) Personnel from one or more national agencies and from DRD work together in the technical unit as equals. Day-to-day management of the unit is provided by co-equal directors, national and international (OAS). In practice, the national director manages national personnel and the international director manages international staff, but the degree of interaction and teamwork must be very high.

The policy direction of the technical unit is provided by an executive commission made up of high-level representatives of the national ministries (or other executive agencies) and a representative of DRD (usually the DRD's director or a division chief). Frequently, the country representative on the executive commission is of ministerial rank, as in the Panama-Darien study. The president of the executive commission is usually the senior national official involved. Decisions of the commission, however, must be adopted by consensus. The commission meets quarterly or biannually to review progress, to approve the workplan, and to review the interim and final reports. To coordinate the national agencies involved in the study, a national coordinating committee that reports to the executive commission is sometimes established.

Figure 3 - DRD's Basic Management System for Regional Development Studies

Surprisingly, dual authority and management by consensus work most of the time. The keys are clearly defined common objectives, clearly defined tasks, foresight, strong communication channels, and the constant reinforcement of teamwork. Accordingly, the dialog between government and DRD staff initiated during the preliminary mission is important.

This basic management system is common to all six of the case studies summarized in this book. The variations are determined by the composition of the participating national agencies and the national coordination mechanisms. In the case of the Pilcomayo study, the multinational character of the study called for several institutional devices for coordinating international action.

It should be pointed out that the "equality" of national and international participants is a relative term that varies widely according to the situation. When the national agency is weak and inexperienced, the international personnel assume greater responsibility, and training and institution-building become dominant elements of the study. When the national agency is strong, the international agency assumes more of an advisory role and helps to improve liaison among national agencies. In countries where DRD has conducted many studies (for example, the Dominican Republic and Ecuador), the national agencies have assumed greater responsibility in each successive study. Even considering these variations in the relations of the technical assistance agency with the national agencies, the institutional actions described are the basic options.

2. Institutional Arrangements for National Studies - Representative Options

The choice of a national counterpart agency for a regional development study depends upon the study's focus and a variety of other factors. Agencies that are particularly effective in data gathering and diagnosis (planning or natural resource agencies, for example) may be weak in project formulation or implementation, while most agencies responsible for implementing projects have limited analytical capabilities. This dilemma can sometimes be resolved by working with a combination of agencies. A variety of arrangements that have worked in wide-ranging settings are described below.

a. Set up a task force of national agencies under the foregoing structure to execute the study. Such task forces are disbanded upon completion of the study. The weakness of this approach obviously occurs during implementation: systematic fellow-through is virtually impossible. This occurred in the Dominican Republic-Cibao and Panama-Darien studies.

b. Work with a sectoral executing agency under the aegis of the national planning agency. This system assures greater follow up while the recommendations are being implemented, but its effectiveness is frequently constrained by the limits of the mandate of the executing agency. In the Santiago-Mira study, the principal counterpart was INERHI, the water resource agency. Despite the presence of the National Planning Board (JUNAPLA) in the study, INERHI was confined by its mandate to dealing only with actions related to water resources, which hampered implementation of the comprehensive recommendations of the final report. JUNAPLA was unable to involve other sectoral agencies, such as the Ministry of Agriculture, in the implementation of recommended projects. The failure to establish a viable regional development authority further limited the implementation of the plan, except in the water resource sector.

c. Work with a renewable natural resource or environmental agency. Most such agencies have a broad mandate and a spatial orientation compatible with a regional planning orientation. However, few have financial or political power, and some have legal mandates that put them at odds with other executing agencies. For example, Peru's Ministry of Agriculture manages the country's national parks, as well as its forests and wildlife reserves. According to law (Decreto Ley N° 21147), forest reserves are classified as "untouchable." Yet, the Ministry of Mines and Energy has a mandate to explore and exploit mineral and petroleum resources throughout Peruvian territory.

d. Work with a regional development corporation or similar executing agency. When such agencies have the funds to implement development, this can be the best of all institutional arrangements. There are few such agencies, however. In the study of the Zulia Region[1] of Venezuela, the powerful Zulia Regional Development Corporation (CORPOZULIA) was one of the counterpart agencies, and most of the study recommendations were implemented. Even when a regional development agency is relatively weak, it can be a good choice as a counterpart. When the Colombia-Darien[2] study started, CORPOURABA, the counterpart agency, had a small budget and limited operating experience. But the in-service training its staff acquired by working with international personnel and the infusion of public and private funds resulting from approval of project proposals galvanized the agency, which was then able to implement much of the recommended plan.

1. OEA, Secretaría General, *Región Zuliana, República de Venezuela: Estudio para el Aprovechamiento Racional de los Recursos Naturales.* OEA, Washington, D.C., 1975.

2. OEA, Secretaría General, y República de Colombia, *Proyecto Darién: Estudio para la Orientación del Desarrollo Integral de la Región del Darién Colombiano.* Medellín, julio, 1978.

e. Help establish a national, independently funded study team that can evolve into a regional development institution when the study is completed. This option usually involves an initiative of the national planning agency, a substantial budget commitment by government, and the tentative decision to establish a new institution. The arrangement is nearly as satisfactory as the previous one. However, mounting a large institution-building effort during a planning study is difficult. In the study of the Nariño-Putumayo region[3] of Colombia, for instance, a regional development corporation was created shortly after the DRD-supported studies were completed. Some study team staff became members of the regional development corporation, and the training given by DRD was well utilized.

3. OEA, Secretaria General y República de Colombia, Departamento Nacional de Planeación, *Región Fronteriza Nariño-Putumayo*, OEA, Washington, D.C., diciembre, 1980.

3. Management Devices for Multinational Studies

Meeting of the Coordinating Committee of the Pilcomayo River Basin Study in Asuncion with representatives from Argentina Bolivia, Paraguay and the DRD.

Institutional arrangements for multinational studies must be made with utmost care. Some arrangements that have worked include:

a. Establish a two-level project structure - one for technical management and the other for political coordination between the countries involved. In the Pilcomayo study, political negotiations accompanied the development planning effort and sometimes redirected it. A Coordinating Committee composed of representatives from the three governments was established as a forum for informal political dialog facilitated by DRD. The technical work was carried out by national technical teams supported by DRD in each country. Resisting the temptation to create a tripartite development commission to oversee the study was critical: what was necessary first was informal rather than formal technical and political dialog among the three countries. Only when all countries better understood the basin's potential and their own options could they envision common development potentials.

b. Undertake parallel rather than joint studies of the multi-country region. In the Darien Region of Panama and Colombia,[1] this approach precluded the need to make complicated political arrangements that might have delayed the execution of the study, The countries developed a comparable data base and formulated projects at a similar level of detail. They may eventually develop a joint strategy for the region and complementary development projects. The weakness of this approach is that there is no guarantee that post hoc negotiations will succeed: national positions may well have hardened by the time negotiations begin.

1. OEA, Secretaría General y República de Colombia, *Proyecto Darién: Estudio para la Orientación del Desarrollo Integral de la Región del Darién Colombiano*, Medellín, julio, 1978.

c. Make use of international agencies in multinational studies to provide a neutral framework in which countries can comfortably exchange information and negotiate informally. In the Pilcomayo study, DRD's presence in the study's management structure, along with the requirement that decisions by the Coordinating Commission be adopted unanimously, greatly stimulated dialog and information exchange.

D. Organizing the study

1. The Agreement

Once the regional development problem has been defined, the broad focus of the study determined, and the management system developed and approved, all the major elements of the study should be documented in a formal agreement. On its face, this agreement is simply a contract between the country and the technical assistance agency for the provision of services. The agreement defines the product in general terms, as well as the financial and institutional ingredients required to deliver it. But it also serves other, less obvious functions. Often, it sets the rules of the game between national agencies involved in the study, specifying or at least implying who reports to whom, how decisions are taken, and which procedures are preferred. Frequently, it is used to obtain and sustain national budget support for the study. It outlines mechanisms for reorienting the study as it goes along, monitoring results, and adjudicating any disputes that arise, Its formality may strike some as unnecessary or inappropriate, and when the study is going well the agreement is rarely used as a reference. But if things do not go smoothly, it can spell the difference between negotiating a way out of the difficulty and watching the project collapse.

A typical agreement includes:

- The background of the government request for technical assistance;
- a statement of the study objectives;
- a description of the study phases and the output of each phase;
- the management structure and procedures for executing the work;
- a precise statement of the financial commitment of the country and the DRD to the study (usually expressed in terms of person-months of professionals and support personnel plus logistical support from the country); and
- an outline of the workplan (varying in the details of the operations to be performed, depending on how comprehensive the preliminary mission was).

All of the case studies in this book were based on formal written agreements.

2. The Detailed Workplan

After the agreement has been prepared and before the study is executed, there is usually a lapse of several months during which efforts focus on preparing a detailed plan of work. This workplan goes far beyond the schematic study outline contained in the agreement. Because of the complexity of regional development planning, workplan preparation is always rigorous. Just how time-consuming it is depends on how well the basic ingredients have been defined in the original request for technical assistance and in the agreement, and how comprehensive the work of the preliminary mission was.

GOALS OF THE WORKPLAN

a. Clearly define the tasks to be performed to achieve the objectives of the study.

b. Identify the specific technical products to be delivered (reports, maps, development projects, training, etc.).

c. Define the available information resources.

d. Allocate the available human and financial resources (both national and international) to the various tasks.

e. Establish a timeframe for delivery of different products.

f. Design a system for continually integrating information and forcing the interaction of specialists throughout the study.

The workplan may propose adjustments in the budget, the timeframe, or even the study's detailed objectives if the process of preparation reveals incompatibilities. The workplan must ultimately translate the study's final detailed objectives into affordable and manageable tasks that can be performed with the available time, talent, and funds. As the basis for executing the regional development study, the detailed workplan must communicate well to all the actors involved.

THE USE OF SYSTEMS ANALYSIS AND MATRIXES

Workplan preparation is a complex exercise in which the components of the plan are first isolated and clearly defined and then placed within a framework that facilitates the identification of critical links between them. One of many techniques that has proved useful in this exercise is a system-oriented matrix for sequencing project tasks.

In DRD's experience, a strictly linear approach to scheduling the arrivals, activities, and departures of study team members seldom holds up against the constraints posed by the unavailability of information, technology, and time, and it does little to foster intellectual interaction. DRD's alternative approach is to (1) define all the analyses needed to fulfill the study's objectives, (2) determine which will not fit within the project budget or time frame given the availability of information, and (3) specify for the rest the points at which collaboration among the various specialists will optimize the analysis. Instead of merely "plotting" activities against time, both independent and collaborative activities are phased to accomplish three goals: optimizing the use of short-term and long-term consultants, promoting interdisciplinary work at critical points, and gearing all study project activities to well-defined products (reports, maps, etc.). (For an illustration of this methodology, see Figure 2 of the Santiago-Mira case study.)

STEPS IN WORKPLAN PREPARATION

It would distort reality to imply that workplan preparation takes place only from the time the initial study objectives are set forth in the agreement until the time the study begins. Some of the most important steps in workplan preparation actually occur during the preliminary mission. (For details, see "Defining the Problem" and "Designing the Management Structure" in the Guidelines.) Furthermore, workplans are never static. They are revised continually during execution.

Workplan preparation for a regional development study can be organized into two stages: analysis of the overall context of the study and analysis of the specific study region.

To analyze the overall context of the study, the following steps are used:

a. Define the nature of the counterpart institution or institutions and their objectives in participating in the study by consulting directly with officials. These are the major clients for the study, and any misconceptions about their interests are likely to have serious consequences later. In the Santiago-Mira study, face-to-face dialog with INERHI and JUNAPLA officials during the preliminary mission cleared up some initial misconceptions about their basic interests.

b. Interpret the relationship of national policy goals to the specific objectives stated for the study area. The absence or presence of clearly defined national policies for developing a particular area is a major consideration in designing the workplan. (See "Defining the Regional Planning Framework" in the Guidelines.)

c. Determine the time, information, personnel, and equipment available for the study. Realistically assess data availability and counterpart support for the study. When resources prove to be less than originally hoped for, adjust the study's detailed objectives accordingly, but try to avoid loss of the integral focus in doing so. (See "Limiting the Study Goals While Retaining an Integral Focus" in the Guidelines.)

To analyze the specific study region, the following are the key steps:

a. Determine the relationships between the designated study region and the larger system of which it is part. (See "Defining the Proper Spatial and Environmental Context" in the Guidelines.)

b. Identify priority sectors and/or geographic areas within the region to be studied. (See "Determining the Optimal Multi-Sectoral Focus" in the Guidelines.)

c. Consider the effects of ongoing projects or programs on the study region. Inventory existing plans and projects as a part of the regional development study. (For details, see "Executing the Study" in the Guidelines.)

Additional practical guidelines in workplan preparation that are illustrated in the case studies follow:

a. Use group dynamics techniques and brain-storming sessions involving counterpart professionals as much as possible. Flow charts and graphics are useful in this process. In the Santiago-Mira study, all these techniques were utilized with success.

b. Clearly define the nature and timing of specific tasks since many pieces of information must be collected and synthesized at each step in the study. The use of simplified critical-path analysis is helpful, but ultra-sophisticated planning tools have not worked well in the field. Delays are common and must be accommodated continually. (See Figure 2 in the Chapare study for a typical work methodology and time sequence.)

c. Schedule many study activities simultaneously so as to promote interaction among specialists. (See the chronograms for the Panama-Darien and Santiago-Mira studies.) Without opportunities for interaction and dialog, the advantages of multidisciplinary studies are forfeited.

d. Relate tasks to the overall strategy of the study rather than to individual sectoral activities or strategies. The tendency for specialists to proceed along purely sectoral lines in a linear fashion is nearly irresistible. The workplan should force experts out of their comfortable sectoral worlds, fostering cross-fertilization and breadth. In the San Lorenzo study, the international director worked hard and with some success at coaxing academicians out of their traditional mind sets.

e. Allow time in the workplan for integrative activities. A well-wrought workplan can help extinguish international consultants' seemingly overwhelming desire to go home as soon as the sectoral reports are completed. The workplan should force them to consult with other specialists about their work and reports before they leave the country. The team leader must constantly emphasize this aspect of the workplan through strong leadership and by setting a good example.

f. Build flexibility into the workplan, especially as concerns schedules and deadlines. In particular, overbudget the time of consultants so they have adequate time to work with the counterparts.

g. Control the level of detail. Many specialists have a tendency to overinvest in data collection and descriptive writing and to skimp on analysis and recommendations. Design the workplan to limit descriptive detail, and allow plenty of time for analysis. In the Dominican Republic DELNO study, failure to control the level of detail of the diagnostic phase caused the project to lose momentum and reduced the scope of Phase II.

h. Recognize the difficult trade-off between improving results and exceeding study resources. In both the DELNO and Cibao studies in the Dominican Republic, efforts to extend and improve the Phase I development diagnoses caused an overrun of budgeted resources and sharp constraints in the Phase II project-formulation activities. In the case of Cibao, it was the government's decision to greatly increase the area of the study that precipitated the trade-off.

i. Schedule formal training activities to upgrade national technicians' skills, and require international consultants to give seminars before leaving the country. In the Panama-Darien study, three rounds of training activities were scheduled. In the San Lorenzo study, training for public officials engendered local political support for the San Lorenzo reserve.

III. Executing the study

Most major DRD regional development studies are divided into two phases. In Phase I, the region's problems and potentials are diagnosed, a preliminary development strategy is designed, and possible development projects are identified. In Phase II, the development strategy for the region is refined, the specific investment projects and programs needed to implement the strategy are formulated, and an action plan is prepared. Each task specified in the workplan is executed within this overall study framework.

A. phase I - Development diagnosis

This phase, which should consume less than half the time of the study, consists of data collection and preliminary analysis. It culminates in an interim report that spells out a preliminary development strategy and project ideas for the government to consider. If properly executed, it will rapidly narrow the scope of the study to the best development potentials without distorting the study's integral focus. Only that information needed to identify development potentials and problems is collected, and potential problems are pinpointed at the earliest possible moment so that alternative development options may be formulated.

Phase I is the most difficult to control of all the parts of the study. Experience verifies that data collection tends to run beyond its initial deadline and to use more funds than budgeted. Interdisciplinary studies seem especially vulnerable to this tendency. This constitutes a serious problem since it drains resources from the subsequent phase of project formulation, which in turn reduces the quality and level of detail of the implementation proposals.

1. General Criteria for Data Collection

a. Information contributed by the different sectors in the study should be at approximately the same level of detail. In the Pilcomayo and Dominican Republic studies, making data compatible was a major technical challenge. In Panama-Darien, common data standards and formats were set for the 24 agencies supplying information.

b. Data should prove or disprove specific hypotheses related to the study's objectives. Data should answer specific questions about development potential and problems, as well as generate project ideas (as the DELNO component of the Dominican Republic study did). The terms of reference of consultants should specify who will use the data they are developing and how (which the Chapare study, for example, did).

c. Undertake data collection in conjunction with existing national institutions, where possible, (Close work with the Tommy Guardia Institute saved time and money in the Panama-Darien study.) The use of international consultants to do basic data collection is very costly and needs special justification. (In the Esmeraldas River basin study[1] in Ecuador, extensive use of international consultants in the design and execution of a farm survey proved very costly and delayed Phase I. Contracting with a local institution to do the survey would have been better.)

1. OEA, Secretaría General, y República del Ecuador, *Estudio de las Cuencas Noroccidentales, Cuenca del Río Esmeraldas: Estudio para la Planificación del Desarrollo de los Recursos de Aguas y Tierras*, OEA, Washington, D.C., 1976

d. Draw on the practical experience of the local population. This saves money and serves as a "reality check." Because local people helped identify needed actions and even specific projects in the Chapare region, the study maintained a realistic focus despite many distortions caused by outside authorities interested only in coca-eradication schemes.

e. Identify project ideas during data collection. Project opportunities identified during fieldwork and checked with local people are more likely to fit local conditions than projects identified subsequently through data interpretation. In the Dominican Republic Natural Resources Inventory, the soils mapping team systematically searched for agricultural project opportunities and identified several that ultimately proved highly successful.

f. Use local research institutions and universities as sources of information. In working with governmental agencies, there is a tendency to deal with those agencies alone. Universities in particular have valuable information and capacities that should be utilized for data collection.

g. Keep description to a minimum and emphasize analysis. Less experienced professionals tend to shortcut the latter. Descriptive writing is far easier than analysis, especially that involving several disciplines, but far less useful to government decision-makers.

2. The Natural Resources Survey

Some form of integrated survey of natural resource development potential accompanies all DRD regional development studies. This reflects DRD's long-held belief that a realistic assessment of the resource base is fundamental to any development planning and project-formulation effort, The central message of DRD's *Physical Resource Investigations for Economic Development: A Casebook of OAS Field Experience in Latin America*, is that an integrated overview of the natural resources of an area slated for development constitutes a sound framework for identifying development projects and detecting potential conflicts between resource uses.

A sequence of satellite images of the Paraguay River in the area of Asuncion, Paraguay and Formosa, Argentina. Imagery of this type was used in the reconnaissance survey of natural resources of the Chaco Region of Paraguay.

Aerial photographic interpretation carried out as part of soil studies in the Lower Bermejo River basin in Argentina.

Supervision of map drafting for the Phase I report of the Lower Bermejo River Basin Study in Argentina.

Resource survey specialists and engineers exchange information while undertaking field work in the Guayas River basin in Ecuador

Most of the methodologies described in the 1969 casebook[1] remain valid today, though satellite imagery, remote-sensing technology, geochemical analysis, and other basic techniques for mapping analysis have since become part of DRD's stock-in-trade. This casebook updates a few aspects of natural resource survey technique. Some lessons drawn from recent methodological advances follow:

a. Use modern satellite imagery and remote-sensing techniques for resource surveys of large sparsely settled or unpopulated regions about which little is known. These tools facilitate rapid and relatively accurate mapping and analysis of geology, geomorphology, soils, natural vegetation, land use, and so forth when coupled with ground verification. Remote-sensing technology has revolutionized reconnaissance surveying and natural resources mapping in large remote regions by providing broad coverage of physical resource information on accurate base maps, In the Pilcomayo River Basin, satellite imagery was the key to the rapid analysis of land capability and the delineation of development zones worthy of more detailed study. In Panama-Darien, side-looking radar imagery was the only accurate base map material available to the study team. Nearly permanent cloud cover in the Darien region made acquisition of standard aerial photographic coverage nearly impossible.

b. Use resource survey specialists who are experienced development practitioners as well as good scientists. Such specialists can orient local professionals along practical and efficient lines of investigation. In the Dominican Republic Natural Resources Inventory, the two DRD soil scientists who undertook the land-capability classification were experienced agronomists. They not only taught their counterparts modern soil mapping techniques, but they also helped them identify agricultural development project possibilities and showed them the practical applications of land-capability classification.

c. Where possible, a single national agency should be responsible for resource surveys. This approach will greatly facilitate the compatibility and integration of data. This was the case, for example, in the Dominican Republic-Cibao study. d. Train local personnel in the application and use of data from integrated resource surveys. Although local personnel are familiar with the use of data from one discipline, they are seldom familiar with the techniques of interpreting data from several disciplines for analytical purposes. A small investment in training increases the usefulness of the study.

1. The casebook features chapters on methodologies for geologic surveys, soil mapping and land capability interpretation, land use surveys, water resource planning, and surveys of forests, grasslands, and vegetation. Three comprehensive case studies of integrated natural resource surveys in Latin America are also included.

3. Data Integration

A critical aspect of Phase I is constant integration of data as it is collected. If this process is not initiated at the beginning of the study, the task becomes progressively more difficult. Some data-integration techniques include:

a. Specify in the terms of reference for each professional not only the problems to be addressed but also the other team professionals with whom cooperation will be necessary. For example, the soil scientist may be instructed to cooperate with the geologist on geomorphology, the agricultural economist and the hydrologist on identification and evaluation of irrigated agriculture projects, and the legal expert and the rural sociologist on land tenure. The terms of reference may state that the soil scientist must write parts of the final report dealing with his own discipline, such as land capability analysis, and must also help write or review parts dealing with multidisciplinary issues.

b. Make sure that all professionals know what their colleagues are doing and why. Exchange drafts of reports among all professionals, hold regular staff meetings, and take other steps to counter the tendency of specialists to pay highest allegiance to their discipline or education instead of to the study's objectives. Time should be budgeted for this, and it is the constant preoccupation of the study manager.

c. Use maps to synthesize the final products of sectoral investigations. Integrating mapped information is one way to integrate the work of different disciplines. As devices for data integration in regional development studies, map-overlay techniques and composite maps are particularly useful. Maps that integrate several types of information include land capability, potential land use, agricultural zones, and project-location maps. The methodology of agricultural zoning used in the Eastern Cibao Valley of the Dominican Republic illustrates map-overlay technique particularly well. The combination of information about geomorphology, vegetation, and land capability in specific "development areas" facilitated the identification of agricultural and agroindustrial projects. In the Panama-Darien study, the regional/urban planner used map-overlay techniques extensively to design the initial regional development strategy and produced several composite maps that appear in the case study. In the Chapare study, the spatial strategy was likewise developed using map analysis.

d. Use specialists from such integrative disciplines as regional planning as team leaders. While specialists from such broad disciplines are good "integrators" it is the commitment to multidisciplinary study rather than the disciplinary training that is the most important. (See "The Role of the Project Manager" in the Guidelines.)

e. Be sure that international technicians provide counterparts from sectoral agencies with on-the-job training that broadens their planning focus. In the Santiago-Mira study, the major counterpart agency, INERHI (a water resource development agency) received prolonged exposure to multidisciplinary thinking. As a result, its staff members greatly expanded their concept of water resource planning and initiated extensive contacts with other sectoral agencies, including the Ministries of Agriculture and of Commerce and Industry.

f. Use matrixes and other forms of systems analysis to illustrate significant points of development interaction within a region. These tools can help identify potential conflicts within development activities or between development activities and environmental hazards, as well as opportunities for mutual support. In the Santiago-Mira study, a simple matrix crossed the major sectoral activities with each other and revealed numerous potential conflicts. For example, construction of access roads for the development of hydroelectric projects would have allowed uncontrolled entrance by squatters to areas designated as zones for protection of natural vegetation. The same technique was later used effectively in the Colombia-Darien[1] study.

1. OEA, Secretaría General, y República de Colombia, *Proyecto Darién: Estudio para la Orientación del Desarrollo Integral de la Región del Darién Colombiano*, Medellín, julio, 1978

4. Focussing on Areas with Highest Development Potential

To make optimal use of the financial resources available to the study, areas that merit intensive examination must be quickly separated from those that do not, To delineate areas with particularly high potential or great need, DRD uses a variety of techniques.

a. In very large areas that are physically, socially, and economically diverse, delineate "program areas" for immediate development. To diagnose the region and identify its distinctive subregion, two kinds of criteria are used: government objectives and priorities for the study area (including export production targets, employment goals, and the like) and a profile of the region's productive capacity, employment levels, social services, and other definitive characteristics. In successive approximations, these interacting factors are analyzed and mapped. This methodology was initially created for the Pilcomayo study, which covered 270,000 km^2, and it was refined in two major river basin studies in Brazil: the Upper Paraguay[1] and Araguaia-Tocantins[2] basins, which covered 390,000 km^2 and 935,000 km^2, respectively.

1. OEA, Secretaria Geral, e República Federativa do Brasil, *Plano de Desenvolvimento Integrado da Bacia do Alto Paraguai - EDIBAP*, Brasilia, D.F., agosto, 1981.

2. OEA, Secretaría General, y CIDIAT, *Evaluación del Impacto Ambiental del Proyecto de Drenaje de la Región de Desarrollo Integral del Programa Guanare-Masparro* Mérida, Venezuela, 1980.

b. In smaller regions with variable potential, determine priority areas initially on the basis of physical characteristics. Use "agricultural zoning" techniques to eliminate areas of high relief or unsuitable climate, and characterize the remaining areas in terms of land form, climate, and soils. To generate ideas for development programs and projects in these areas, consider social, economic, and agronomic factors. Agricultural zoning techniques were used with success in the Dominican Republic Eastern Cibao and Cibao region studies, which covered 5,300 km^2 and 19,000 km^2, respectively. c. In relatively underdeveloped areas, identify local areas suitable for integrated rural development. Where both development potential and investment capital are modest, select a small number of areas where agriculture, livestock, forestry, and energy resources all hold development potential, and where existing settlements and infrastructure can accommodate further growth. This technique is illustrated in the Panama-Darien and Pilcomayo studies.

5. Identification and Resolution of Conflicts

A fundamental message of this casebook is that environmental issues must be dealt with as early as possible during planning to avoid unnecessary conflict in the development process. "Environmental impacts" arising out of development are frequently conflicts between different resource users. Identifying these potential conflicts early on and exploring alternative development solutions to minimize or avoid the conflicts are therefore important goals of DRD regional development studies. (For details, see "The Role of the Environmental Management Advisor" in the Guidelines.) A few basic guidelines are included here:

a. Look for interactions within and among ecosystems. Some form of systems analysis, such as the development of a regional systems model of the area's major ecosystems and their significant components and processes, is essential. Since the value of the model is in helping each participant understand when and to what degree the sectors relate to one another, such a model is best constructed by the team as a group. Within DRD, this process was developed and utilized for the first time in the Guanare-Masparro[1] study in Venezuela.

1. OEA, Secretaria Geral, e Ministerio do Interior, *República Federativa do Brasil*, PRODIAT; *Diagnóstico da Bacia do Araguaia-Tocantins*, Brasilia, D.F., outubro, 1982.

b. As part of the modeling exercise, identify the natural goods, services, and hazards of each major ecosystem. (See Table 2 of the Santiago-Mira study.) Even under the best multiple-use plans (in which resource assumptions and ecosystem interactions are made explicit), some natural goods and services will be destroyed or impoverished or their use as such will be precluded, while other natural goods and services will be used but will benefit some individuals or groups more than others. Since, by definition, all natural goods and services - just like all economic goods and services - have value because some specific group wants to use them, identifying them serves to spotlight all the groups that will be affected by a given development activity.

c. Include even the smallest interest groups' concerns in the analysis. Once a project has been executed, alliances between small interest groups that were left out can become formidable and can effectively oppose or even defeat significant support for a development project. In the San Lorenzo study, the project objectives initially excluded many interest groups. Eventually, they were included, however, and contributed to significant portions of the final strategy.

d. Resolve conflicts through project coordination, negotiation between parties, and third-party mediation. During the early stages of planning, the results of arbitration are not as traumatic, since all study team members are playing by the same rules and share a common perspective on the planning objectives. Also, at this stage, the positions of local interest groups have not yet hardened. In the Santiago-Mira study, a well-coordinated planning study with clear objectives and a well-designed workplan, only a few conflicts in resource use were encountered and they were handled well. Resolution of conflicts was far easier to negotiate during Phase I when the parties were "equals" than it would have been if these conflicts had been discovered later, after investments in time, funds, and prestige had been made. In the San Lorenzo study, groups competing for the canyon's resources included urban recreationists, residents and industries of Saltillo who wanted to use the water supply, university researchers, conservationists, and the *ejido* farmers. Identifying the need of each group and showing how those needs could be harmonized helped the study team resolve the conflicts and arrive at solutions acceptable to all.

e. Seek a strategy that will promote an equitable and just distribution of the costs and benefits of development. A plan or strategy that does not do this merely postpones conflicts.

f. Take a neutral view of potential conflicts in resource use but highlight the conflicts so as to facilitate decisions. In the San Lorenzo study, the potential conflict was posed in terms of the development of one economic sector (tourism) impinging upon the development of another (agriculture), rather than as a conflict between environment and development. The relative economic and social advantages of the two uses of the San Lorenzo Canyon were then explored, and the various users were consulted in the search for an amicable solution to the potential problem.

6. Inventory of Existing Plans and Projects

There are few large places left in the Americas where no development is under way or planned. Most studies of regional development must, therefore, take account not only of what exists on the ground but also of what is planned, The development context of a region is as important as its resources and population dynamics. The quantity of existing plans and proposed projects in some regions, however, is truly awesome. (In the Chapare region, 54 agencies supported development activities, many of them conflicting.) Making an inventory of existing plans and projects is exceedingly important, but it can be overwhelming. (The danger of the effort getting out of hand is well illustrated in the DELNO project in the Dominican Republic.) Some tips on how to avoid problems include:

a. Identify all significant development plans and projects in the region, no matter what agency - public or private - is involved, but collect detailed information only about those that serve or contradict the proposed development objectives. In the Dominican Republic-DELNO study, the inventory got out of hand because no criteria were established that would limit the process. All projects proposed for the DELNO area were analyzed, irrespective of the period of implementation or development objective or available financing. The process delayed Phase I and limited the final product of the study.

b. Organize planned projects in a time sequence, and avoid including projects that fall outside the time horizon of the study. In the Chapare study, a large number of proposals were identified in the project inventory but only a few were examined in detail - those with immediate implementation possibilities.

c. Be sure to identify projects with high-level political support that have already gained momentum. In the study of the Upper Bermejo River basin[1] in Argentina and Bolivia, for example, a major dam project known as Zanja del Tigre was perceived to have high-level political support and was advancing to the stage of feasibility study. The river-basin study was designed so as to avoid either directly challenging or overlooking this major project proposal. As it turned out, the study provided a broad perspective that helped the government consider other alternatives to Zanja del Tigre.

1. OEA, Secretaría General, *Cuenca del Río de la Plata: Estudio para su Planificación y Desarrollo, República Argentina-República de Bolivia, I - Alta Cuenca del Río Bermejo, Estudio de los Recursos Hídricos*, OEA, Washington, D.C., 1974.

7. Identification of New Project Ideas

A key objective of Phase I, as indicated, is to identify new project ideas based on the analysis of socio-economic development needs and development potentials. This process should begin early in the study, even during the preliminary mission, and proceed throughout Phase I, Project ideas need not be comprehensive at the outset since only a few will eventually be selected for full-scale elaboration during Phase II. (The process of identifying, selecting, and formulating projects in relation to the development study of a region is illustrated in Figure 4.)

Some practical guidelines include:

a. Compare information on natural resource development potential with existing uses of resources to identify project ideas. In the Eastern Cibao portion of the Dominican Republic study, the agricultural zoning and agricultural project-identification techniques used demonstrate this approach. (See, particularly, the sequence of graphics and maps that illustrate the methodology of agricultural zoning and agricultural project identification, Figure 8 and Maps 5 to 9.)

b. Analyze population growth and projected demands for economic goods and services as new project ideas are generated. Particular care should be taken to project needs for social services, Failure to consider needed social services was a weakness of DRD studies before the mid-1970s. Investment projects for development of agriculture, forestry, mining, and industry coupled with projects for infrastructure (such as transportation, communications, and energy) are vulnerable to failure without the associated social services (education, health, urban services, etc.). Analyses of human needs must accompany surveys of development potentials. (See, for example, the Panama-Darien, Chapare, and Santiago-Mira studies.)

c. Interview local people during field studies in Phase I as a means of identifying new project ideas. In the Dominican Republic Natural Resource Inventory, many project ideas for natural resource development were identified during soil mapping and land capability analysis. Some of these ideas were later elaborated and appear in the final report.

d. Determine which needs are being partially or fully satisfied by available natural goods and services and how. Projects that improve or protect these amenities may be significant for the development of the region. In the San Lorenzo study, a program for reforestation and forest management sought to improve the local population's use of the forests. Similarly, forest conservation projects were developed to protect the area's groundwater-recharge function since San Lorenzo Canyon supplied water to the nearby city of Saltillo.

e. Identify early in the study a small number of projects suitable for immediate implementation. Such projects should be pushed forward to implementation long before the study is complete. In the study of the Upper Bermejo River Basin[1] in Argentina and Bolivia, a water supply project for industrial development was identified early in the analysis and formulated all the way through the feasibility stage. It was under construction shortly after the study ended.

> 1. OEA, Secretaría General, *Cuenca del Río de la Plata: Estudio para su Planificación y Desarrollo, República Argentina - República de Bolivia, I - Alta Cuenca del Río Bermejo, Estudio de los Recursos Hídricos,* OEA, Washington, D.C., 1974.

f. Early involvement of the private sector will also facilitate prompt action on promising investment projects. In the study of the Zulia Region[2] in Venezuela, private enterprise was consulted soon after projects were identified, Several agroindustrial projects were being analyzed at the feasibility level before the reconnaissance survey of the region was completed.

> 2. OEA, Secretaría General, *Región Zuliana, República de Venezuela: Estudio para el Aprovechamiento Racional de los Recursos Naturales,* OEA, Washington, D.C., 1975.

Figure 4 - GENERATION OF PROJECTS FOR REGIONAL DEVELOPMENT

Members of the executive commission of the Esmeraldas River Basin Study in Ecuador analyze the location of proposed development projects prior to field reconnaissance and analysis of the Phase I report.

8. The Preliminary Regional Development Strategy

Phase I concludes with a formal report that is usually published in limited quantities. The report contains the results of the development diagnosis, the preliminary regional development strategy or options, and abbreviated descriptions of the projects needed to implement the strategy. Perhaps the most important product of Phase I, this draft of regional development strategy sets the stage for all subsequent investigations and serves as the basis for the final development strategy. Preparation of the strategy is not a discrete, easily-defined task. Instead, it grows out of all the other tasks of the study, beginning with the preliminary mission and continuing through Phase I. Projects identified as virtually inevitable for the region also influence the strategy. The strategy or alternative strategies must be carefully evaluated by the government, usually within the framework of the executive commission set up to manage the study. Acceptance of one strategy signals the initiation of Phase II of the study, Some practical guidelines follow:

a. Present alternative development strategies. Phase I involves careful analyses of socio-economic conditions, as well as surveys of physical and human resources. Alternative development strategies become evident when all these variables are analyzed. In the Panama-Darien study, three alternatives - each with a different level of investment - were put forward. Acceptance of one strategy tentatively committed the government to a specific level of funding to implement the study's final recommendations.

b. Carefully link the preliminary development strategy to national goals and priorities. In the Santiago-Mira study, the team scrutinized the National Development Plan to assess the region's role in national development and the impact that planned national development programs would have on the region. The national goal of integrating regions was given particular attention in formulating the strategy for the Santiago-Mira region.

c. Include in the preliminary strategy only those sectors and subregions that have significant problems or potentials for development and for which development action has a reasonable possibility of success. The strategy should provide the basis for concentrating effort and should avoid the comprehensiveness of some forms of traditional development planning.

d. Express initial strategies succinctly and clearly. In the Chapare study, the Phase I general report was only 22 pages long. The strategy was so clearly described and agency responsibilities so clearly spelled out that decisions by government were greatly facilitated.

e. Allow government agencies adequate time to evaluate the proposed strategy and projects. The end of Phase I and the presentation of the report containing the initial development strategy should be a break point in the overall study. In the Pilcomayo study, the political issues involved were so complex that the three countries required more than four months to evaluate the Phase I report before giving the go ahead for Phase II. A long break between Phases I and II is not usually desirable, but if serious political issues are unresolved it is safer to wait than to move ahead on false assumptions. The lag period can sometimes be used for training counterpart personnel and disseminating information on the study's technical findings.

B. Phase II - Project formulation and preparation of the action plan

Phase II is more comprehensive in some DRD studies than in others. The level of detail of the projects being formulated depends principally on the availability of financing for the study. Projects may be posed as mere ideas or developed to the level of project profiles as defined by international financial institutions. (Compare the results of the natural resources survey and those of the DELNO project in the Dominican Republic.) On the other hand, significant numbers of projects are formulated to the level of pre-feasibility. (Compare "project profile" and "pre-feasibility study" in the Glossary.) In rare cases, full-scale feasibility studies are carried out. When pre-feasibility or feasibility studies are completed, the country is in a position to implement the projects with loan financing - a highly desirable situation. Commonly, banks will finance feasibility studies once pre-feasibility studies are done. They are more reluctant to finance pre-feasibility studies because the risks are greater that the project may not turn out to be economically viable.

The action plan is the other major product normally produced in Phase II of DRD studies. The plan consists of a series of clearly defined and compatible development goals, a simple and flexible strategy for reaching them, and a set of coordinated actions (principally, investment projects and support activities) needed to implement the strategy. The projects formulated in this phase constitute the package of critical investments required to implement the strategy. (The Panama-Darien and Santiago-Mira studies provide examples of action plans.)

1. Project Formulation Criteria

Not all the new projects identified in Phase I will be fully formulated in Phase II. When a government evaluates the Phase I report, it rejects many project ideas as too expensive or too far afield from its development objectives, It must also decide which projects will be formulated to the pre-feasibility study stage and which will remain as project profiles. The projects to be formulated must all fit the selected development strategy. A few practical considerations follow:

a. Consider the probable source of financing for each project from the outset, whether it will be a government agency, the private sector, or an international lending agency. If international loan financing is contemplated, formulate projects according to the criteria of the World Bank, the Inter-American Development Bank (IDB), or other potential funders, This will save time and money later when loan applications are drafted, The Inter-American Development Bank participated in the Pilcomayo study and then financed further feasibility studies of irrigation projects that were identified in the Bolivian portion of the basin. (The Bolivian government contracted with DRD to execute the studies.)

b. When private sector financing is contemplated, identify possible investors early. Taking this step can substantially reduce the later costs of project preparation. With government knowledge and participation, private sector interests can be consulted from the outset and persuaded to shoulder part or all of the costs of investment project formulation. In the Venezuela-Zulia study[1] conducted with DRD support in 1973-74, the private sector undertook pre-feasibility and feasibility studies of agricultural and agro-industrial projects under contracts known as *para convenios.* The regional development agency agreed to reimburse the private sector interests if the projects did not prove to be economically feasible. Many of these projects were eventually implemented.

1. OEA, Secretaría General, *Región Zuliana, República de Venezuela: Estudio para el Aprovechamiento Racional de los Recursos Naturales,* OEA, Washington, D.C., 1975.

c. When a government agency will be involved in implementation, invite it to join in project formulation. The sectoral agencies involved in the Santiago-Mira and Dominican Republic-DELNO studies implemented several of the projects they had helped to formulate.

d. Help would-be implementing agencies develop a parental view toward projects and to incorporate them into their future plans and budgets. Blithely assuming that project execution will come about automatically has been the undoing of many regional development planning projects: commitment of the financing and executing agencies must be tested early in the planning process and repeatedly thereafter.

e. Consult the intended beneficiaries of development projects early in project formulation so as to avoid some unpleasant surprises later. Support from landowners and other intended beneficiaries may be critical to later implementation efforts. In the San Lorenzo study, local people were initially cool to the idea of a reserve; they had to be apprised of the personal benefits it would entail.

f. Give special attention to projects that make use of technologies and practices already being utilized in the development area. Projects based on both are likely to be implemented promptly and with relatively predictable results. In Chapare, for example, contact with local farmers revealed that expanding existing types of cultivation was more efficient than trying to introduce new technologies.

g. Formulate the projects that governments have designated as high priority through the stage of pre-feasibility if time and money permit. Projects that have reached the pre-feasibility stage are bankable - that is, governments can obtain loans to finance the next stage, which is the feasibility study. Since loan financing is much more likely to be available than grant financing for studies, this is a very important consideration. Many good projects have been stalled for years at the stage of project idea or profile for lack of money to take the next step.

Dialogue between the international project chief and local farmers in the Chapare Region in Bolivia early in the study helped both to identify projects and provide for early consultation with the intended beneficiaries.

2. Developing Packages of Projects

Although development activity is the goal of regional development planning, the planning process itself focusses largely on the identification and formulation of packages of coordinated and mutually reinforcing development projects. These projects must both avoid resource-use conflicts and contribute to sustained development.

Simultaneously formulating interrelated projects in many sectors is the core of regional development planning - perhaps its greatest challenge. Packages of projects can, for example, connect agricultural-production and forestry-development projects to roads, telecommunications, and other infrastructure projects aimed at linking producers to markets. At the same time, they can link production to health and education projects and other basic services. Industrial and agro-industrial processing projects in the package can guarantee that the area does not merely export raw materials (thus forfeiting the profit to be made in processing). Having water supply and electrical power projects in the package, as well as new urban facilities, can further strengthen the foothold of employment-generating industries.

The key to successful integrated development is coordination and timing. More specifically:

a. Where appropriate, keep development areas or zones small enough to permit the formulation of packages of projects for integrated rural development. The Panama-Darien study demonstrates that packages of closely interrelated projects are most feasible in limited geographic areas.

b. In packages of projects, balance investments in production, infrastructure, and social services. Production projects should generate the wealth needed to support the social services, as they did in Pilcomayo and Panama-Darien studies.

c. Make sure that the overall benefits of a package of projects justify the costs. If some projects have a marginal internal rate of return, others in the package must compensate. In the Panama-Darien study, the production projects of agricultural, forestry, and agro-industry were able to support the costs of the social service projects in the packages.

3. The Action Plan

The refinement of the regional development strategy and creation of an action plan represents the culmination of a regional development study. The action plan is the framework and rationale for the projects that are finally recommended. Usually, the projects are summarized in a form specified by the international lending agencies. The action plan is usually the final chapter of the integrated regional development study. It contains an investment timetable that shows the interrelated projects over time and in relation to supporting activities. Policy recommendations constitute an important part of this plan, They are usually presented by sector, but sometimes program areas or development zones are also used. The coordination of policy recommendations by geographic area is a demanding task, far more complicated than presenting traditional sectoral recommendations. Institutional recommendations, enabling legislation, and incentive programs are also incorporated into the action plan. Some practical tips gleaned from experience follow:

a. Prepare action plans that contain both a set of projects and programs and a short-term investment program with a timetable that clearly shows the sequence of actions needed for efficient implementation. Timing of the execution of interrelated projects is particularly critical. The Santiago-Mira and Panama-Darien studies contain good illustrations of action plans with related investment programs.

b. Include project maps that show the physical location of all recommended projects within the region. Such maps are very useful for illustrating the spatial strategy of the action plan. (See, for example, the maps in the Panama-Darien and Chapare studies.)

c. During preparation of the action plan, evaluate each proposed project or action in terms of its physical resources, and its economic, social, cultural, administrative/institutional, and spatial (or regional) implications. The evaluations-quantitative, when necessary - should be presented systematically, at a depth commensurate with the level of detail of the projects (profile, pre-feasibility, feasibility, etc.), However, there is no need to attempt to reduce all such considerations to economic terms: the goal is to provide a complete but simple basis for making value judgments, In the Lower Bermejo River basin study[1] in Argentina, each project idea was evaluated according to social, spatial, and "environmental" criteria, rather than with standard cost-benefit criteria. Project idea selection for inclusion in the action plan thus involved a test of each idea against the overall study objectives.

d. Evaluate the set or packages of proposed projects using the same approach as above, In the process of producing this combined evaluation, project modifications that will strengthen the impact or mitigate undesirable effects of the package as a whole often suggest themselves. In the study of the Upper Paraguay River basin[2] in Brazil, a simulation model of the social and economic relationships was used to evaluate the impact of important projects and packages of projects on the development of the whole Upper Paraguay River basin.

> 2. OEA, Secretaria Geral, e República Federativa do Brasil, *Plano de Desenvolvimento Integrado da Bacia do Alto Paraguai - EDIBAP, Plano Básico,* Brasília, D.F., junho de 1981.

e. Create a project-evaluation framework that will help decision-makers analyze the action plan. Since decision-makers have different interests and orientations, action plans should contain evaluation tools that reveal and appeal to these interests. In the Lower Bermejo River basin study[1] and the Pilcomayo study, simple procedures and graphics were used to analyze the impacts of alternative projects on the use of natural resources, the development of public infrastructure, the local and regional economy, the technology, the use of space and the organization of production and marketing. They also helped to gauge public, private and social costs. Decision-makers were able to rate each project according to the mixture of criteria they considered important: social, spatial, environmental, or economic.[3]

> 1. OEA, Secretaría General, *Cuenca del Plata: Estudio para su Planificación y Desarrollo, República Argentina, Cuenca Inferior del Río Bermejo, Programación para su Desarrollo,* OEA, Washington, D.C., 1977.
>
> 3. For further information about this methodology see: OAS, General Secretariat, *Environmental Quality and River Basin Development: A Model for Integrated Analysis and Planning,* OAS, Washington, D.C., 1978.

f. Include ancillary actions necessary to make the action plan work. Changing food prices initially set to benefit urban dwellers may have a much greater impact on agricultural production than increasing agricultural production with new projects, Although it is difficult to adjust pricing mechanisms, action plan proposals that include pricing changes can work if the analysis of the associated political costs and benefits is astute. Likewise, proposed changes in legislation and in regulations that might otherwise inhibit implementation of the action should be included. Tax amendments, subsidies and other incentives should also be included where appropriate. The San Lorenzo study team used many of these mechanisms to rally the support of local interest groups and to pressure state and national government to pass the legislation and supply the financial support needed to implement the plan.

g. Examine the conclusions reached about the study region for their applicability to other areas. For example, the study of Northwestern Paraná[1] in Brazil was undertaken to resolve the problem of extensive erosion in the region, but the conclusions were found to be applicable to other Brazilian states.

1. OEA, Secretaria Geral, *Bacia do Rio da Prata: Estudo para sua Planificação e Desenvolvimento, República Federativa do Brasil, Noroeste do Estado do Paraná,* OEA, Washington, D.C., 1973.

C. Some general considerations

1. The role of the study manager

In a complex interdisciplinary team effort, the key person is usually the study manager. In the technical assistance efforts of regional development planning, the demands on this individual's time and talents are heavy. To meet these demands, managers should have technical competence and experience in an advanced academic field, a working knowledge of several fields other than their own, and an understanding of development administration. (The manager's role in the Chapare and San Lorenzo studies illustrates this balance.) Whenever possible, study managers should be selected from among those responsible for the overall planning of the study. At a minimum, they should be involved in the design of the workplan or the preparation of the agreement. Without this initial involvement, managers may veer from the study's original intent, unaware of the background critical to its success. (Note that a distinction is made in "Designing the Management Structure" in the Guidelines between management principles applicable to regional development studies and those of use to established government agencies.)

No ideal management style can be prescribed. What is appropriate depends on the study environment, the complexity and goals of the study, the composition of the team, and the leadership skills of the manager. What works for one manager in one country in a highly complex study may not work in another country in a different situation. Managers who were successful in the past in one type of study may not succeed in a different environment, so their past achievements must be viewed against the backdrop of new demands.

Study managers have three basic roles: manager, technician, and communicator/diplomat. As managers, they translate the workplan into action, convert executive commission decisions into operational instructions to technicians, and direct technicians' day-to-day activities while nurturing teamwork. As technicians, they work alongside other team members. In most studies, they produce technical reports of their own while constantly integrating the output of others. As communicators and diplomats, they maintain a steady partnership with their counterparts (the national directors) and maintain dialogs with other national technicians and support staff. Simultaneously, they stay in contact with high-level government officials, and jointly with the national director they promote and defend the interests of the study.

The study manager must have a well-rounded and balanced viewpoint, resisting sectoral biases that might divert the focus of the study from its stated objectives.

Some suggestions for the study manager's agenda include:

a. Coordinate professionals' activities as specified in the workplan, staying alert to the potential need to modify the plan as a result of delays and other factors.

b. Promote the exchange of ideas and information among team members, giving particular attention to the need for permanent dialog between the national and international specialists who comprise the technical unit.

c. Resist sectoral, academic, and other one-dimensional points of view.

d. Develop a thorough understanding of the political factors influencing the study, but stop short of playing out a political agenda. This was particularly critical in the Pilcomayo study, where sensitive issues involving three countries were dealt with constantly.

e. Encourage and lead negotiations between proponents of conflicting proposals or activities. The San Lorenzo study demonstrates the importance of early identification by the study manager of potential conflicts between actual and potential development activities in the region. It also shows the importance of initiating negotiations early.

f. Coordinate the team's work with the objectives, goals, and activities of other agencies and groups working in the region. In the Chapare area, where so many other agencies were working, the study team made such coordination a high priority.

2. The Role of the Environmental Management Advisor

Environmental management specialists, ecologists, or natural resource conservationists do not participate in all DRD regional development studies, but the studies are all in one way or another influenced by the concepts embodied in these fields, The DRD has sometimes found it useful, however, to include a professional from one of these fields as an environmental management advisor in its major regional development studies.

The job of an environmental management advisor is to help the sectoral specialists and study manager identify resource opportunities, constraints, and potential conflicts among resource users. The advisor's job is not to defend special interests or argue against development. Like the other team members, the advisor must be pragmatic and fully aware that the environmental viewpoint is but one of many that will affect final actions.

An environmental overview is most critical in the preliminary mission, when the problem is being defined and the workplan designed; during Phase I, when projects are initially identified: and in Phase II, when projects are being selected for implementation. Bringing in an environmental advisor after these key decisions have already been made is inefficient, if not ineffective. Environmental issues must be dealt with early in the planning process if unnecessary conflicts in the development process are to be avoided. Indeed, the environmental management advisor's major role is to collaborate in the identification of conflicts between sectors or resource users and to help resolve these conflicts before they develop into "downstream" problems. If sectoral projects are all formulated with resource potentials and constraints in mind, many of the potential conflicts will never materialize. For this reason, integrating the work of team members is even more important than the presence of the environmental management advisor. When potential conflicts between sectors arise, the sectoral specialists themselves can negotiate choices and compromises, coached by the study manager. Where this process is built into study operations, however, environmental advisors still serve several important functions: a. Developing a simplified regional model of the major ecosystems under study, including the interactions between components and processes in the system and their interactions with other allied systems. Such a model should quickly acquaint team members with the structure and function of the system being studied, show where more detailed information might be needed, and help determine the type, volume, and specificity of the information the sectoral specialists will have to collect and analyze. The model, in short, is a point of reference and a tool - not the end-product of an environmental advisor's work. b. Developing detailed characterizations of the natural goods, services, and hazardous phenomena in the system. For example, in the Santiago-Mira study, such descriptions are useful in the identification of conflicts resulting from proposed or actual resource use or conservation, in the formulation of development projects and ideas, and in support of conflict-resolution activities. c. Identifying possible conflicts between actual and potential development activities or between different economic sectors in the planning area and advising the study manager and other team members so that dialog and conflict resolution may be promptly initiated.

3. Composition and Abilities of the Study Team

Although the composition of the study team is determined primarily by the technical tasks at hand, some generalizations still hold. Long-term regional development planning teams usually involve a large mix of disciplines, but regional planners, economists, natural resource specialists, and engineers predominate. Project-formulation and evaluation experts are also needed, and depending on the nature of the study area and the counterpart agencies, rural sociologists, other social scientists, and public administration specialists are also used in certain phases of the project. Striking a balance among all mitigates professional biases.

To achieve proper functioning of the team:

a. Avoid the use of many short-term consultants from different disciplines. Integrating the work of team members with such limited involvement places an extraordinary burden on the study manager, particularly at report-writing time. (In the DELNO study, for example, the quantity of consultant's reports was so great and the integration of these reports so limited that after completion of the fieldwork an entire year was required to assemble a final report.) In contrast, using long-term personnel helps maintain project continuity and promote dialog. The trade-off may involve the loss of specialized expertise and periods of "down time" when the long-term specialists' skills are less relevant.

When possible, use the same consultant for more than one task. In the Colombia-Darien study,[1] the same person was contracted for the urban development, institutional analysis, and training component.

1. OEA, Secretaría General, y República de Colombia, *Proyecto Darién: Estudio para la Orientación del Desarrollo Integral de la Región del Darién Colombiano*, Medellín, julio, 1978.

b. When financial limitations do not permit an optimal team, use fewer but more seasoned professionals and try to increase the participation of national technicians and institutions. Two primary goals of technical cooperation are technology transfer and institutional development. These goals may be sacrificed, however, if the participation of international professionals is reduced too much or if the effort is not accompanied by thorough training.

To assess the abilities of team members, several factors must be considered:

a. Make sure professionals in multidisciplinary studies understand their specialties from the perspective of the overall goal of the study and can function as team players. The use of matrixes and flow charts that relate the work of one specialist to another vis-à-vis the different goals of the study is helpful.

b. Require that consultants have a facility for identifying projects. Technical expertise alone is not enough. Team members must be able to recognize an investment opportunity when they see one and to make quick pragmatic evaluations. In the Dominican Republic Natural Resource Inventory, for example, each natural resource specialist took responsibility for both mapping resource data and identifying project possibilities in his discipline.

c. Look for consultants who are also good teachers and who relate well to their counterparts. Consultants rarely use the full range of their technical knowledge, but they must constantly interact with their counterparts and teach them.

d. Accord high value to the ability to write analytical reports. Not only writing skills, but also the ability to involve counterparts in this effort, will determine the quality and political effectiveness of the interim and final reports.

e. Weigh previous experience carefully. Do not assume that previous successful experience on a planning team in one culture necessarily guarantees success in a different culture with; different administrative machinery and data availability. Breadth of experience is nevertheless frequently more important than depth. A professional who has done the same job over ten times without significant variation is not as likely to be as "experienced" as the professional who has had to adapt his expertise to five different cultural settings.

4. Training and Institution-Building

A critical goal of any regional development study undertaken with the support of a technical cooperation agency is the strengthening of national capacities. **TECHNICAL ASSISTANCE SHOULD BE VIEWED AS A SHORT-TERM SUBSTITUTE FOR LOCAL TECHNICAL CAPABILITY.** It should provide a good environment for on-the-job training, as well as opportunities for formal training for in-country technicians. Training should be part of a carefully conceived program and should be available for personnel who will be responsible for follow-up actions in the study region, as well as for those who will conduct similar development studies in other regions. The growth of the operational capability of counterpart agencies is usually a fair measure of the success or failure of technical assistance.

Although training and institution-building techniques are well documented elsewhere, certain pitfalls common to multidisciplinary studies warrant mention here:

a. For training during regional development studies, rely primarily on seminars, on-the-job training of counterparts, and workshops. Long-term training sessions that take team members away from the study site seldom compensate for the disruption and loss of momentum they cause. In the Panama-Darien study, training is given extensive treatment. Particular note should be taken of the training techniques used.

b. Take care to schedule formal training courses for periods of minimal study activity. Before Phase I, between Phases I and II, and after completion of the final report are ideal times.

c. Ensure the use of the technical results of the study by training potential users to interpret the data. Agencies and individuals who are not involved in preparing the study, but who might have use for its findings should be informed of the results and how to use them. Whenever possible, the staff of these agencies should be involved in seminars and training courses. All the case studies exemplify this practice.

d. Hold a final seminar to help national agencies implement the results of the study. This seminar can be used to link study goals to agency goals, as well as to provide a planning model of broad use to the agency, In the San Lorenzo study, the final seminar was particularly comprehensive and brought all the interested implementation agencies together.

5. The Final Report

The final report, although not the end goal of regional planning, is a key product. The final reports of DRD studies usually contain a summary of the development diagnosis (Phase I) and a presentation of the proposed strategy and the action plan (Phase II) with the set of recommended projects in abbreviated form. It must summarize large quantities of material and present it in a concise and balanced way. Most of all, it must generate forward motion. A summary of the contents of the final report of the Chapare Study, which appears in Table 1 of that case study, illustrates the components and form of presentation of a typical study in which DRD has provided assistance.

Some hard-earned tips on report writing include:

a. Keep the final report short. Use annexes for detailed sectoral reports if they are required.

b. Use maps to present important data, analyses, and conclusions. Well-prepared maps can portray a large quantity of information and sharply reduce the amount of text.

c. Produce Phase I reports to force the early integration of data and present well-reasoned preliminary conclusions. This takes pressure off the final report-writing and can streamline the product. In the Chapare study, the interim report answered so many of the basic questions about development potential, strategy, and mechanisms for implementation that it permitted a more schematic final report.

d. Produce ample quantities of final reports. At least 500 copies should be produced for in-country use in most Latin American countries; 1,000 copies are needed if a modest distribution is desired outside of the country; and 2,000 copies or more would be useful if the report is to be distributed widely throughout the region. Only ten copies of the report on the Esmeraldas River basin[1] in Ecuador were produced, and despite an investment of more than US$750,000 in the study, the results are nearly lost.

1. OEA, Secretaría General, y República del Ecuador, *Estudio de las Cuencas Noroccidentales, Cuenca del Río Esmeraldas: Estudio para la Planificación del Desarrollo de los Recursos de Aguas y Tierras,* OEA, Washington, D.C., 1976.

e. Where important original maps of natural resources are a major product of the study, produce at least 1,000 copies, in color, if possible. High-quality maps enhance the prestige of the final publication and definitely influence reactions to the study's recommendations. The trade-off is higher cost and a possible delay in presentation of the final report. The 1967 Dominican Republic Natural Resource Survey, although it was expensive and time-consuming, contained high-quality natural resources maps that are still in use today;

the 2,000 copies of the report and maps that were printed were all distributed almost immediately. The maps are still so well regarded that a set of them can cost US$500.

On-the-job training involving a senior soil scientist of the DRD and an Argentine counterpart.

Production of maps for the phase II report on agricultural zoning in El Salvador.

IV. Implementing the study recommendations

The most common flaw of regional development studies is viewing the final report as the conclusion of the effort. Tens of millions of dollars invested in area development studies in Latin America in the past 20 years have been wasted because of a tendency, perhaps carried over from academic experience, to view a well-written report as an end in itself rather than as a step in the implementation process. Libraries and government offices in most Latin American countries are repositories of tons of development studies, many of high quality, that have scarcely been looked at since they were produced.

The regional development study is, in fact, a midpoint in a process that begins with the definition of development objectives and concludes with concrete actions to implement development policy, Implementation needs should be anticipated in the design of the study, be kept in clear focus throughout the execution of the study (when the initial steps toward implementation are taken), and be under way before the ink on the final report is dry.

In practical terms, the greatest development challenge is political - getting sound plans implemented under prevailing financial and institutional conditions. It is a mistake to view regional development studies as simple sequences in which political will is converted into a financial commitment to undertake studies, which in turn automatically converts into another financial commitment to undertake projects. Instead, political will, technical studies, and funding are co-variables: a change in one can lead to a change in either of the others. In the Pilcomayo study, for example, political will was needed to collect and analyze data about the region; later, the study results were needed to make possible further political decisions about eventual implementation, which in turn required more studies.

Since regional development financing comes from many sources, including international agencies, and since each source operates on different technical and political criteria, early consultation with the probable financing source is critical. Lack of such consultation can result in some unwelcome surprises, even when the political will to implement development projects exists and the studies are well done. The following practical procedures for promoting implementation can be taken at each of the steps in the regional planning process.

A. Considering implementation in the design of the study

1. Define the interests of the funding sources when designing the study. Consult the implementing agencies or funding sources about their financing criteria and data requirements, and design the study accordingly. (See "Project Formulation Criteria" in the Guidelines.)

2. Analyze the national system of project generation. Determine the nature, interrelationship, and budget authority of the agencies involved in planning, project formulation, financing, and implementation, Determine if the actions contemplated are compatible with that system. If they are not, have the counterpart agencies initiate prompt consultations to rectify the problem.

3. Design a project management structure that includes implementing agencies. Alternatively, include implementing or financing agencies as participants in the project formulation stage. In some cases, a financing agency can be incorporated in an advisory capacity within the study's management structure. In the Pilcomayo study, the Inter-American Development Bank participated in the study essentially as a monitoring agency.

4. Allow adequate time and financing for project formulation activities. Phase II is frequently shortchanged in time and financing as a result of a prolonged and expensive diagnostic phase. This occurred in the DELNO, Cibao, and many other DRD studies. Project formulation, especially to the level of pre-feasibility, is expensive. The usual trade-off if funds are short is a reduction in the number of projects to be formulated or abandonment of pre-feasibility studies in favor of less comprehensive project profiles.

5. Design the study to include follow-up activities after the presentation of the final report. In the case of the Guayas River basin study,[1] which DRD helped Ecuador conduct in 1963-64, two high-level international specialists were maintained for two years after the completion of the report to help the national and regional governments monitor the implementation of recommended pre-feasibility and feasibility studies being carried out by a consortium of private consulting firms contracted with loan funds from the Inter-American Development Bank.

1. OAS, General Secretariat, *Survey for the Development of the Guayas River Basin of Ecuador: An Integrated Natural Resource Evaluation,* OAS, Washington, D.C., 1964.

B. Preparing for implementation during execution of the study

1. Conduct seminars with counterpart agencies or other agencies that will be involved in implementation or other "downstream" activities. Stimulate their interest and their sense of participation and ownership of the final product.

2. Use seminars and media contacts (if the government allows) to engender support from a broad political spectrum. (The San Lorenzo study illustrates the effective use of media and publicity.) Also, consider holding town meetings and other dialogs with the beneficiary population (as in the Chapare study, for example).

3. Approach local agencies responsible for generating and operating projects to get their project ideas. Later, formally propose those that meet minimum project-formulation criteria, ignoring the popular misconception that only highly refined proposals should be put forward for consideration.

4. Fit project ideas into existing sectoral plans. Agricultural sector plans, for example, frequently call for increased cultivation of certain crops or efforts to raise their productivity, but are not site-specific. Take advantage of such openings.

5. In multinational projects, create a high-level but informal forum for technical discussion at which information about development implementation can be exchanged without any commitment to the proposals under discussion. The Pilcomayo study provides an example.

6. Shun the advice of theorists who insist that no parts of a plan should be implemented before the full plan is known. Make every effort to initiate some projects before the overall study is complete. This serves two purposes: it gives the government officials who commissioned the study a practical product in the short term to show to their constituencies, and it helps avoid the loss of momentum that usually occurs after the final report has been presented. When part of the plan is already being implemented, the rest of the plan has a better chance.

7. Recognize from the beginning that governments are unlikely to commit themselves fully to the recommendations of the study. Develop alternative proposals and flexible strategies. Assume nothing, and avoid striving for academic perfection. Tie development proposals to as many national priorities and "pet projects" as possible. Remember also that governments change, and future governments may be interested in alternatives that are not favored today.

8. When an agency commits itself to implementing an alternative, help it prepare terms of reference for pre-feasibility, feasibility, or other studies needed to obtain financing. In the Ecuador-Guayas River basin study,[1] the DRD helped the government prepare a US$1.3-million loan application to the Inter-American Development Bank to undertake the recommended pre-feasibility studies. The loan was granted, and it financed a series of further studies leading to major river-basin development projects.

1. OAS, General Secretariat, *Survey for the Development of the Guayas River Basin of Ecuador: An Integrated Natural Resource Evaluation,* OAS, Washington, D.C., 1964.

9. Involve the private sector in project design as appropriate. At the request of government, promote specific projects with the private sector. (See "Project Formulation Criteria" in the Guidelines.)

C. Follow-up after the study is complete

1. Hold seminars with government officials at the end of the study to discuss technical findings and projects. Such seminars help to prevent the lull and sense of self-satisfaction that characterize the moments just after presentation of the final report from being converted into serious loss of forward momentum in implementation. After the San Lorenzo study was completed, for example, OAS, UNESCO, and the Latin American Social Science Faculty (FLACSO) sponsored a seminar in Monterrey, Mexico, to discuss the general subject of project implementation, using San Lorenzo as one of the case studies. The seminar helped the interested agencies accelerate the implementation of the San Lorenzo study's recommendations. (See "Training and Institution Building" in the Guidelines.)

2. Encourage government to keep the integrated study team together for as long as necessary after completion of the report to help implement proposals. This is difficult since governments tend to disband study teams or shift them over to studies in different regions before what they have learned is fully utilized. (In the Panama-Darien study, the Planning Ministry kept the team together for almost a year

after completion of the study to help implement the projects.) Continued technical assistance to the study team while the report is being "marketed" helps prevent the premature disbanding of the team.

3. Conduct training courses on use of the final report and of mapped information. In the Natural Resources Inventory in the Dominican Republic, training in map-reading was provided to Dominican agency personnel.

4. Provide prompt support in the preparation of loan applications to international financing agencies if the government requests assistance.

D. Keeping packages of projects from unravelling

A constant battle in integrated regional development is that against the tendency of carefully integrated project packages to fall apart. Where the planning authority is decentralized or weak, sectoral agencies pay scant attention to the grand design and select projects that meet narrow, preconceived needs.

Often, the agency's mandate overrides the study area's needs. For example, a highway department may build penetration roads in a colonization area without considering the transportation needs of proposed agro-industrial projects or infrastructure projects. If the industrial-development or social service agency does not initiate and synchronize its implementation activities, settlers will pour into an area ill-equipped to accommodate them. (In the Panama-Darien study area, this "roads first" approach worked against one of the goals of the regional development study - preventing settlement on lands poorly suited to permanent cultivation.) In other instances, economically attractive projects (such as hydroelectric power projects) are built without action on project proposals for infrastructure or social services, which are less financially attractive but which could be justified when undertaken in a package with the highly profitable project. Once the stellar project is complete, support for the others is almost impossible to marshal.

The pitfalls of the piecemeal approach are among the most challenging problems in regional development. There are no easy answers, but some devices do work:

1. Prepare packages of projects for small, rural areas accorded high development priority within the overall region. If budget cutbacks occur, reduce the number of such areas in which development will be initially undertaken rather than permitting the packages of projects to be unravelled on a sectoral basis. In the Panama-Darien study, this approach originally worked in the face of severe budget cutbacks: the number of development areas and project packages for immediate action was reduced from eight to two. Later, however, only the transportation infrastructure received financing and the packages fell apart.

2. Encourage the strengthening of regional development authorities and other local institutions to give them a significant role in the financing of development. As stressed repeatedly, this is perhaps the single most important key to maintaining an integrated focus during development implementation. Where regional development corporations exist in Latin America and where they are given ample financing, integrated development plans are being executed. The Corporación Guayana in Venezuela, the Santa Cruz Development Authority in Bolivia, and the Cauca Valley Authority in Colombia have strong mandates and substantial resources, and all routinely implement packages of projects, Likewise, some state and provincial governments have been given significant authority to implement

development projects, as in the case of Brazil, Argentina, and Mexico.

Not surprisingly, many regional development corporations and other local institutions in Latin America complain of great difficulty in obtaining flexible multi-sectoral program lending from international banking agencies. These lending institutions, like most governments, are organized sectorally, and they naturally resist projects that are not conceived along traditional sectoral lines. Some signs of flexibility are becoming apparent in both the World Bank and the Inter-American Development Bank, especially in loans for integrated rural development projects. But a similar breakthrough in the broader field of regional development is not yet apparent.

As stated in the introduction to this casebook, the greatest challenges to regional development are political and institutional. Until governments are willing to further decentralize project implementation and development planning, and until more institutions are organized so that sectoral considerations do not always predominate, progress toward truly integrated development will be incremental and halting.

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ATLANTIC OCEAN
PACIFIC OCEAN
1
2
3
4
5
6
LEGEND
1 DOMINICAN REPUBLIC
2 DARIEN (Panama)
3 PILCOMAYO Argentina Bolivia Paraguay
4 SANTIAGO-MIRA (Ecuador)
5 CHAPARE (Bolivia)
6 SAN LORENZO (Mexico)

Case study 1 - Natural resources and regional development in the Dominican Republic

PROBLEM SUMMARY

Building Integrated Regional Development Plans on National Resource Surveys - A Natural Resources Inventory and Development Action Plans for Subregions and a Region (Dominican Republic)

The Dominican Republic case study consists of accounts of three studies that were undertaken for different but related purposes between 1964 and 1980. The Natural Resources Inventory (1964-66) created a national resource data base for development planning, helped planners identify projects for immediate implementation, and enabled the Dominican Government to plan longer-range resource-development activities for resource-rich zones. Working with the Dominican National Planning Office on a US$350,000 budget, the study team developed integrated maps depicting vegetation, land use, hydrology, geology, soils and land capability, population distribution, and transportation networks. It proposed study projects in irrigation, drainage, flood control, crop diversification, and agricultural production, as well as research programs in mining development, underground water resources assessment, forest conservation, and national parks development. Recommended investments in studies and pilot projects totalled US$5,000,000.

The Development Action Plan for the Northwest Corridor (DELNO), the second study in the series, was conducted between 1973 and 1975 to help revitalize the regional economy and to create a regional planning model. The Department of Regional Development (DRD) helped the Technical Secretariat of the Presidency and the Ministry of Agriculture develop an action plan that featured 18 investment projects organized in four programs. Proposed investments totalled US$45,000,000 and focussed on forestry, mining, soil and water conservation, agricultural production, cattle research, agricultural extension and credit, irrigation, telecommunications, rural roads, education, cooperatives, and tourism.

The third study (1978-79) was designed to create a general development strategy for the Cibao Region and a more fine-tuned strategy for the Eastern subregion within Cibao. Working with the Dominican National Planning Office again and a US$518,600 budget, DRD proposed 130 investment projects in agriculture, forestry, mining, agro-industry, water resources, tourism, resource conservation, social services, and road-building for the 5,300 km^2 subregion. These were tied via policy and institution-building proposals to the social, economic, and spatial development strategy.

DOMINICAN REPUBLIC - NATURAL RESOURCES INVENTORY**- Fact Sheet**

Project area:	48,442 km^2
Population:	4,006,405(1970)
Duration of Project:	Preliminary Mission: 1964 Fieldwork: 1/1965-5/1966 Publication of Final Report: 1967
Technical contributions:	
DRD disciplines (8)	Number of DRD Experts (11)
Geographer (Project Chief)	1
Cartographer	3
Forest Engineer (vegetation specialist)	1
Geologist	1
Hydrologist	1
Soil Scientist	2
Transportation Engineer	1

Population Specialist	1
Total professional person-months:	
DRD:	Gov. of Dominican Republic: N.A.
Fieldwork:	33
OAS Headquarters:	172
Financial contributions:	
DRD:	US$354,000
Gov. of Dominican Republic:	US$50,000
Total investment in projects proposed:	US$5,000,000

DOMINICAN REPUBLIC - DELNO REGION STUDY **- Fact Sheet**

Project area:		9,562 km^2
Population:		650,229(1970)
Physical characteristics:		
- Holdridge life zones:		
	Subtropical	
		Thorn woodland
		Dry forest transition zone to moist forest
		Moist forest transition zone to dry and wet forest
		Wet forest
	Lower montane	
		Moist forest
		Wet forest transition zone to rain forest
	Montane	
		Wet forest
- Elevation range: Sea level to 3,175 m		
- Land capability classification:		
	Arable soils: 52%	
	Non arable soils: 48%	
Duration of Project:		
	Preliminary Mission: 1971	
	Fieldwork: 2/1972-12/1974	
	Presentation of Final Report (preliminary version): 2/1975	
	Publication of Final Report: 1977	
Technical contributions:		

DRD disciplines (22)	Number of DRD Experts (35)
Economist (Project Chief)	1
Economists	2
Agricultural Economist	1
Agro-industry Specialist	1
Agronomist	2
Cattle Production Specialist	2
Computer Programming Specialist	1
Editor	1
Education Specialist	2
Forest Development Specialist	2
Geologist	1

Infrastructure Development Specialist		3
Irrigated Agriculture Specialist		1
Labor and Manpower Specialist		1
Marketing Specialist		1
Public Health Specialist		1
Regional Planner		1
Sedimentologist		1
Soil Specialist		4
Telecommunications Specialist		1
Transportation Specialist		1
Water Resources Specialist		4
Total professional person-months:		
	DRD: Gov. of Dominican Republic: 116	
	Fieldwork: 134.5	
	OAS Headquarters: 37	
Financial contributions:		
	DRD: US$266,000 Gov. of Dominican Republic: US$300,000	
Total investment in projects proposed: US$45,000,000		

DOMINICAN REPUBLIC - CIBAO REGION STUDY **- Fact Sheet**

Project area:			19,144 km^2
Population:			1,798,644(1970)
Physical characteristics:			
- Holdridge life zones:			
	Subtropical		
		Thorn woodland	
		Dry forest transition to moist forest	
		Moist forest transition to dry and wet forests	
	Wet forest		
	Rain forest		
	Lower montane		
		Moist forest	
		Wet forest transition to rain forest	
	Montane		
		Wet forest	
- Elevation range: Sea level to 3,175 m			
- Land capability classification:			
	Classes I-V: 39%		
	Classes VI-VIII: 61%		
Duration of Project:			
	Preliminary Mission for Eastern Cibao Project: 1977		
	Fieldwork, Eastern Cibao Project: 10/1978-12/1979		
	Publication, Phase I Report, Eastern Cibao Project: 12/1979		
	Fieldwork, Cibao Region Project: 1/1980-2/1983		
	Publication, Phase I Report, Cibao Region Project: 2/1982		
Technical contributions:			
DRD disciplines (18)			Number of DRD Experts (23)
Geographer (Project Chief)			1

Agricultural Economist	1
Agricultural Production Project Specialist	1
Agro-industry Specialist	1
Agronomist (soils)	2
Cartographer	1
Demographer	1
Ecologist	1
Editor	1
Forest Engineer	1
Hydrologist	1
Project Specialist	1
Regional Economist	2
Regional Planner	2
Sociologist	1
Tourism Specialist	1
Transportation Specialist	2
Water Resource Planner	2
Total professional person-months:	
DRD: 177 Gov. of Dominican Republic: 388	
Financial contributions:	
OAS/DRD: US$701,000 Gov. of Dominican Republic: US$1,000,900	
Total investment in projects proposed: US$332,000,000	

Irrigated truck crops in the Central Cibao Valley of the Dominican Republic. This region contains some of the best agricultural lands in the country.

MAP 1

I. Introduction

For all developing countries, the economic importance of the natural resource base can only heighten as population pressures mount. Increasingly, international agencies will call for accurate natural resource information as a condition of investment, and developing countries will need simple and well-tested methodologies to generate practical information. The three studies described here demonstrate the importance of a sound natural resource data base and the influence of technical assistance on the evolution of regional development planning in a developing country. They also show how sequential technical assistance projects can complement each other in some respects and perpetuate past errors in others.

For nearly two decades, the Department of Regional Development (DRD) of the OAS has provided technical assistance to the Dominican Republic. (See Map 1 for location of the Dominican Republic). The natural resource survey OAS began in the Dominican Republic in 1964 was the first such study conducted on a national scale in Latin America. This inventory remains a worthy model today despite the limitations pointed out here. The second study (known as the Línea Noroeste or DELNO study), initiated in 1971 and based partly on the data synthesized in the inventory, was designed to help planners develop proposals for environmentally sound resource-utilization projects for the western Cibao. The third study, conceived as a subregional study of the eastern Cibao but expanded into a regional study of the entire Cibao, was launched in 1977 to complement the second study and provide a planning base for developing the northern part of the country. (See Table 1.)

These studies collectively demonstrate the benefits of creating a development planning base through a natural resource inventory. They underscore the need to base development planning on realistic assessments of the resource base and illustrate these methodological challenges:

- Minimizing the time and cost of collecting and synthesizing data on natural resources for development planning;
- Allocating study resources optimally among data collection, mapping, strategy formulation, and project design;
- Strengthening a developing country's institutional capability to generate and use the natural resources data needed to identify and prepare investment projects;
- Evaluating the aptitude of land units for specific development projects through agricultural development zoning;
- Selecting a few sectors for development planning after an initial overview of development options; and

- Coordinating existing and newly generated projects in a coherent action plan.

The Dominican Republic is well endowed with natural: resources, but agriculture and other resource-production activities must be accommodated to a wide range of ecosystems. Occupying the eastern portion of the island of Hispaniola (which is shared with Haiti), the country is spanned by four parallel mountain ranges that run from the northwest to the southeast. (See Map 2.) Decreases in rainfall from east to west are reflected by the natural vegetation, and seasonal fluctuations in precipitation can cause crop failure in areas without irrigation, even where rainfall totals 1,500 mm per year. Only 13 percent of Dominican lands are arable, (Map 3 shows the relief, potential land use, and relative irrigation requirements of arable lands in the Dominican Republic.)

In the country's breadbasket - the Cibao Region - and in other agricultural valleys, diverse crops are grown. But the subtropical forests that once covered the valleys have disappeared with increased crop production. So much timber has been removed from the mountains for use in construction and charcoal manufacturing that forests can no longer fully restore themselves. In the piedmont and the higher reaches, no significant productive forests remain.

Increasing numbers of small farmers have moved into mountainous areas. Farming on steep slopes causes soil erosion, which drives farmers to even steeper and more inaccessible areas and generates sediment and surface water run-off that prematurely end the useful lives of irrigation, hydroelectric power, and transportation systems.

When the DRD first began working in the Dominican Republic in 1964, the country was socially and economically stagnant, and economic development and natural resource issues were addressed only when crises occurred. Even today, proceeds from sugar and coffee exports are too small to finance the development of other economic sectors, which must provide most employment opportunities. Since the population of the Dominican Republic is expected to double by the year 2000 and the country has no virgin lands available to colonize, its ability to conserve and rehabilitate ifs natural resources is increasingly important to its economic productivity and progress.

II. The natural resources inventory

In 1963, a commission composed of the OAS, the Inter-American Development Bank (IDB), and the Economic Commission for Latin America (ECLA) formally agreed to help the Dominican Government produce a national development plan. In 1964, the OAS was asked to provide technical assistance in planning the development of the country's natural resources.

Table 1 - NATURAL RESOURCES AND REGIONAL DEVELOPMENT IN THE DOMINICAN REPUBLIC TIMELINE

Item	1962-1967	1968-1970	1971-1974	1975-1977	1978-1980	1980-1981
Dominican Government Activities	1962-1966 Junta prepares NDP. 1966-Junta transformed into ONAPLAN. 1966-ONAPLAN prepares compendium of existing regionalization schemes.	1968-GODR requests technical assistance from OAS for DELNO.	1973-1974-SEA serves as counterpart for DELNO Project.	1975-ONAPLAN prepares regionalization scheme. 1977-GODR requests technical assistance for Cibao Oriental. 1977-ONAPLAN adopts its regionalization scheme for its planning purposes.	1978-GODR requests assistance in natural resource management project from USAID. 1978-ONAPLAN returns to serve as counterpart for regional planning studies. 1979-GODR focuses on natural resource management Issues following hurricanes David and Frederick. 1979-GODR formally supports Plan Sierra Project.	1980-ONAPLAN creates INDESUR to guide development In southwestern region. 1980-Government decree establishes nationwide regionalization scheme. 1981-CONARENA created and begins to discuss natural resource management Issues.

International Technical Assistance Activities	1963-OAS-IDB-CEPAL agreement with GODR to support preparation of NDP. 1964-OAS-GODR agreement for NRI. 1965-1966-Fieldwork completed for NRI. 1964-INDRHI-IBRD-UNDP agreement for water resources study.	1968-OAS-IDB-GOI agreement for "Sisal area" development.	1971-OAS-GODR agreement for DELNO study. 1972-DELNO Preliminary Mission. 1973-1974-DELNO Phase II.	1975-DELNO Phase II completed. 1975-DELNO Final Report (preliminary version) presented for review.	1978-ONAPLAN initiates planning activities in southwestern and southeastern regions with UNICEF and UNDP. 1979-Cibao Oriental Phase I completed. 1980-OAS and GODR agree to extend Cibao Oriental Project to cover entire Cibao Region. 1980-Cibao Region Phase I.	1980-USAID presents PID for NARMA. 1980-CEP field work completed. 1981-Cibao Region Phase I completed. 1981-USAID approves NARMA.
Publications	1967-NRI.		1972-Delno Preliminary Report.	1977-DELNO Final Report. 1977-CRIES Project information.	1979-Cibao Oriental Phase I Report (preliminary version).	1981-CEP. 1981-Cibao Region Phase I (preliminary version).

CEP	- Country Environmental Profile
CONARENA	- Consejo Nacional de Recursos Naturales
CRIES	- Comprehensive Resource Inventory and Evaluation System
DELNO	- Desarrollo de la Línea Noroeste Project
GODR	- Government of the Dominican Republic
GOI	- Government of Israel
IBRD	- International Bank for Reconstruction and Development (World Bank)
IDB	- Inter-American Development Bank
INDESUR	- Instituto de Desarrollo del Suroeste
INDRHI	- Instituto Dominicano de Recursos Hidráulicos
JUNTA	- Junta Nacional de Planificación y Coordinación
NARMA	- Natural Resource Management Project
NDP	- National Development Plan
NRI	- Natural Resource Inventory
OAS	- Organization of American States/Department of Regional Development
ONAPLAN	- Oficina Nacional de Planificación
PID	- Project Identification Document
SEA	- Secretaría de Estado de Agricultura
SURENA	- Subsecretaria de Recursos Naturales of SEA
UNDP	- United Nations Development Programme
USAID	- United States Agency for International Development
UNICEF	- United Nations Children's Fund

MAP 2

MAP 3

A. Designing the Study

On a preliminary mission to Santo Domingo in May of 1964, the OAS Natural Resources Unit (currently the Department of Regional Development - DRD) found a serious lack of data on natural resources. No government body was investigating the island's natural resources, and none had plans for such studies. Apart from World Bank-supported research on the development of the Yaque del Norte and Yaque del Sur

River basins, international organizations had no resource studies planned or under way. Formulating sound economic development plans and projects in this information vacuum was virtually impossible.

With the need for natural resource information firmly established, the question became the best means of getting it quickly. Here, two factors worked to the mission's advantage. The Dominican Republic is small (48,442 km^2), and the government had recently taken 1:60,000 aerial photographs of the whole country. Accordingly, the DRD study team decided to complete a national reconnaissance inventory of natural resources within two years - a timeframe the Dominican Government found acceptable.

The natural resources inventory focussed on building technical data bases for formulating natural resource development and conservation policies and programs. Dominican officials wanted to minimize deforestation and erosion, increase food production on currently cultivated land, and speed up the settlement of public lands, which was behind schedule in part for want of the technical data needed to plan agricultural production,

To help these officials identify development projects and justify related investment studies, the team set forth four objectives:

1. Evaluate natural resources by conducting integrated reconnaissance surveys, compiling basic natural resource data, and evaluating data for national and regional planning purposes;

2. Relate data to development efforts such as land settlement, agrarian reform, technical assistance to farmers, soil and forest conservation, and basin management:

3. Identify areas with high natural resource development potential and, when possible, identify resource development projects; and

4. Prepare for further resource studies by estimating costs and time requirements, locating specialists, and helping contract services for 1:20,000 aerial photography of the entire country.

B. Executing the Study: Conducting the Inventory and Identifying Development Projects

Working closely with the national planning agency (ONAPLAN), DRD natural resource field specialists carried out the inventory. They began collecting data in January of 1965 and finished 15 months later after interruptions arising from civil war. (Table 2 shows the allocation of the specialists' time and the cost of the study.)

The principal members of the team were a geographer/land-use expert (who also served as study coordinator), a geologist, two soil scientists, a hydrologist, and a forester-ecologist. All were selected for their practical experience. The soil scientists, for example, were knowledgeable about agricultural development as well as soil classification. They were also experts in geomorphology and aerial photographic interpretation - important in reconnaissance soil mapping.

Given this practical orientation, it was clear from the study's outset that data collection would not be open-ended. Instead, the aim was to fulfill specific pre-defined objectives. Each specialist defined the type, quantity, and quality of information needed for development project identification, and topical maps and accompanying texts were designed principally to define development potential.

Natural resource analysis was based on aerial photographic interpretation and field verification. The investigations of soils, geology, vegetation, land use, and other resource issues were undertaken simultaneously, and the information was sketched directly onto the 1:60,000 scale aerial photographs. Map-overlay techniques were used to compare and synthesize data from the various investigations. Preparing a suitable base map for presenting the data at 1:250,000 took much more time than expected, and the final compilation of the resource maps was delayed as a result.

Many project ideas came directly from the map-overlay exercise and interaction among the specialists. The team members identified more-detailed development opportunities by talking to farmers and observing management practices, service facilities, and marketing conditions firsthand,

The inventory featured seven elements: (1) life zones (which indicated climatic conditions and forest resources), (2) geology and mineral resources, (3) geomorphology, (4) soil resources (including soils and land capability), (5) water resources, (6) land use, and (7) population distribution.

1. Life Zone Survey

This survey was based on the Holdridge method and was expanded to include sample inventories of pine forests and evaluations of forestry potential and conservation problems. (See Glossary.) The life zone map at 1:250,000 scale helped the project team identify various agricultural production zones based on rainfall and temperature regimes.

2. Geology and Minerals Survey

This study was conducted to determine whether a minerals survey program was needed and, if so, how to finance it. The 1:250,000-scale geology map, which covered the whole nation, turned out to be more comprehensive than the project-identification approach demanded. Consequently, the team recommended examining known deposits before charting more-detailed geological maps. Although preparing this map of known deposits took more time and money than anticipated, mineral exploration companies later created substantial demand for the map.

Table 2 - TIME ALLOCATION IN THE DOMINICAN REPUBLIC NATURAL RESOURCE INVENTORY

	Total person-years	**Work %**	**% of work time in the field**	**Cost in %**

Technicians				
Land-Use Specialist (Study Coordinator)	2.8	9.8	42	10
Forester	2.5	8.8	17	8
Soil Scientist	2.4	8.4	16	7
Geologist	1.9	6.7	22	9
Soil Scientist and Editor	1.4	4.9	11	4
Hydrologist	1.2	4.2	9	5
Transportation Specialist	.9	3.1	8	6
Population Specialist	.6	2.1	-	1
Chief of the Natural Resources Unit	.3	1.0	-	2
Travel				2
Perdiem				5
Miscellaneous				1
Cartographic Division				
3 Supervisors	4.0	14.0		10
17 Draftsmen	7.9	27.6		14
Office Support				
3 Secretaries	2.7	9.4		4
Contractual Printing				8
Special Supplies and Services				4
	28.6	100%		100%
	Total Cost = US$354,184			

3. Geomorphic Survey

This investigation produced data on land forms and their genesis, soil parent materials, and subsurface structure. The map's land-form delineations served as convenient units for the study of such other natural resources as soils and groundwater, but the scale used (1:500,000) was too small to identify development projects, so larger-scale maps were developed for this purpose. (See "agricultural zoning" in section IV-B.)

4. Soil Survey

With the understanding that objective data on soils were needed before interpretive maps could be developed, the team prepared a map of "soils associations" at 1:250,000, indicating relief, texture, nutrient content, drainage, and use limitations for each unit. Then, a land capability map was prepared at the same scale as an interpretation of the soils map.

This soils survey was probably the most useful and innovative component of the natural resources inventory. At the time, it helped the team identify potential agricultural development projects and delineate areas for further investigation. Since then, the Dominican Government has based further soils-classification and hydrological studies on the survey and used it to design and execute conservation and crop-production projects. In addition, agricultural land prices have been keyed to the classifications used on the original land-capability map.

5. Hydrological Survey

The movement and availability of surface and subsurface water in major Dominican watersheds was evaluated to determine national and regional irrigation and hydroelectric potential. Water requirements for a range of crops were mapped, and local electrical power demands were also assessed. Results - portrayed on a composite map at 1:250,000 scale - were used to formulate a groundwater exploration program, a watershed-management plan, and a program for installing stream gauges, In addition, other issues warranting further study were defined.

6. Present Land-Use and Vegetation Type Survey

As vitally important as land-use information is, the study team discovered that composite land-use maps can be extremely time-consuming to prepare and difficult to use. Combining agricultural land-use information with data on forests and vegetation data made the map highly confusing. (In later DRD studies, forest-inventory data and information on vegetation cover were presented separately from land-use data.) Nonetheless, when overlaid on the land-capability map, the land-use map sparked ideas for agricultural projects and revealed actual or potential environmental problems. For example, large areas in Land Capability Class VII (lands suitable only for forest production or for remaining under natural cover) were found to be in pasture or under cultivation. Years later, these areas had to be reforested after severe soil erosion and sedimentation damaged nearby irrigation and hydropower structures.

7. Population Distribution Mapping

A 1:250,000-scale population distribution map was drawn up to help the project team relate natural resource potential to land use and attendant transportation problems, as well as to guide agroeconomic surveys. It also revealed rural population density and population pressures in the northwestern region, an area the Dominican Government later singled out for further study.

Once topical maps were developed from these seven surveys and other baseline data, map-overlay techniques were used to interrelate natural resources to economic and social factors, thus producing a picture of various combinations of resources, present versus potential resource uses, and the proximity of resources to population centers, roads, and service facilities. (The map-overlay analysis applied here was unique at the time since it made use of relatively high-quality information at 1:250,000 and covered an entire country.) The survey results were synthesized on a project identification map that was published in 1967. (Table 3 is a summary of the final report.)

One methodological pointer that can be gleaned from the studies concerns the use of existing studies. When the National Resource Inventory started, no systematic map coverage existed for any resource, but a large number of maps with varying scales, reliability, and mapping units did exist for each resource. The team invested substantial effort, particularly in the soil survey, in evaluating the quality of existing coverage, "harmonizing" the disparate mapping units, correlating the Dominican data with information from Cuba and Puerto Rico, and extrapolating data from detailed maps of local areas to much larger areas with similar characteristics. The effort eventually paid off in increased speed and accuracy of mapping.

Another important innovation was linking the geomorphic survey with the soil survey and combining the results with the life zone survey. Land forms were depicted at three levels as follows:

Level	Example	Surface Area (approx. km^2)
Region	Cibao Valley	6,900
Subregion	Yuna delta of the Cibao Valley	500
Unit	Alluvium of the Yuna delta	100

Geomorphic factors were mapped relatively quickly, which helped orient the interdisciplinary team. Moreover, the geomorphic subregions and units that were delineated first as each region was mapped were used to specify the type and level of work to be conducted in each of the other disciplines and as a framework for integrating the results of these other studies.

The geomorphic units served as the basis of soils mapping. By combining the topographic constraints (identified in the geomorphological survey) with the climatic constraints (identified in the life zone survey), the team was able to determine the general aptitude of large land areas. By factoring in edaphic and management constraints (identified in the soil survey), the team also established the specific potential - in terms of crop type, forage grass species, livestock variety, and commercial tree species - of areas as small as a few square kilometers.

Table 3 - NATURAL RESOURCE INVENTORY SUMMARY OF THE CONTENT OF THE FINAL REPORT[1]

Component	Presentation
Summary	Overview of technical aspects of the project and the project team's recommendations.
Natural Resource	Data base for evaluation of the following In relation to the country's population and agricultural production system:
Description and Evaluation	- Geomorphic regions
	- Life zones and climates
	- Geology and minerals
	- Soils
	- Land capability
	- Land use and vegetation
	- Forest resources
	- Water resources
	- Urban/rural population distribution
Investment Development Programs	Objectives, scope, terms of reference, and estimated costs for:
	- Mineral resources
	- Exploration and evaluation of ground water resources
	- Forestry development
	- Agricultural development (focussing on soil capability, irrigation, crop diversification, and technology for 26 crop-production
	projects)
	- Conservation of forests, soils, and water resources
Study Projects for Agricultural Experimentation and Technical	Objectives, scope, terms of reference, and estimated costs for:

Assistance Programs	- Controlling plagues affecting bananas and other national crops - Correlating the problems and studies of other countries with agricultural conditions much like the Dominican Republic's - Consolidating the country's agricultural experimentation, extension, and promotion activities
Description of Soils	Appendix describing the soils-classification methodology used in the Inventory, the geographic situation and geomorphological divisions, and the soil series and associations in the north, east, central, and south-east, Including present and potential use and limitations

Key Mapped Information	***Scale***	***Objective Data***	***Interpretative Data***
	1:250,000	1. Geology	1. Land capability
	(In color)	2. Lifezones	2. Project Identification
		3. Hydrologic data and water consumption for agricultural purposes	
		4. Soils associations	
		5. Present land use and types of vegetation	
		6. Urban and rural population distribution	
		7. Transportation	
	1:500,000	8. Geomorphology	
	(in color)	9. Mean annual precipitation	

1. OAS, *Reconocimiento y Evaluación de los Recursos Naturales da la República Dominicana: Estudio para su Desarrollo y Planificación;* Unión Panamericana; 1967.

By indicating the general-use capabilities of relatively large land areas, the Natural Resource Inventory provided a valuable planning tool. Among other applications, the maps were used to designate areas where agriculture and grazing should be curtailed, areas too steep for forest exploitation but well-suited to become national parks, and areas where agricultural research was needed. By providing a basis for comparing the development potential of land areas, the Inventory increased national planners' ability to set priorities and guide development.

The maps were also designed to help planners identify specific agricultural and resource-development possibilities. Some such projects were identified while the Natural Resource Inventory was being conducted. More important, national agencies have since used the maps to identify and formulate scores of investment projects.

As powerful as the tool was, few planners, decision-makers, or technicians immediately grasped its applicability. It took an education campaign to get planning and resource development agencies to make widespread use of the information. Using simple demonstrations, the trainers showed, for example, that an area suitable for citrus production was currently being used for extensive grazing. The national agencies quickly learned how to use data from the Inventory for planning and project identification,

C. Implementing the Results of the Study

The impact of the Natural Resource Inventory can be evaluated according to four criteria:

1. As an information base,
2. As a means of strengthening the country's institutional ability to generate natural resource information,
3. As an influence on national and regional planning, and
4. As an immediate source of ideas for investment projects.

Measured by the first criterion, the project was an unqualified success. With an investment of US$350,000 and two years' work, the lack of the natural resource data needed to permit regional planning and the identification, design, and prioritization of resource-development projects was redressed. The maps and studies produced in 1964-67 are still being used today, and a number of international agencies have held up the inventory as a model that should be applied to large, little-studied land areas throughout the developing world.

The study was intended to build an information base that Dominican agencies could expand, update, and improve. In this regard, the lack of a counterpart agency responsible for resource mapping limited the study project's impact. The study stimulated the national planning office (ONAPLAN), the national water resource institute (INDRHI), and the Secretariat of Agriculture, among others - to strengthen their capabilities in resource mapping and evaluation. In 1981 and once since, the Dominican Government proposed to create a ministerial-level commission - the National Council on Natural Resources (CONARENA) - to discuss natural resource management issues and develop policy, but to date the commission has not been established. As a result, the country has no centralized capability to analyze and integrate results from many sectors.

Without question, the Natural Resource Inventory has furthered regionalization in the Dominican Republic. For a decade, data from the inventory were used to delineate development regions and to determine which regions or subregions subsequent development studies should cover.

As for generating investment projects, the inventory was less successful. Since the project proposals were not developed to the pre-feasibility stage, they could not be forwarded immediately to the international lending agencies and they lost momentum.

Identifying projects and calculating the costs of conducting further pre-investment studies was not enough to prompt the Dominican Government to act on the study team's recommendations. Some resource-management proposals could not work unless new agricultural production models that included natural resource conservation measures and short-term economic incentives for farmers were adopted. This is an ambitious undertaking considering that the sectoral agencies lacked the technical capacity to develop the project outlines enough to satisfy international lenders and the country lacked the regional planning apparatus needed to make sure the projects were included in sectoral agencies' activities. Still another obstacle was the tendency of the national government, sectoral agencies, international lenders, and consulting firms involved to ignore all but large, highly visible projects that could be implemented quickly,

Many projects did nevertheless grow out of the inventory. The Dominican agriculture sector used the Natural Resources Inventory to create and execute forestry, soil-conservation, and internationally supported agricultural-credit programs. The Inventory also sparked further natural resource analysis, experimentation, and professional training within the Ministry of Agriculture.

Water resource agencies used the inventory to identify high-priority areas for hydroelectric generation, irrigation, and other dam and reservoir projects. These agencies pursued projects primarily on the basis of their water resource potential, too often overlooking projects' impacts on agricultural production or watershed preservation and conservation. But the inventory did save the water resource agencies time and money.

The land resource inventory was also used in tax assessment. A subsequent DRD technical mission helped the Dominican Government design a cadastral survey and initiate an agricultural land-taxation system that would start with the districts with the most production (and revenue-producing) potential.

Based on the study team's conclusion that deforestation and soil erosion were the Dominican Republic's major resource-degradation problems, the Dominican Government closed all private sawmills and banned the harvest of live trees. However, this blanket approach did little to rectify the damage already done or to make headway where soil conservation and reforestation were most needed. In fact, under this law, commercial interests that stand to benefit from good forest management are prohibited from operating, while small farmers have lost the incentive to replant trees for soil conservation purposes.

Proposed reforestation and soil conservation projects were not funded. The Dominican Government evinced little interest in projects not directly related to short-term economic development.

These five categories of activities developed more or less independently, which reflects the lack of coordinated policy and regional planning in the Dominican Republic from 1962 to 1967 and after. But even though they were never integrated, these wide-ranging activities did at least stem from a common source of information. In short, the natural resources inventory set the stage for integrated development planning.

III. The DELNO region study

In the mid-1960s, the Dominican Republic was strapped for loan funds. Like many developing countries, it was hard-pressed to generate project proposals that met international financing agencies' criteria. Although the Natural Resource Inventory had turned up many project possibilities, they were too sketchy to attract outside financing.

A. Designing the Study

The Natural Resources Inventory indicated such wide-ranging sectoral and geographic possibilities that ONAPLAN, the Dominican national planning agency, needed a basis for selecting the most important for subsequent study. Since it was experimenting with regionalization schemes, ONAPLAN also wanted geographic guidelines for selecting projects for more detailed study and some way to coordinate and multiply the effects of sectoral actions in a limited space. Accordingly, it decided to focus the second study on the northwestern part of the country, principally the Western Cibao. (See Map 4.)

The Cibao valley lies between the Central Cordillera and the lower Northern Range. Drained by the Yaque del Norte River to the west arid the Yuna River to the east, the central part of the region is the country's agro-industrial center and a major producer of commercial hydropower. By contrast, the western part of the region is severely depressed: infant mortality, disease, unemployment, and illiteracy rates are the highest in the country while agricultural productivity, family income, housing conditions, and life expectancy are low. Even as early as 1964, when the Natural Resource Inventory was initiated, the Dominican Republic fully recognized that deforestation in the area was contributing to soil erosion and thus jeopardizing the upper watersheds in the Central Cordillera.

In 1971, the government asked DRD to help in prepare an investment and action plan for the northwestern region (DELNO). At this point, the region's geographical boundaries had been defined only roughly, the relative importance of various sectors was still being debated, and little regional political support for the action plan existed,

Given the Dominican Government's planning needs, the team undertook eight tasks:

1. Define the northwestern region in more precise geographical terms;
2. Incorporate soil, forest, conservation, and preservation projects identified in the inventory into an economically defensible

package according to priorities set forth in the inventory;

3. Propose agricultural development projects and demonstrate their relevance to pressing economic problems;

4. Prepare projects in social infrastructure, mining, and tourism to support agricultural production projects;

5. Conduct experimental research and training related to small-scale agricultural production, conservation, and irrigation projects;

6. Make integrated development projects reflect regional development objectives and develop projects to the pre-feasibility level;

7. Involve sectoral agencies in project identification and implementation; and

8. Evaluate existing sectoral projects in terms of a regional development strategy.

The DELNO study was designed to build on the Natural Resource Inventory, which generated data for use in planning and project identification. The goals of DELNO were to prepare project proposals that would collectively constitute a development plan for the northwestern region and to precisely determine the institutional, economic, and social costs and benefits of each project.

B. Executing the Study

The technical assistance agreement the Dominican Republic and the OAS signed called for three products: a list of immediate actions that would generate project momentum and political support, outlines for further studies of both short-and long-term actions, and the formulation at the pre-feasibility level of specific projects aimed at better utilizing existing resources over the short term.

MAP 4

The technical assistance agreement also established the project's organizational structure. An executive commission composed of representatives of the State Secretariat for Agriculture (SEA) and DRD would oversee the project. An advisory committee of representatives from other sectoral ministries, development agencies, and regional businesses would promote information exchange, coordinate local participation, and help implement the study project's results. (See Figure 1,)

1. Phase I - Diagnosis and Project Identification

The DELNO study was carried out in two phases. Starting in February of 1972, the area's natural resources, economy, infrastructure, social systems, and institutions were analyzed. The study team delineated the study area and divided it into a hierarchy of sub-areas. It also evaluated each economic sector and the resource problems and potential of each sub-area. For the lowlands, it recommended intensive agricultural production. For the mountainous areas, it proposed reforestation and soil conservation measures. In the geographically diverse area including both the city of Santiago and the Tavera dam site, the key issues were agricultural market potential and the sub-area's influence on surface water availability in the study area's lower portions.

More generally, the development strategy was aimed at conserving and managing natural resources, developing the physical and social infrastructure needed to boost economic production, and otherwise fortifying the economy, Since the ultimate goal was to raise the population's standard of living without subsidizing the area with national funds and to take full advantage of the area's natural resources without degrading the resource base, each development project proposed had to be justified on economic and social grounds.

A preliminary report published by ONAPLAN at the end of Phase I in 1972 spelled out this development strategy, the results of the diagnostic study, and the workplan for preparing the action plan. This report included interpretations of the basic natural resource and socio-economic data and descriptions of the methodologies used to collect and analyze them. (Figure 2 is a chronogram of international technician's activities in the overall study.)

2. Phase II - Formulation of the Action Plan

From January of 1973 to February of 1975, the action plan was formulated. Project alternatives identified in the first phase were grouped into six sectoral programs. Health and irrigation proposals were sent directly to the implementing agencies for further review, while 24 proposals for agriculture, transportation, communication, and mining projects were studied further by the team itself. Subsequently, five of these 24 alternatives were folded into general farm-to-market road and education programs. The other 19 proposals were further developed as independent projects, though two projects eventually combined agricultural and agro-industry proposals.

Besides preparing the action plan, the study team in Santo Domingo investigated pilot forestry, water-conservation, and soil-conservation projects in the region. For example, it developed cost figures for small irrigation dams and recommended planting trees on small test plots of badly eroded soils. Such activities helped determine the amount of time and money that agricultural training, extension work, and project implementation would require.

Institution-building activities included fellowships for national counterpart personnel and three courses (one of them on formulating and evaluating development projects) for the staff of the participating sectoral agencies. The study team also organized a seminar on soil conservation for national agency representatives and Dominican academicians.

At the end of Phase II, the final report was prepared and sent to ONAPLAN for review. Because the new Dominican Government required more detail on the agricultural projects and wanted newly available agricultural information incorporated into the analysis, revisions took two years to complete. The final report, *Plan de Acción para el Desarrollo Regional de la Línea Noroeste,* published by OAS in 1977 summarized the region's resource problems and potential, recapitulated the strategy prepared in Phase I, and itemized programs, projects, and proposals for subsequent study. (See Table 4.)

C. Implementing the Recommendations

The DELNO study did not enable Dominican sectoral agencies to integrate their activities, because they still had no clearly defined resource-management policies. But the Dominican Government did use the DELNO model to integrate natural resource baseline information and socio-economic data into project design. The study also demonstrated the importance of social services and infrastructural support to both individual projects and intersectoral coordination - a marked improvement over the narrow technical and sectoral approach taken in the Dominican Republic before 1968.

Such strides were possible largely because the DELNO project team had the Natural Resources Inventory to draw upon. This became especially apparent during project identification. The information from the inventory was used to set geographical boundaries for the region, and the land-capability maps, resource descriptions, and technology assessments included in the inventory enabled the SEA to better identify projects. Ultimately, SEA took the lead in generating natural resource information and interpreting natural resource and socio-economic data.

Figure 1 - DELNO STUDY ORGANIZATIONAL STRUCTURE

Figure 2 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES, DELNO STUDY

Table 4 - DELNO STUDY SUMMARY OF FINAL REPORT[1]

Component	**Presentation**		
Introduction	Summary of the project's background, scope, terms of reference, conclusions and recommendations.		
Description of the Region	Physical, demographic, natural resources, and economic and social aspects.		
Action Plan	Economic and social situation background, development strategy; nature and scope of the Action Plan, and Its respective programs and projects, and regional planning alternatives.		
Diagnostic	(a) Provinces and municipalities of the Línea Noroeste. (b) Agricultural development. (c) Water resources and their use. (d) Other productive sectors (Industry, mining and tourism). (e) Infrastructure (transportation, telecommunications and energy). (f) Institutional aspects.		
The Study's Proposals Programs and Projects	(a) Soil and water conservation. (b) Forest management and timber production. (c) Geology - mining Inventory. (d) Sectoral Investment Projects as follows:		
	Production	*Infrastructure*	*Social*
	- Specific crop production (6) - Textile Industry - Cattle rations market study - Cooking oils - Cattle production development and credit programs - Experimental station for pastures and forage study - Irrigation projects (2)	- Telecommunications, radio and television - Farm to market roads - Local tourism development	- Pilot regional education plan - Strengthening of the co-op system

Key Mapped Information	*Scale*	*Thematic*	*Synthesis*	*Projects*
	1:250,000	- Forest cover - Limitations for management	- Land capability and soils classification	- Natural resource management and conservation projects - Agricultural projects - Water resources, communications and telecommunications projects (4) - Tourism development projects - Crop production (7)
	1:500,000	- Infrastructure and social services		

1. OAS, *Plan de Acción para el Desarrollo Regional de la Línea Noroeste*; OAS; 1977.

Deforestation, over-grazing by goats and resultant soil erosion in the Yaque del Sur Valley of the Dominican Republic. Resource

management problems of this type are also common to the DELNO Region.

The availability of extensive data posed problems as well as opportunities. To relate the voluminous data to the project area's socio-economic problems and development objectives, the study team had to prolong the diagnostic phase. This drained study resources and limited the funds available for project identification. Moreover, some of the data developed during the protracted diagnosis was too detailed to be of much practical use, though it still served as grist for the study team's conclusions.

A related problem was the proliferation of sectoral projects. With so much baseline data from the inventory and international technical assistance programs on hand, the Dominican agencies in charge of water resources, agricultural, health, and educational programs prepared hundreds of projects. Trying to analyze every project in terms of regional development priorities, national needs, and international funding potential became laborious and time-consuming, especially since no limits on the time horizon of the analysis or project financing had been set.

The projects developed from the proposals met with mixed results, partly because there had not been enough dialog with the implementing agencies. The agricultural project proposals were forwarded to the appropriate sections of SEA, but projects that did not match the sub-agencies' implementation priorities were neglected. For example, terrace-construction and reforestation projects in the piedmont areas were never undertaken, despite the high priority the study team assigned to both.

The multisectoral projects sent to the Dominican Agrarian Institute (IAD) to implement along with the agricultural projects received more institutional support than the projects sent to SEA. But IAD operated under severe budgetary and technical constraints - a great misfortune since many of the most promising resource development projects identified were on lands under its authority. The Carbonera rural settlement project, for instance, was not carried forward, even though both the Natural Resources Inventory team and the DELNO team accorded it high priority.

Contour cropping for soil conservation and improved watershed management in the Yaque del Sur Valley of the Dominican Republic. Such land management practices are greatly needed in many parts of the country.

Other agencies used the DELNO model to propose development projects to international lending institutions, and some projects identified by the DELNO team were transformed into national programs. For example, the transportation agency turned the farm-to-market road projects into a national road program that was eventually launched with support from an international lender. Similarly, the national communications agency used the telecommunications recommendations for the northwestern region to devise a national communication plan to expand and upgrade telephone service. While these expanded programs were well wrought, they were not fully integrated at the regional level.

In sum, what was conceived by DELNO planners as a package of multisectoral projects unravelled during implementation into disconnected groups of sectoral projects. The Secretariat of Agriculture turned out to be institutionally too narrow to develop a multisectoral framework for implementing the projects, It brought projects to the pre-feasibility level and began dedicating relatively more resources to project design, but changing the emphasis consumed scarce resources needed to coordinate sectoral implementation. Because so much time and money were spent gathering information, the momentum built up during the diagnostic phase of the DELNO project slowed during project formulation and all but dissipated during project implementation.

Despite the conceptual advances made during this planning project, the Dominican Government did not develop a coherent framework for implementing the development projects the DELNO team identified. When the final version of the action plan was published in 1977 after five years of effort, relatively few project ideas had materialized into projects.

IV. The Cibao region studies

In the late 1970s, the Dominican Government again sought to initiate integrated development in an area suffering from poverty and unemployment. This time, however, it wanted to work where development potential was great enough to bring about changes quickly and at relatively low cost. It favored the northern region which encompassed the area from the water divide at the Central Cordillera's crest to the Atlantic Coast, including the whole of the Cibao Valley. The DELNO study had covered the western Cibao. The agriculturally rich central part of the region was already highly developed. That left the eastern part of the Cibao.

The overriding factor, however, was the presence in the Eastern Cibao of good to excellent soils that had been only marginally exploited. With more appropriate crops, better agricultural management, and modest investments in irrigation, drainage, and roads, agricultural production and processing could increase enormously. The area also held important potential for tourism, mining, and fishing.

A. Designing the Study

In late 1977, the Dominican Government asked DRD for technical assistance in conducting a study of the Eastern Cibao. The goal was to establish a framework for capitalizing underutilized natural resources as part of a development scheme the project team would devise. The Dominican Government wanted the study to complement the earlier DELNO study, thus affording a panoramic view of the Cibao.

The institutional situation looked propitious. ONAPLAN now had the operational capability to follow up on recommendations - a shortcoming in the DELNO study. It also possessed the power to coordinate the regional activities of national sectoral agencies, thus keeping packages of integrated projects intact.

Benefitting from the experiences of the DELNO Project, DRD decided to field a preliminary mission. This team's composition, tasks, and products exemplify what have since become standard for missions of this type. The team consisted of an engineer/economist (the former mission chief of the DELNO study), a geographer/natural resource expert (the mission chief-designate of the Eastern Cibao study), a regional planner/transportation expert, and a lawyer/public administration expert.

Working with seven Dominican personnel, this team completed its work in one month. Its report analyzed the relation of the region to the rest of the country and summarized the government's development objectives for the region. It also described the region's physical, social, economic, and institutional features; made a preliminary diagnosis of development potentials and constraints, sectoral goals, and strategies; and set forth a preliminary development strategy for the region. It prepared a preliminary version of the agreement between OAS and the government that stipulated the products and management structure of the study, the nature and timing of the principal phases, and the parties' contributions and responsibilities. Most of these issues were tentatively agreed upon by the time the mission completed its work.

ONAPLAN and OAS assumed co-directorship of the project under the supervision of an executive commission composed of Dominican public and private agencies interested in the region, (The organizational structure of the study is shown in Figure 3.) Before fieldwork began, the directors decided to devote relatively little additional time to diagnoses. This too reflected the experience gained in the DELNO project, as well as the Dominican agencies' growing experience in identifying and designing projects and their clear need for support in executing integrated regional projects.

Figure 3 - ORGANIZATIONAL STRUCTURE OF THE EASTERN CIBAO STUDY

An important aspect of the preliminary mission's work was gauging the level of development activity in the region. With a large number of projects proposed, planned, and under way, it became clear that the challenge would not only be generating new projects, but also making sure that the new projects proposed were coordinated with existing projects in a single action plan. Drawing from the Natural Resource Inventory, the DELNO report, and its own findings, the preliminary mission team decided to:

1. Make a more comprehensive survey of existing projects;

2. Focus on underutilized or poorly managed natural resources, ways to diversify the economic base, and infrastructural support for agricultural production, agro-industry, tourism, and other activities;

3. Accord highest priority to water resource projects;

4. Make sure the projects identified would be economically sustainable and self-sufficient, as well as fit the regional development strategy the study team would prepare; and

5. Develop project proposals to the pre-feasibility level where possible.

These guidelines were incorporated into a workplan, which was approved after the elections in mid-1978,

B. Executing the Study

1. Phase I - Diagnosing the Eastern Cibao

The Eastern Cibao study began with a quick assessment of the area's economy and natural resources, preparation of a development strategy, and the identification of investment projects. The assessment covered water, climate, and other natural resources from the vantage of potential opportunities and problems; the subregional economy, especially crop and livestock production, tourism, and mining; the subregional transport system, including the rural road network and railroad, port, and airport facilities; and the social sector, with emphasis on health, education, employment, and housing. Simultaneously, the team completed its inventory of existing projects.

Collectively, the studies of natural resources, agriculture, and transport constituted a study of "agricultural zoning," a planning technique DRD had refined over 15 years. (Part of the process described here was actually conducted in the Natural Resource Inventory and part in the Eastern Cibao study, but for convenience the process is described fully here.)

As Figure 4 indicates, the first steps consist of conducting geomorphic and life-zone studies, then combining them into "Development Zones." Geomorphic studies were conducted jointly by a geologist and an agronomist who together interpreted land forms, parent materials, and soils genesis. This enabled them to characterize soil nutrients and other factors. Using field mapping and photo-interpretation techniques, they also delineated gross geomorphic regions and sub-regions, then subdivided them into geomorphic units. (See Map 5.) The geomorphic subdivisions they devised also provided convenient geographic units for other resource specialists.

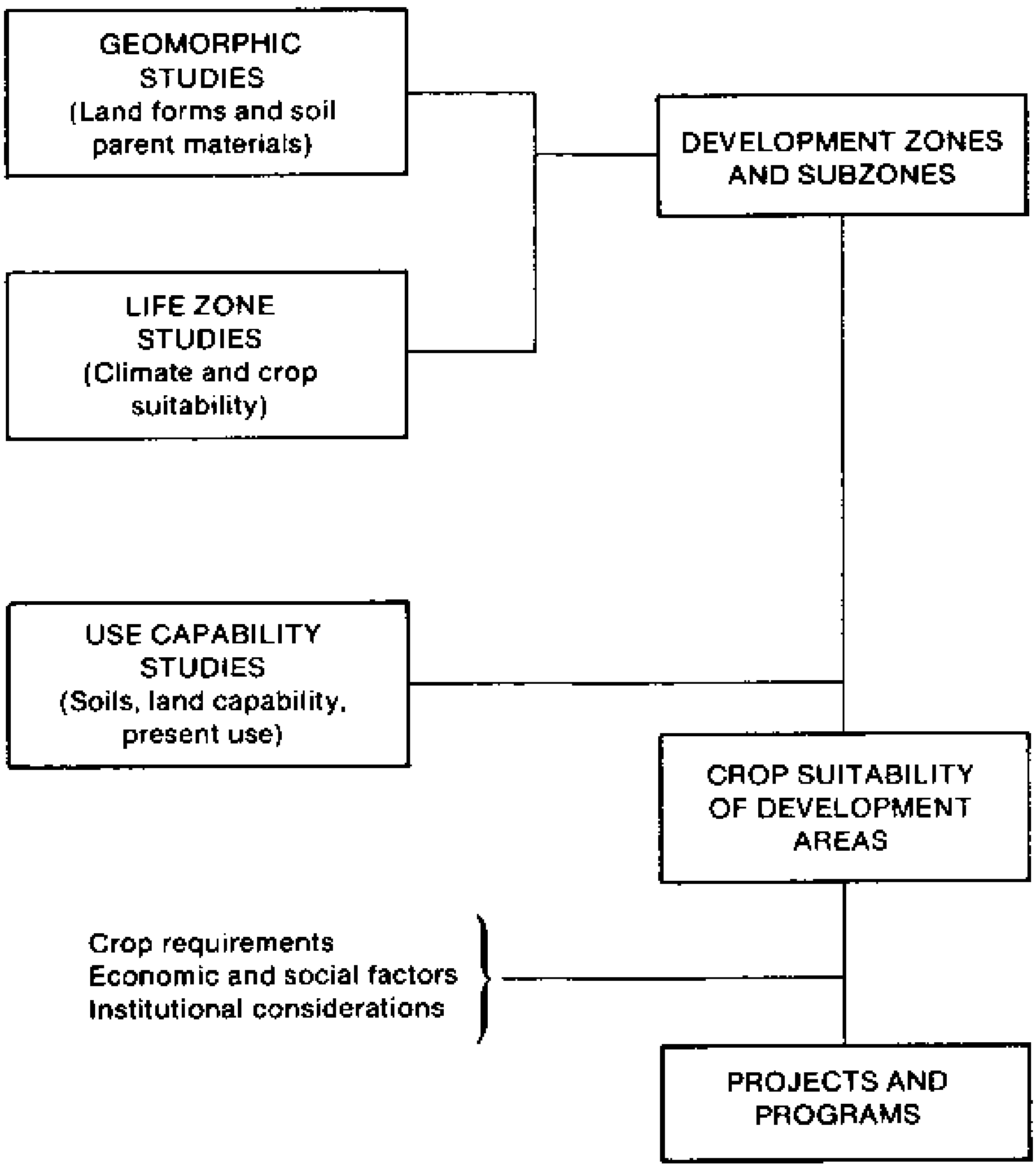
Simultaneous to the geomorphic studies, Holdridge life zones were delineated, and the crops climatically appropriate for each life zone were specified. (See Glossary.) The climatic data required for defining life zones are commonly available, but they can also be ascertained in the field through vegetation analysis. While only annual values for climatic factors were needed to map the life zones, monthly information on rainfall and temperature was added to make crop suitability interpretation more precise. Three life zones were delineated in the Eastern Cibao: moist subtropical forest, wet subtropical forest and a small area of subtropical rain forest. (See Map 6 and Table 5.)

Once the life zones were delineated, the geomorphic and life zone units were combined into development zones, subzones, and areas defined by topographic, climatologic, and soils characteristics. (See Map 7.) This fulfilled two functions. First, it established a development hierarchy for land and indicated where favorable resource characteristics justified more intensive studies. For example, the development zone classifications on Map 7 range from "agriculture, grazing, agro-industry" - the highest quality zone - to "forestry, agriculture" to "conservation" - land with no development potential. Second, it characterized each development unit in terms of the mix of crops best suited to local climate, topography, and soils. Thus, in the Eastern Cibao region, the land suitable for agriculture and grazing (essentially the Eastern Cibao Plain, Nagua Plain, San

Juan-Rio Boba Plain, and the western part of the Yuna Delta Development Zone) lies almost entirely in the moist subtropical forest life zone, but topographic and edaphic variations make some development subzones or areas suitable for vegetables, rice, bananas, or sugar cane. Others are more suitable for pasture or permanent crops. On the other hand, land topographically suited for forestry (e.g., the Northern Cordillera Development Zone) is plentiful in both principal life zones. Commercial species recommended for the moist forest include mahogany, and, for the wet forest, western pine. In the Eastern Cibao region, most of the differences between and within the development zones are geomorphic. In other regions where the topography is less variable and climatic change relatively greater, the life zones have a greater influence on the difference in agricultural potential of the development zones.

Next, land capability (or potential land use) characterization was factored in. Soils were mapped as series and phases where agricultural potential was high and as associations elsewhere. An adaptation of the eight-level land capability classification used by the U.S. Soil Conservation Service was applied. The development zones with good agricultural potential were then subdivided into development areas according to crop suitability. These recommended crop uses were indicated by physical or resource characteristics. (See Map 8 and Table 6.)

Figure 4 - GENERALIZED SCHEME OF AGRICULTURAL ZONING PROCESS



Finally, social, economic and institutional factors, as well as specific crop requirements, were considered. These included the cost and potential of irrigation or drainage; access to local, national, and export markets; the existence of or potential for government-sponsored settlement projects; water demand by month and by crop cycle; fertilizer requirements; wind, insolation, soil depth and other special conditions; and crop yields at specified management levels in each land capability class. Existing and needed farm-to-market roads were also mapped. The study team pared this voluminous information down to the "best use" opportunities and identified the crops most appropriate for each development area. It then developed maps depicting agricultural programs and projects - crop and animal production, processing industries, production services, and rural services - in relation to the development areas. (See Map 9.) These proposals were supplemented with the team's proposals for fishing, mining, and tourism projects.

MAP 5

MAP 6

Table 5 - GENERAL CHARACTERISTICS OF THE LIFE ZONES

Life Zones	Temperature (0°C)	Rainfall (mm/year)	Potential Evapotranspiration (mm/year)	Relation between Evapotranspiration and rainfall	Natural Vegetation	Appropriate Uses and Species
Subtropical Moist Forest	24.4-27.1;25.7[1]	1332-2202;1767[1] Irregular distribution with definite dry season	1229-1451;1340[1]	20% less than annual average rainfall	Forest with moderate growth and easy natural regeneration. Pests and diseases are sporadic	On land with high productive capacity: Intensive agriculture with irrigation (sugar cane, tobacco, coffee, coconut, banana, peanuts, tomatoes, sweet-potato, rice, cassava, cocoa, citrus, avocados); intensive livestock (milk cattle and pigs, using guinea and pangola grass). On steep terrain: forestry (mahogany, capá, oak, eucalyptus)
Subtropical Wet Forest	26.5[2]	2339[2] Irregular distribution without pronounced dry season	1209[2]	60% less than average annual rainfall	Exuberant forest with epiphites and parasites. Rapid growth and easy natural regeneration. Pests and diseases are numerous and frequent	Agriculture with species that tolerate high humidity or perennial crops (coffee, cacao, yam, subtropical fruits, rubber, guava). Livestock (selected grasses). Forestry in steep hills, especially pine trees (occidentalis), sablito y ciruelillo

Subtropical Rain Forest	18-24[3]	4000+[3] Heavy rainfall all year around	1040-1200[3]	75% less than average rainfall	Forest with epiphites, parasites and tree ferns. Very rapid grown and abundant natural regeneration	Low value for agriculture, livestock or commercial forestry due to high rainfall and steep topography. Conservation for erosion control important.

1. Range and average for 7 stations.
2. One station.
3. Estimated value. No station.

MAP 7

MAP 8

Table 6 - CROP SUITABILITY OF DEVELOPMENT AREAS SAMPLE AREA OF EASTERN CIBAO REGION

Zone, Subzone, and Area	Land Capability Class	Recommended Crops
1b Salcedo Subzone		
1b1 Piedmont area	II	Cacao
1b2 Savanna area	II	Fruit trees
	V	Pasture, rice (low productivity)
1b3 Alluvial area	II	Vegetables, banana
	IV	Rice (high productivity)
2 Nagua Plain Zone		
2a Western subzone	II	Sugar cane, banana, vegetables
	III	Sugar cane, fruit trees (mango, citrus)
	V	Pasture
	VII	Conservation
2b	IV	Rice (high productivity)
	VII	Organic soils*
	VIII	Conservation
4 Yuna Delta Zone		
4a Eastern Subzone		
4a1	II	Rice (high productivity)(risk of inundation)
	VII	Organic soils*
4a2	II	Rice (high productivity)(risk of inundation)
	VII	Organic soils*
	VIII	Natural vegetation or rational exploitation of mangrove
4b Western Subzone	II	Vegetables
	III	Fruit trees
	IV	Rice (high productivity)
	V	Rice (low productivity), pasture
	VIII	Organic soils*
* Cropping possible with special technology.		

Class	Land Capability and Potential Use	Conservation Requirements
I	Cultivable lands, suited to irrigation, with level relief and without important limiting factors. High productivity, given good management.	Requires only good management practices.

II	Cultivable lands, suited to irrigation, with level undulating or smoothly hilly relief. Limiting factors not severe and can be compensated through moderately intensive management practices. High productivity, given good management.	Requires moderate conservation measures.
III	Cultivable lands, suited to irrigation but only with very profitable crops. Level, undulating or smoothly hilly relief. Rather severe limiting factors. Moderate productivity, given intensive management practices. Possible crop range restricted.	Require intensive conservation measures.
IV	Lands of limited cultivability, not suited to irrigation except under special conditions and with very profitable crops, chiefly suitable for pasture or perennial crops. Level to hilly relief. Severe limiting factors. Require very intensive management practices. Low to moderate productivity.	Optimum capability is for tree crops that require little tilling work.
V	Lands not suitable for cultivation, except for rice growing. Suitable chiefly for pasture. Very severe limiting factors, particularly in relation to drainage. High productivity for pasture or for rice, subject to very intensive management measures.	Optimum capability is for pasture, without restrictions.
VI	Lands unsuitable for cultivation, except for mountain crops. Suitable chiefly for forestry and pasture. Very severe limiting factors, particularly steepness, shallowness, rockiness.	Optimum capability is for forest and pasture, with restrictions.
VII	Uncultivable lands, suitable only for forestry.	Optimum capability is for forest, with severe restrictions.
VIII	Lands not suitable for cultivation. Suitable only for use as national parks and wildlife areas.	Recreation and wildlife area.

MAP 9

While the identification of opportunities proceeded smoothly, a problem developed during the project inventory. Some government agencies requested that the Eastern Cibao study incorporate projects they had already identified or initiated. Since one study project goal was coordinating development activity, the study team welcomed the opportunity. Nevertheless, classifying each project, estimating the preparation time needed for each, gauging the institutional and political forces influencing each, and then determining each project's relationship to the proposed regional development strategy overwhelmed the staff. With roughly 125 ongoing and proposed projects, the project identification map lost its value as a quick reference. Moreover, identifying high priorities quickly was impossible, since each project was accorded apparently equal weight. Evidently, neither DRD nor its Dominican counterparts had fully grasped the lessons learned in DELNO about limiting the number of projects for analysis.

The study team also used the diagnostic studies to create a four-part regional development strategy. The economic development component focussed on stepping up agricultural production of traditional crops for domestic use and export, developing tourism, improving the production and marketing of agricultural and mining products, and creating foreign exchange through mining. The social development component was aimed at creating rural jobs in agro-industry and agriculture, intensifying rural adult literacy programs, and building educational facilities and programs, housing, and health-care institutions. The infrastructure development component was geared toward defining subregional development zones for planning purposes and expanding telecommunications and ground transportation within these zones. The environmental management component was designed to strengthen environmental legislation, help the agricultural and water resource agencies to carry out research and pilot projects, and incorporate natural resource management measures into development projects.

Despite problems during the lengthy diagnostic phase, Phase I of the Eastern Cibao Project was completed on schedule in one year. One thousand copies of the Phase I report which contained colored maps, were published (See Table 7.)

2. An Unconventional Phase II - Expanding the Study Area

With the publication of the Phase I report, *Plan Regional de Desarrollo del Cibao Oriental - Diagnóstico y Estrategia de Desarrollo,* the study team prepared to begin formulating projects. The government, however, contended that the Eastern Cibao study together with the study of Western Cibao (the DELNO study) did not add up to a plan for the whole Cibao region. Thus, ONAPLAN decided that instead of moving into what had originally been conceived as Phase II (pre-feasibility studies of selected projects) for the Eastern Cibao, the study team should undertake a Phase I-type study (diagnosis, strategy, and project identification) of the whole Cibao Region before conducting any pre-feasibility studies.

Although dramatically restructuring the study would slow project formulation for the subregion, it was still the quickest way to create the regional planning base ONAPLAN wanted. This expanded study was conducted along the same lines as the Eastern Cibao study. Between January and December of 1980, the study team collected new data and analyzed published information, conducted interviews, field verified the potential for development projects, created thematic and synthesis maps for the region, and profiled 378 sectoral projects. Industrial development and energy issues were stressed since the region possessed hydroelectric potential and unconventional energy resources.

To expand the study's scope with limited resources, the study team worked closely with appropriate sectoral agencies. This procedure was cost-effective, and it substantially increased the chances of project implementation. To further improve those chances, the study team held a course in June and July to train counterpart personnel in project formulation and evaluation.

The Dominican Government also asked the study team to prepare annual operational plans for the region. The first of these, prepared for 1981, included all ministries' actions and investment plans for the Cibao Region.

By late 1980, the regional analysis was completed and published as the Phase I report, (see Table 8), which included a list of proposed projects. To select projects for further development, ONAPLAN sponsored a seminar in January of 1981 for all the major agencies at work in the region. Attendees together selected 14 projects for pre-feasibility study, then assigned them to participating agencies for elaboration with the study team's assistance. Colonization projects were emphasized.

By the end of the year, pre-feasibility studies of the projects selected by the seminar participants had been completed. The total investment cost of these projects amounted to US$34,270,600. (See Table 9.)

The overall Cibao study had been long and complicated. It had spanned three years, involved 23 DRD specialists, and a complex pattern of operations. (See Figure 5.)

C. Implementing the Recommendations

Which of the projects presented for financing will be implemented has not yet been determined, but the Dominican Government is actively seeking external funding for the four integrated settlement projects and for the sisal and chickpea production projects. The farm-to-market road system has been included in the national road development plan. The regional system of minihydro plants has become part of a major national renewable energy project supported with international funds. The rabbit meat and rubber production projects, the biodigestor and biomass for grain-drying projects, and the two tourism projects are being considered for inclusion in regional investment plans.

Table 7 - EASTERN CIBAO STUDY SUMMARY OF PHASE I REPORT[1]

<table>
<tr><th>Component</th><th colspan="4">Presentation</th></tr>
<tr><td>Background</td><td colspan="4">• Overview of the project's history, scope, terms of reference, and management. Summary of technical analyses of the principal problems, potential, and development strategy of
- Natural resources
- Productive capacity and existing technology
- Land tenure
- Institutional participation in development
- Social characteristics (literacy, employment, income, health, and housing)</td></tr>
<tr><td>Diagnostic</td><td colspan="4">• The physical, economic, social, and institutional Importance of the Cibao Oriental Subregion in the Cibao region and the nation.</td></tr>
<tr><td>Development Objectives and Strategy</td><td colspan="4">• Global objectives and strategy for developing
- Economic area
- Social area
- Physical area</td></tr>
<tr><td>Investment Projects In Integrated Development Zones</td><td colspan="4">(a) Identified sectoral projects and number in each subsector:</td></tr>
<tr><td></td><td colspan="2">Production</td><td>Infrastructure</td><td>Social</td></tr>
<tr><td></td><td colspan="2">- Agriculture (56)
- Cattle Raising (6)
- Forestry (7)
- Mining (6)
- Industry (15)
- Water Resources (13)</td><td>Tourism (6)
Roads (9)
Ports (1)</td><td>Education (4)
Health (5)
Housing (2)</td></tr>
<tr><td></td><td colspan="4">(b) Description of the Development zones and the placement of the identified projects</td></tr>
<tr><td></td><td colspan="4">(c) Investment Project Identification Sheets. For each sectoral project, the following information was presented:
- Title
- Location
- Description and justification</td></tr>
<tr><td>Key Mapped Information</td><td>Scale</td><td>Thematic</td><td colspan="2">Synthesis Projects</td></tr>
<tr><td></td><td>1:250,000</td><td>- Transportation system
- Health resources
- IAD settlements</td><td colspan="2">- Land classification - Investment project for irrigation identification - Critical environmental areas</td></tr>
</table>

	1:700,000	- Physiography - Annual mean precipitation - Mineral resources	- Life zones - Development zones

1. OAS and ONAPLAN, *Plan Regional de Desarrollo Cibao Oriental - Diagnóstico y Estrategia de Desarrollo* (preliminary version); Technical Secretariat of the Presidency; 1979.

Table 8 - CIBAO REGION STUDY SUMMARY OF PHASE I REPORT[1]

Component	Presentation			
Background	Overview of the project's relation to the Cibao Oriental Project, its scope, terms of reference, and management. Summary of the technical analyses of principal problems, potential, and development strategy of - Natural resources - Agriculture - Mining - Tourism - Social sectors			
Diagnostic	The physical, economic, social, and institutional importance of the Cibao Region in the national context			
Development Objectives and Strategy	Global objectives and strategy for developing - Economic area - Social area - Physical area - Environmental management concerns			
Investment Projects in	(a) Identified sectoral Projects and number in each subsector:			
Integrated Development Zones	*Production*	*Infrastructure*	*Social*	
	- Agriculture (52) - Cattle Raising (15) - Forestry (16) - Fisheries (2) - Mining (13) - Industry (46) - Water resources (41)	- Energy (27) - Roads (42) - Tourism (43)	- Education (30) - Health (17) - Housing (15) - Potable water and sewerage (19)	
	(b) Description of the Development Zones and the placement of identified sectoral projects			
	(c) Investment Project Identification Sheets. For each sectoral project, the following information was presented: - Reference number - Title - Number of families benefitted - Location - Execution time - Investment cost (RD$) - Description and objective - Project level - Responsible GODR institution			
Key Mapped Information	*Scale*	*Thematic*	*Synthesis*	*Projects*
	1:300,000	- Climatic information and annual mean precipitation - Forest resources - Mineral resources - Tourism resources - Health resources - Water resources - IAD settlements	- Life Zones - Land classification for irrigation and irrigated areas - Critical environmental areas - Land productive capacity - Development Zone	- Investment project identification

1. OAS and ONAPLAN, *Plan Regional de Desarrollo del Cibao: Diagnóstico y Estrategia da Desarrollo,* (preliminary version); Technical Secretariat of the Presidency, 1981.

Table 9 - PRE-FEASIBILITY STUDIES PREPARED FOR THE CIBAO REGION

AGENCY		PROJECT	INVESTMENT COST
IAD	1.	Integrated Development of Angelina Settlement	US$ 3,328,400

	2.	Integrated Development Agropampa and Yanguela Settlements	20,304,600
	3.	Integrated Development of Cañongo Settlement	1,606,100
	4.	Integrated Development of Carbonera Settlement	636,300
Secretary of Agriculture	5.	Experimental Production of Rabbits for Meat	50,000
	6.	Rehabilitation, Cultivation, and Industrialization of Sisal	404,700
	7.	Rehabilitation and Promotion of Rubber Production	474,500
	8.	Expansion of Chickpea Production	100,000
Secretary of Public Works	9.	Regional System of Farm-to-Market Road	(a)
National Energy Commission	10.	Regional System of Minihydro Plants	(b)
	11.	Biodigestors	3,500,000
	12.	Use of Biomass Waste for Grain Drying	250,000
Secretary of Tourism	13.	Regional Tourism Office in Samaná	200,000
	14.	Rehabilitation of Airport in Arroyo Barril, Samaná	416,000
TOTAL			**US$ 34,270,600(c)**

Notes:

a. An estimated US$1,000,000 In roads for the region are included in a national farm-to-market road plan.

b. Further preparation of a regional minihydro system is included in an US$18,000,000 national study for small-scale energy production.

c. The total Includes the estimate US$1,000,000 for the regional system of farm-to-market roads.

Figure 5 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES, CIBAO STUDY

The projects were formulated by the national agencies themselves under the supervision of ONAPLAN with varying degrees of DRD participation, Moreover, which projects are funded matters less than the ability of ONAPLAN and the national sectoral agencies to work effectively together. They now have the technical capacity to identify, prioritize, select, and implement projects, and they appreciate the importance of planning complementary projects in a limited space to multiply their collective impact - the essence of regional development.

V. Epilog

In the past two decades, the Dominican Government has made major strides in developing and implementing an integrated regional development process. Geographical regions have been defined and used at the national level to assess natural resource potential, formulate development strategies, and identify major investment projects. Sectoral agencies are now routinely asked to help prepare and assign priority to those projects. Multisectoral investment budgets are drawn up for regions and subregions, Moreover, sectoral agencies are required to participate in a national dialog on the use of the country's natural resources.

The current president of the Dominican Republic, elected in 1982, noted the DELNO Report during his campaign. He declared the area's development to be a principal campaign issue, and requested that the annual operations plan for the Cibao Region cover only the DELNO area rather than the whole region. With his election, the proposals prepared a decade ago will be revived.

ONAPLAN's new director has stated that the documents prepared by DRD constitute the basis for creating a Regional Development Institute for the Western Cibao.

It is far too early to predict the extent to which the project recommendations will be implemented for the overall Cibao Region or, in particular, for the DELNO study area. But a solid basis for development action now exists.

VI. Lessons learned

The **NATURAL RESOURCES INVENTORY** revealed the value of:

1. Using a resource inventory as a basis for identifying investment projects, development planning, and natural resource management. The inventory remained useful for more than a decade and established a "common ground" for development proposals.

2. Simplifying and rapidly delineating areas of high potential in which work should be concentrated and areas of low potential where no further study is needed.

3. Directing the inventory at the categorization of land units according to topography, climate, and other relevant characteristics. This can be achieved by mapping each discipline's findings individually, then combining them using map-overlay and other

synthesizing techniques.

4. Using existing data and correlating it with data from nearby countries to increase the accuracy of maps and to expedite the mapping process.

5. Using land-form mapping as a point of departure for a resource inventory and as the basis for reconnaissance mapping of soils and other resources.

6. Identifying or enhancing project opportunities by interviewing local people and agencies as a part of the field studies.

7. Relying on polished comprehensive cartographic presentation. While costly, it pays off in prestige value, which in turn influences decision-makers' reactions to study recommendations.

8. Training local personnel to interpret and apply the results of the resource inventory. Without such training, the results will not be widely used.

9. Making a single national agency responsible for natural resource evaluation. This simplifies the integration and maintenance of data. In the Dominican Republic, the responsibility was distributed among several agencies.

10. Justifying resource conservation projects in economic terms and incorporating them into a development strategy. Reforestation and soil conservation proposals were presented as isolated sectoral projects not clearly related to economic development. Consequently, they were not funded.

The **DELNO** and **CIBAO REGION STUDIES** showed the advantages of:

1. Using the DRD model of diagnosis in regional development planning - a diagnosis followed by the formulation of a strategy and specific projects. This model proved flexible and effective under a variety of conditions.

2. Identifying small projects for immediate implementation and beginning their implementation during the study so as to build momentum and respect for the study.

3. Avoiding the trap of excessive data gathering. The DELNO study team spent too much time gathering resource data and identifying projects. The Eastern Cibao study team developed excessive detail on existing projects. In both, proportionally more time should have been spent formulating and implementing projects.

4. Being flexible about institutional arrangements. The difficulties the Ministry of Agriculture experienced during the DELNO study made it apparent that a national planning agency working in conjunction with operational agencies makes a better institutional partner than a sectoral agency does. Several sectoral agencies working together as a task force on a study under the supervision of a national planning agency and with outside technical assistance can also work under some circumstances.

5. As a prerequisite of project implementation, getting a national agency to claim the project as its own and to accept responsibility for promoting the project and obtaining financing for it.

The **THREE STUDIES TOGETHER** demonstrated the importance of:

1. Quickly determining the overall nature of the problems the study will address. Before the Natural Resource Inventory, the problem was a lack of the natural resource data needed for planning and project identification. In the DELNO study, the principal problem was the lack of "bankable" projects. In the Eastern Cibao and the Cibao Region studies, the problem was coordinating ongoing projects with new projects that would "fill in the gaps" in the new development plan.

2. Understanding that once a proposal has been developed through the pre-feasibility level, it tends to generate its own momentum for implementation. Before a pre-feasibility study is completed, however, a proposal has a tenuous lease on life.

3. Viewing technical assistance as a short-term substitute for local technical capability. It is also an effective mechanism for training and institution-building since the counterpart individual and agency learns by doing.

The growth of operational capability of counterpart agencies is the true measure of the efficacy of technical assistance. A technical assistance agency can generate only so many investment projects, but if it generates the local capability to do without technical assistance, that number will multiply.

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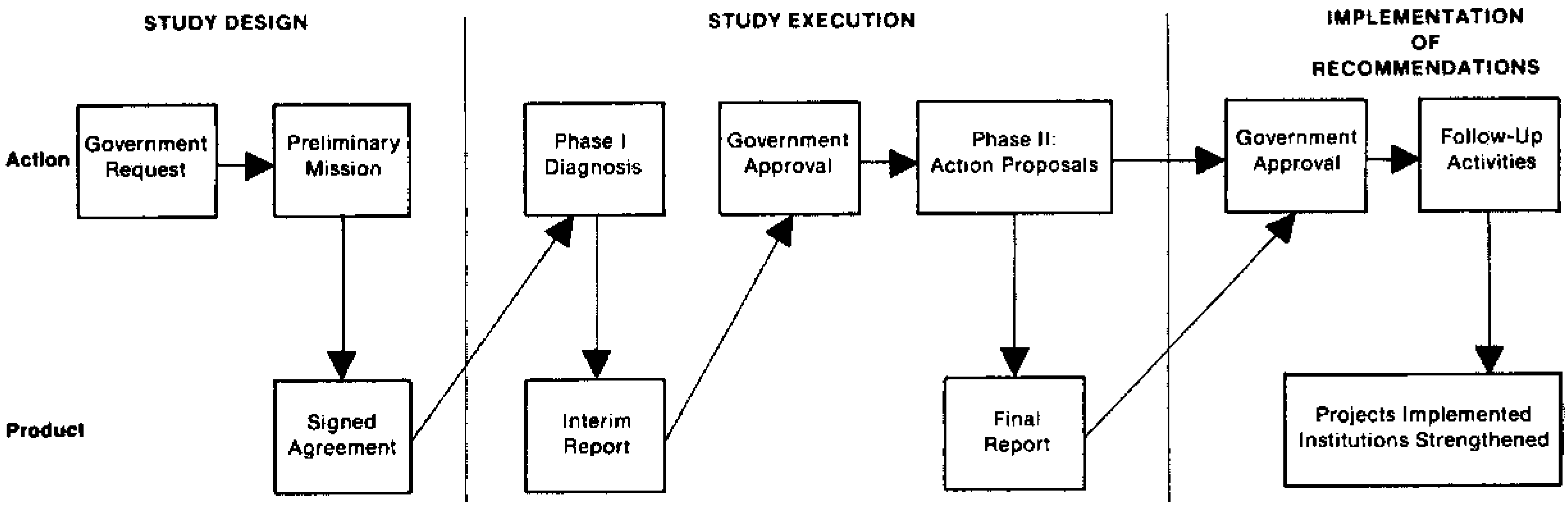
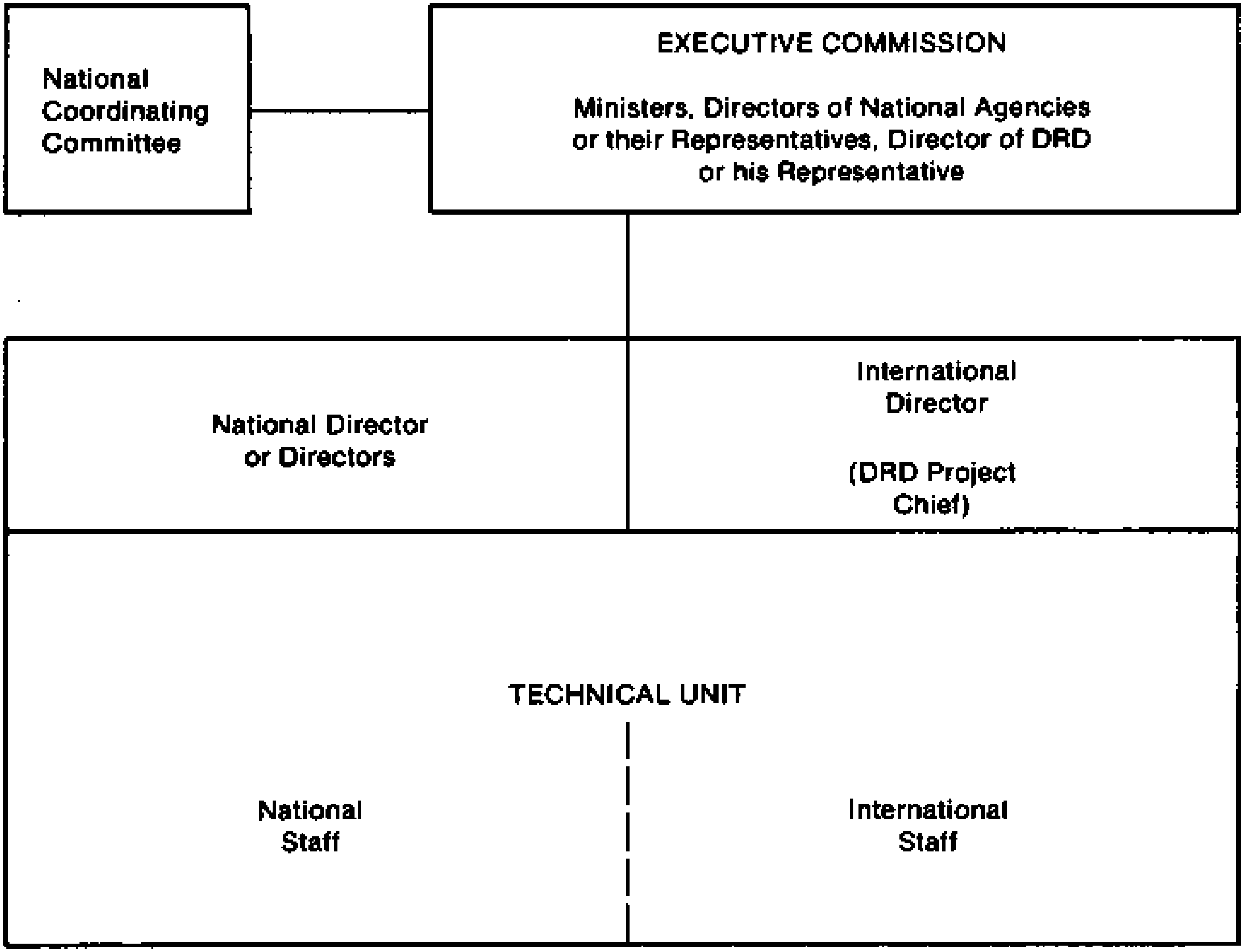
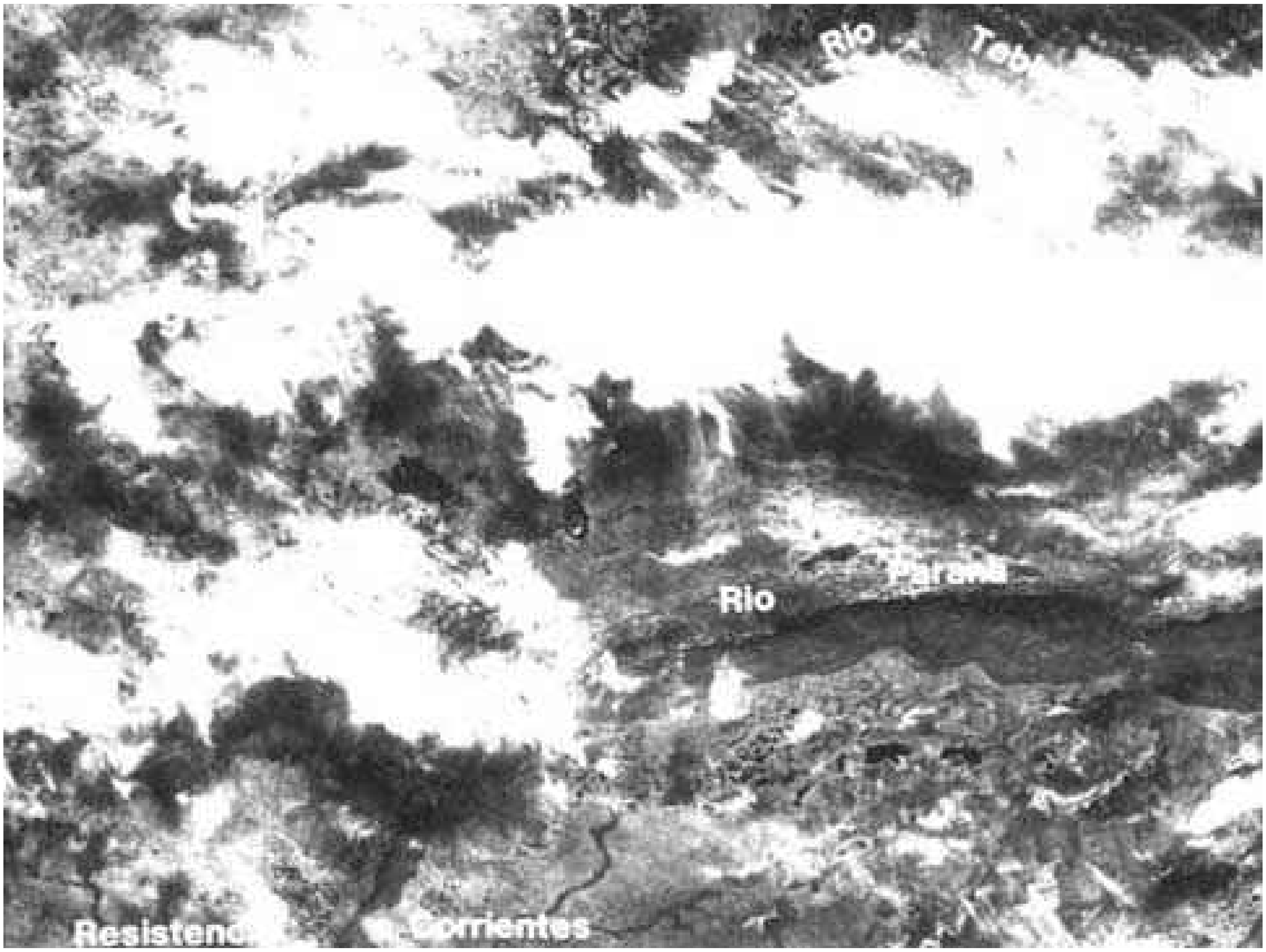

STUDY DESIGN
STUDY EXECUTION
IMPLEMENTATION OF RECOMMENDATIONS
Action
Product
Government Request
Preliminary Mission
Signed Agreement
Phase I Diagnosis
Interim Report
Government Approval
Phase II: Action Proposals
Final Report
Government Approval
Follow-Up Activities
Projects Implemented Institutions Strengthened


National
Coordinating
Committee
EXECUTIVE COMMISSION
Ministers, Directors of National Agencies
or their Representatives, Director of DRD
or his Representative
National Director
or Directors
International
Director
(DRD Project
Chief)
TECHNICAL UNIT
National
Staff
International
Staff


Formosa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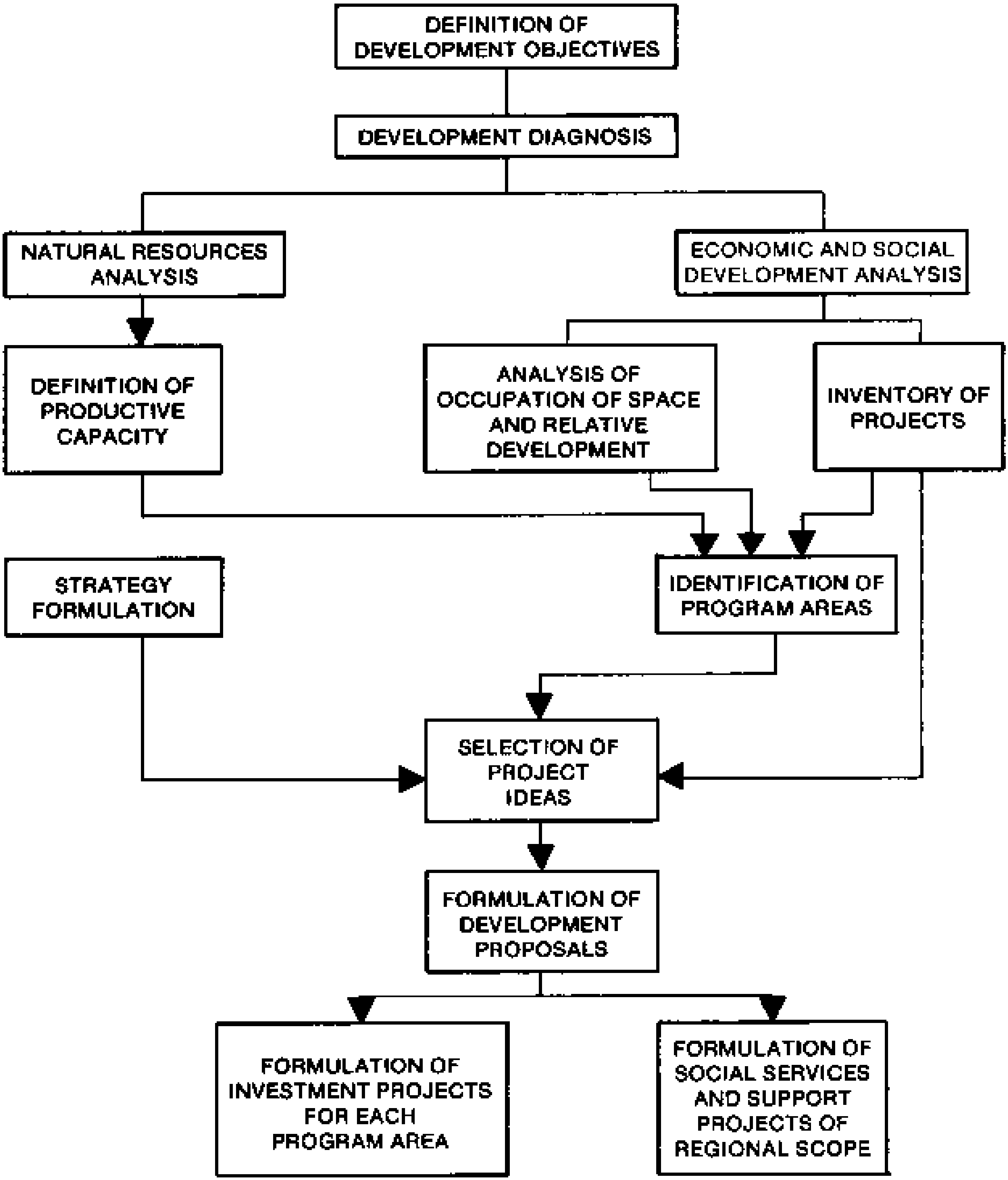

DEFINITION OF DEVELOPMENT OBJECTIVES
DEVELOPMENT DIAGNOSIS
NATURAL RESOURCES ANALYSIS
ECONOMIC AND SOCIAL DEVELOPMENT ANALYSIS
DEFINITION OF PRODUCTIVE CAPACITY
ANALYSIS OF OCCUPATION OF SPACE AND RELATIVE DEVELOPMENT
INVENTORY OF PROJECTS
STRATEGY FORMULATION
IDENTIFICATION OF PROGRAM AREAS
SELECTION OF PROJECT IDEAS
FORMULATION OF DEVELOPMENT PROPOSALS
FORMULATION OF INVESTMENT PROJECTS FOR EACH PROGRAM AREA
FORMULATION OF SOCIAL SERVICES AND SUPPORT PROJECTS OF REGIONAL SCOPE

Case study 2 - The Darien region study, Panama

PROBLEM SUMMARY

Opening a Remote Tropical Region With a Penetration Road-Planning Integrated Development in the Darien Region (Panama)

The Panama-Darien study (1974-77) was aimed at finding ways to support development and preserve the resource base in a tropical forest region that a new segment of the Pan American Highway would open to settlers. Additional objectives were to create local employment opportunities and to integrate the regional economy with the national economy. DRD's tasks were to propose coordinated and mutually reinforcing development projects for the short- and medium-terms.

The investments recommended for the 16,800 km^2 area totalled US$49,000,000. Based on a natural resource assessment and the identification of two high-priority development zones, the planning team made "pre-feasibility" proposals for integrated agricultural, livestock, forestry, fishery, agro-industrial, energy, roads, communications, and social service programs in the most promising settlement areas. Together, these programs would generate an estimated 3,400 direct jobs in a population predicted to jump from 24,400 to 34,400 with the completion of the road.

PANAMA - DARIEN REGION STUDY **- Fact Sheet**

Project area:			16,803 km^2
Population:			24,400
Physical characteristics:			
	- Holdridge life zones:		
		Tropical Moist Forest	
		Premontane Very Moist Forest	
		Low Montane Rain Forest	
		Premontane Rain Forest	

	- Elevation range: Sea level to 1,800 m	
	- Land capability classification:	
		Classes II-V: 9.1%
		Classes VI-VIII: 90.9%
Duration of Project:		
	Preliminary Mission: 1973	
	Preparatory Mission: 1974	
	Fieldwork: 2/1975-7/1978	
	Publication of Final Report: 1978	
Technical contributions:		

DRD disciplines (23)	Number of DRD/Experts (42)
Agricultural Engineer (Project Chief)	1
Project Deputy Chief (Specialist in Project Formulation, later Project Chief)	1
Agricultural Economist	1
Agricultural Production Specialist	3
Agro-industries Specialist	2
Anthropologist	1
Cartographer	2
Communications Specialist	1
Cooperatives Development Specialist	1
Economist	1
Editor	1
Environmental Specialist	6
Fisheries Specialist	1
Forest Industries Specialist	2
Geologist	1
Health Specialist	2
Institutional Development Specialist	1
Municipal Development Specialist	1
Project Implementation Specialist	1
Regional Economist	3
Regional Planner	3
Rural Electrification Specialist	1
Soils Engineer	2
Transportation Specialist	1
Water Resources Planner	2
Total professional person-months:	

	DRD: 176 Government of Panama: 122
Financial contribution:	
	DRD: US$473,500 Government of Panama: US$268,000
Total investment in projects proposed: US$49,000,000	

MAP 1

I. Introduction

Opening new resource-rich areas is an important part of development for countries still favored with such untapped potential. But developing nearly empty areas is a mixed blessing. A penetration road can create new social, economic, and cultural opportunities. If new roads connect one country with another, trade benefits can be substantial. But as access to remote regions increases, so do the ill effects of spontaneous colonization - deforestation, erosion, the depletion of other natural resources, pressures on limited social services, and the spread of disease.

This account of planning the development of the Darien region of Panama, through which the Pan American Highway was to be built, illustrates both the great difficulty of limiting spontaneous colonization along a penetration road through a remote humid tropical forest and the commensurate importance of integrated development planning. (The location of the Darien region is shown on Map 1.)

Key methodological challenges highlighted in the case study include:

- Focussing the study of a large region on small areas of concentration;
- Preparing "packages" of complementary projects for settlements in a nearly empty area;
- Attempting to keep these packages from unravelling as available investment financing decreases;
- Minimizing damage due to spontaneous colonization along a major penetration road; and
- Integrating development planning activities on both sides of an international border.

The Darien Gap region typifies the potential and problems of many tropical forest regions in Latin America. Loggers have removed most of the cedar, mahogany, and other valuable wood, and the small-scale farmers who have settled the area in their wake have planted corn and bananas on the easily exhausted soils that lie beneath the forest cover.

The sparsely populated Darien region is inhabited by isolated ethnic groups, each with its own laws and customs. Per capita income is low and social services minimal. To address such problems, Panama's 1972 constitution created a new institutional framework for spurring economic development, raising living standards, and increasing citizen participation in the provinces.

At the national level, Panama has suffered from the worldwide inflation and subsequent recession set off by the oil crisis in 1973. The country's current development goals are to increase reliance on indigenous energy sources, raise agricultural productivity in the traditional food-producing provinces, and improve public works and services, especially in the interior. The national government has also promoted Panama as an international financial and tourist center.

The Pan American Highway near Bayano at the beginning of the section of new construction through the Darien Gap.

During the 1970s, Panama renegotiated Canal treaties with the United States, extending Panama's sovereignty over territories once under U.S. control. During these negotiations, however, the private sector adopted a "watch and wait" position and its share of total investment fell, which contributed to economic stagnation.

Against this backdrop, the Darien region study was initiated to assess the potential, of using the Pan American Highway to further eastern Panama's development without undercutting the productive resource base. Since spontaneous development would inevitably occur when the Darien became accessible, Panama asked the Organization of American States (OAS) to help it plan development activities with minimal negative impacts.

The Darien study demonstrates the process of narrowing down a large study area to selected smaller areas by

- Dividing the study area into subregions or programming zones and selecting the most promising programming zones;
- Delineating the best settlement areas within the selected programming zones; and
- Identifying specific projects within the settlement areas.

This rapid contraction of the study area paid off: by sharpening the focus of investigation, the planning team realized concrete results with minimum expenditures of time and resources.

The study also describes the process of revising study recommendations as investment capital commitments drop without sacrificing the integrity of the projects recommended - in this case, keeping the packages intact. The sequence was, first, recommending the development of eight settlement areas, then concentrating on only two of the eight, and, finally, phasing project implementation in the two.

The study also illustrates the futility of both prescriptive and "add-on" approaches to environmental management. The Panamanian Government's efforts to legally restrict spontaneous colonization adjacent to the new penetration road failed, and none of the so-called environmental projects has been implemented. In contrast, the study team recommended developing selected areas rapidly and intensively to provide jobs and services for migrants and thus reduce spontaneous colonization in the less productive areas. These proposals were aimed at systematizing both the analysis and development of the area.

II. Designing the study

A. The Preliminary Mission

Responding to the Panamanian Government's request for technical assistance, the Department of Regional Development (DRD) of the OAS sent a preliminary mission to Panama for four weeks in 1973. The team was composed of a senior DRD headquarters official (a geographer), an economist, a water resources specialist, and a transportation engineer. The mission's goals were to analyze the impact of the development strategy the national government had adopted for the region, inventory and evaluate existing projects in the Darien Gap, and generate ideas for additional actions.

These activities were designed to lay the groundwork for multidisciplinary studies incorporating physical, socio-economic, legal, political, and institutional analyses. Panama favored this integrated approach to regional development, which conformed with its national development strategy for the 1970s, its decision to develop the Darien region, and its new interdepartmental commission for developing the region.

The mission discussed two major projects with Panamanian officials: the construction of the Bayano Dam for generating hydroelectricity and the completion of the Pan American Highway to the Colombian border. The government had already launched a development planning project for the Bayano and enacted a law (N°71) making the Pan American Highway a high national priority and restricting settlement to an eight-kilometer strip on both sides of the highway. The road and the dam, both under the jurisdiction of the Ministry of Agriculture, represented large capital outlays and the extension of new services to remote areas. Both also posed the threat of natural resource degradation.

Panamanian officials wanted the road to integrate the Darien with the rest of the country and to connect Panama to Colombia and points south. Thus, the mission proposed six broad goals for the Darien study: (1) accelerating the region's contribution to the country's economic development, (2) raising the employment level in the Darien, (3) increasing the farm sector's income, (4) increasing agricultural and agro-industrial production, (5) protecting and gradually integrating local indigenous groups, and (6) preserving and managing regional ecosystems, To realize these broad goals, the mission proposed preliminary targets for guiding rural immigration, improving forestry management and development, bringing social services in Darien up to the national average, developing population centers, and raising regional per capita income.

Within a month's time, the mission had examined the region's problems, current and planned activities, and development opportunities. Taking local and national perceptions of the Darien's development into account, the mission presented proposals as hypotheses that could be confirmed or rejected with a minimum of additional study - an approach that held costs down by eliminating unproductive lines of investigation,

Before the study could be formally initiated, the physical boundaries of the study area, the contributions the OAS and the Government of Panama would make to the study, and the level of investment capital Panama would dedicate to implementing the study team's recommendations had to be determined. So as to include both the Highway and Bayano projects, the province of Darien and the Chepo and Chiman districts of Panama province were included in the study area. Since it quickly became clear that study resources were not sufficient to achieve the results the Panamanian Government desired, the scope of work had to be curtailed to match the available resources. While Panama deferred decisions on project-implementation funding, the team took three steps to stay within the planning budget:

- Limiting the time frame of the study by concentrating on development up to the year 1985. (Later, as investment funds became still more limited, the focus was further narrowed to a five-year action program.)

- Formulating investment projects through the pre-feasibility level only.

- Restricting the geographic focus. The highest priority subregions would be quickly delimited, and subsequent work would be concentrated in these areas.

B. Designing the Management Structure

Soon after the preliminary mission took place, a new Planning and Economic Policy Department was created within Panama's Ministry of Planning and Economic Policy (MIPPE) to coordinate the development activities of other departments and decentralized agencies. Although the Ministry of Agriculture had expressed interest in sponsoring the study team, MIPPE became the counterpart agency because it could make the project a high national priority, its office of Regional Planning and Coordination shared most of the Darien study team's views of regional planning, it designated the provincial planners, and it had budget authority for implementing projects.

The study was to have two management tiers: an executive commission and a technical unit. (See Figure 1.) MIPPE's Minister would preside over the executive commission, which would also include DRD's director and the Ministers of Agriculture and Public Works. Technical unit staff - the study team's national director, MIPPE staff, and the head of the international mission-would work with national and international specialists to conduct the studies the executive commission ordered. By involving national and international personnel in each task, this management structure would force the international experts to tailor their methods to Panamanian circumstances and enable Panamanians to acquire on-the-job training.

Project activities began in early 1974 with a review of all available aerial photographs and hydrological studies. Ideas for investment projects were compiled, and the exact contributions and responsibilities of the OAS and the Government of Panama were determined. The agreement was signed in April of 1975, and the workplan was approved quickly.

III. Executing the study

The Darien study was executed in two phases. In Phase I, diagnostic studies were conducted as a basis for designing a regional strategy, and then development subregions were defined, In Phase II, interrelated projects were formulated for each subregion, an action program for short-term development of selected sub-regions was proposed, and an institutional strategy for implementing the proposals was developed. Many DRD specialists were involved in the study, and the timing of their arrival and departure was critical. (Their periods of participation in the study are shown in Figure 2.)

A. Phase I - Diagnosis of the Region's Potential

The first year's studies focussed on the region's economic activity, spatial organization, population, natural resources, and institutional capacity. These studies revealed that most of the region's output came from technologically primitive agriculture and forestry, and that the region's total output comprised less than 1 percent of Panama's GNP. Only two population centers had more than 1,500 people: La Palma (1,742) and Yaviza (1,660). There was no transportation network to link dispersed populations.

The technical unit's institutional analysis proved critical. Panama's 1972 national constitution established the hierarchy of political subdivisions as province, district (county), *corregimiento* (township), and locality. (See Table 1.) Only the districts can collect revenues. The *corregimientos* have only small sums for local improvement. The province itself has virtually no budget for projects, and the governor's functions are limited to policy-making and coordination. But while financially weak, councils and boards meet often at all levels, so the technical unit had ample opportunity to garner support for the study and assess community expectations and needs.

The natural resources studies focussed primarily on the region's soils and substantial forest resources, though water resources were also assessed. Since aerial photographic coverage of the area was inadequate, the technical unit worked with experts from the Tommy Guardia National Geographic Institute to explore alternative ways to prepare a base map for the Darien. To stay on schedule and within budget, the team decided to make do with radar images at a scale of approximately 1:250,000, with outdated aerial photographs of 40 percent of the region, and with field surveys.

Two methods for compiling more accurate supplementary information were considered: setting up a multidisciplinary team to conduct a joint study of each area and conducting conventional sectoral studies. Because the part of the region used for agriculture and livestock raising had little forest while the other part was mainly sparsely inhabited rain forest (see Map 2), the sectoral approach was chosen. This approach saved time initially, though the time needed later to synthesize the findings offset some of the gains.

The natural resource studies demolished some deep-rooted myths about the region's unlimited potential. For the most part, the soil was quite shallow, and the broken terrain invited soil erosion. Forest resources were extensive, but most valuable tree species had already been logged. However, other species could be harvested to make paper, particleboard, and other wood products.

Both informal and formal training were conducted during Phase I of the study. Panamanian experts in the technical unit improved their skills informally during this time by working with international specialists and other national experts in the sectoral agencies. In addition, a formal one-week seminar was held in mid-1975 on regional development and project formulation. Sponsored by MIPPE and conducted by the Inter-American Training Center for Formulation and Evaluation of Projects (CETREDE) of the OAS, this seminar brought together administrative and technical staff from planning, sectoral, executing, and financing agencies to discuss the theory and practice of regional planning and project development. More than merely a skills workshop, this seminar enabled the Panamanian officials who would eventually be responsible for evaluating, financing, and implementing the projects to understand the design framework. At the same time, it gave the technical unit some idea of how its work would be perceived and used.

Figure 1 - ORGANIZATIONAL STRUCTURE

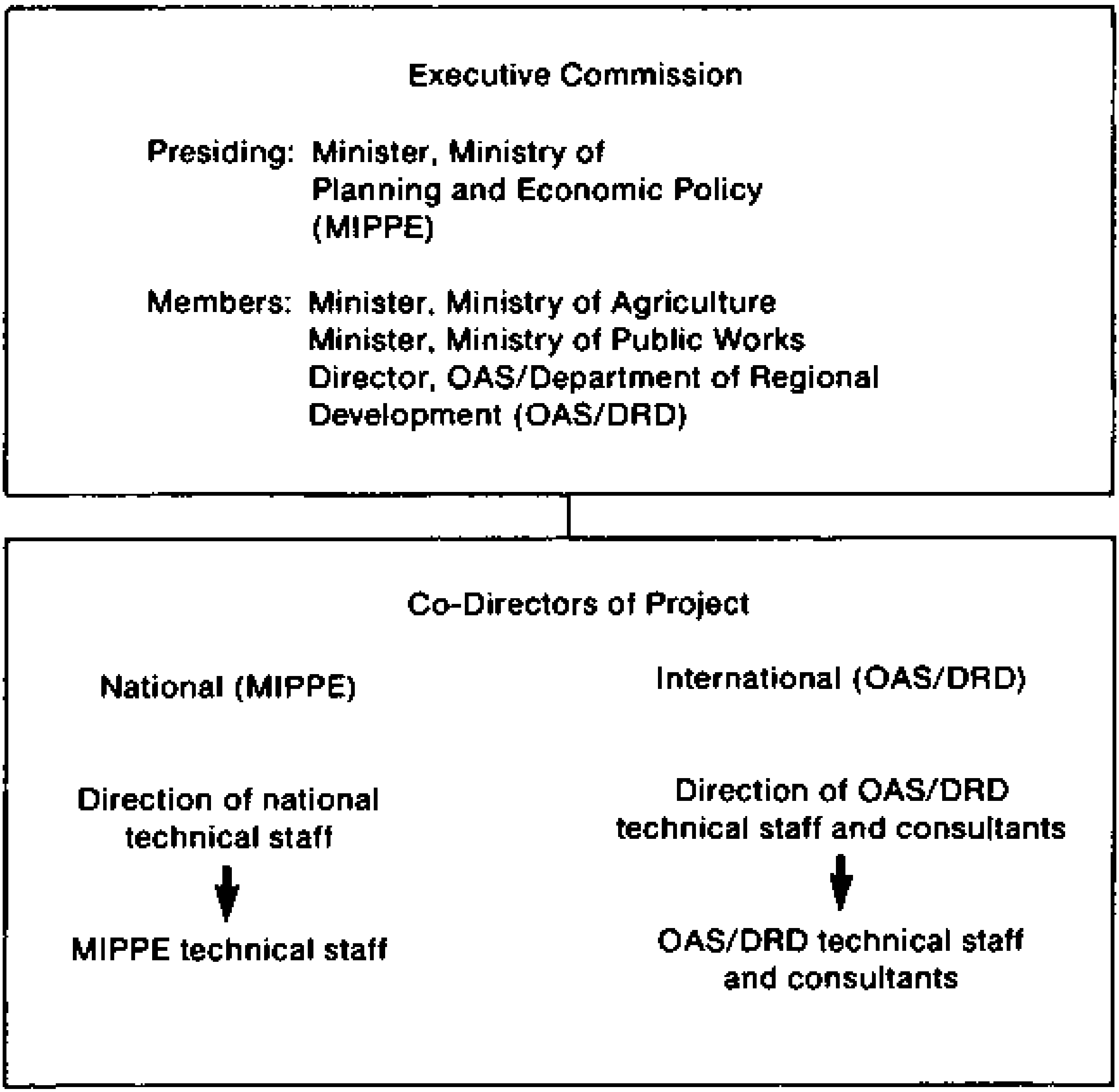


Figure 2 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES

TABLE 1 - POLITICAL-ADMINISTRATIVE LEVELS

Level Administrative Division	Head of Division	Collegial Groups	Membership
1 Provincial Governments	Governor	a. Provincial Coordination Council	Representatives of the *corregimientos* and members of the Provincial Technical Board. Presided over by the Governor.
		b. Provincial Technical Board	Chief of the military zone, directors of regional agencies and departments and decentralized agencies of the central government. Coordinator: Provincial Planner (MIPPE). Presided over by the Governor.
2 Districts (Counties)	Mayor	District Council	Representatives of the *corregimientos*. Presided over by the Mayor.
3 *Corregimientos* (Townships)	Representative	Town Board	Representatives of the local boards. Presided over by the representative.
4 Localities		Local Boards	Members of the community.

A serious institutional conflict between MIPPE and the Ministry of Agriculture arose during Phase I over the Bayano Integrated Development Project in Panama Province. According to the Ministry of Agriculture, land development in the river basin would also affect the river's ability to feed the Bayano Dam, so the Darien study's area of action should not include the Bayano watershed. MIPPE disagreed. As an initial compromise, the study directors confined forestry and soil studies to the Darien province. Later, the executive commission restricted all activities to Darien.

By early 1976, data on land use, soil capability, mineral and fishery resources, telecommunications, transportation, and overall regional development potential had been collected and analyzed. A small task force was set up within the technical unit to synthesize the results, extract and coordinate the principal findings of the sectoral studies, and prepare a regional strategy that complemented the 1976-80 national development plan. This task force concluded that the GDP of Darien province would triple and the economically active population would double within 20 years. Infrastructural needs would increase commensurately. Accordingly, the focal points of the proposed regional development strategy were to (1) strengthen the densely populated areas of La Palma-Chepigana and Yaviza-El Real-Boca de Cupe by improving production activities, services, and infrastructure; (2) improve control over squatter populations along the Pan American Highway and plan subsequent settlement; and (3) design a river-and-road network to connect the densely populated areas to each other and to the rest of Panama. (See Map 3.) The overall strategy was to direct development toward the areas that could best accommodate it over the long term and away from marginal areas where agro-industrial development would severely damage the resource base.

Potential Land Use, Darien Region, Panama

MAP 2

The forest inventory team during reconnaissance mapping of the Darien Region.

The forest inventory team with Darien colonists.

To implement this strategy, the technical unit proposed three alternatives. The first, based on a *status quo* investment level, focussed primarily on developing social services and physical infrastructure. The second assumed a substantial increase in capital expenditures to finance rapid growth in the production sector. The third, a compromise aimed at better balancing the development of the social and production-related sectors, entailed modest investment increases. The executive commission selected the third option, and this exercise spurred government to commit funds for implementing the study's recommendations.

The findings of the diagnostic studies, the proposed regional strategy, and the government's rationale for its investment commitment for the region were published in July 1976 in a joint OAS/Government of Panama report, "Present Situation and Perspectives on the Darien Region."

B. Phase I - Subregionalization and Project Identification

From the diagnostic phase, the technical unit had the data needed to divide the study area into subregions - a first step toward evaluating existing projects and identifying new ones. Subregionalization was a two-step process. First, homogeneity and polarization analyses were conducted. Second, practical political and operational aspects were considered.

The subregions were relatively homogeneous units selected on the basis of such factors as soil quality, relief, climate, land use, and vegetation cover. The technical unit determined the limits of attraction and the reach of services around each of the principal population centers, both for the present and as projected to the years 1985 and 2000. (See Maps 4 and 5.) It then meshed these polarization analyses with the data on the boundaries of the political subdivisions to delineate five "programming zones." (See Map 6 and Table 2.)

Zones I and II, Chucunaque and La Palma-Sambú, were designated for immediate development since preliminary construction activities on the Pan American Highway had already led to uncontrolled settlement in this area, agricultural conditions were relatively favorable, and Yaviza was the region's fastest-growing town. The core areas of Zone II, La Palma and Sambú, contrasted dramatically. La Palma, the capital and largest town of the province, was politically powerful but economically stagnant. An impetus was needed to create jobs in this provincial center so as to reduce migration to Panama City and toward the Pan American Highway. In contrast, enterprising Choco Indians (*Darienitas*), and immigrants from other Panamanian provinces were pouring into Sambú despite the lack of service facilities there. The clear needs in Sambú were for a market-service center and social infrastructure.

Development activities would be deferred in Zones III and IV, mountainous and resource-poor areas in the northwest and southwest corners of the province. The mountainous Zone V was designated as a forest reserve that would serve as a buffer against migration and hoof-and-mouth disease from Colombia. (The U.S. Department of Agriculture had already dedicated US$7.7 million between 1974 and 1978 to the establishment of a similar disease barrier along the Pan American Highway in Colombia - *Los Katios* National Park.)

MAP 3

MAP 4

MAP 5

MAP 6

Table 2 - PROGRAMMING ZONES (Subregions)

Subregion	Area ha.	Population Density	Percentage of soil suitable for		Key Development Considerations
			Annual Crops and Pasture	Forestry	
I. Chucunaque	550,000	High to average	54	33	Route of the Pan American Highway
II-A* La Palma-Sambú	286,000	High	31	37	Proximity to the Gulf of San Miguel
II-B* Rio Balsas	121,000	Average	70	21	Center of the province on the Balsas and Tuira rivers
III. Rio Jaqué	90,000	Average to low	8	18	Pacific coastal location shared Colombia border
IV. Rio Congo	124,000	Low	20	32	Proximity to Gulf of San Miguel
V. Forest Reserve	63,000	Low to nil	11	45	Shared border with Colombia; Foot-and-mouth disease control

Source: Based on *Current Situation and Prospects of the Eastern Region - Darien* (Preliminary Document), Government of Panama and OAS, July, 1976. La Palma-Sambú and Rio Balsas were originally delineated as separate zones and subsequently melded to become Zone II.

MAP 7

The results of Phase I were incorporated into a preliminary report that was submitted to the executive commission in June of 1976.

C. Phase II - Formulation of Interrelated Projects

After the executive commission approved the programming zones in mid-1976, Phase II was launched and the technical unit concentrated on the two zones designated for immediate development. To identify promising settlement areas within each, it used six criteria: compliance with the regional strategy, the location of productive land, population forecasts and land-use trends, land-use regulations, the presence of squatter settlements, and the condition of the infrastructure. The region's low level of economic activity and limits on technological and entrepreneurial capabilities were also considered. The study team tentatively delineated five settlement areas in the Chucunaque subregion and three in La Palma-Sambú. (See Map 7 and Table 3.) It then identified the physical connections among the urban areas and specified the socio-economic infrastructure that each emerging community needed.

To select the optimal combination of production, service, and infrastructure projects to stimulate development, the technical unit relied on a master list drawn from its own work and discussions with local populations. Many proposals on this list had sprung from the project's close contact with authorities. The MIPPE provincial planner initially assigned to the study area worked intimately with local authorities and provincial community groups, and when MIPPE later made the planner a member of the technical unit, the unit functioned as the provincial planning office. This arrangement made the study team a prolific source of project ideas.

Table 3 - SETTLEMENT AREAS OF THE CHUCUNAQUE AND LA PALMA-SAMBU PROGRAMMING ZONES

Subregion and Zone	Location	Area ha.	Population in 1977	Present Land Use	Carrying Capacity (families)*
I. *Chucunaque*					
1. Yaviza	Surrounding Yaviza	21,000	2,700	Crops, livestock and forestry	1,900
2. Canglón	Mouth of Canglón river	13,000	Sparse	Crops, livestock and forestry	1,200
3. Laja Blanca	Valley of Chucunaque river	5,100	Indian Sparse	Crops	460
4. Metetí	Northeast of Pan American Highway	7,200	Spontaneous colonies Sparse	Crops	660
5. Santa Fe	Valley of the Sabana, Lara, and Hinostroza rivers, and slopes of the Tumagantí ravine	11,200	Sparse	Crops and services (highway juncture at La Palma)	1,000
II. *La Palma-Sambú*					
1. Sambú	South and west of Sambú	12,250	1,100	Crops, livestock and forestry	1,100
2. Setegantí	South of La Palma	9,200	Sparse	Crops	840
3. Rio Balsas	North of the forest reserve	7,000	Sparse	Crops and forestry	640

Source: Based on the "Integrated Development Project for the Eastern Region of Panama-Darien." OAS General Secretariat, Washington, D.C. 1977.

* Family size of five persons.

The settlement at Sambú. Diverse ethnic groups are gathered together in this small population center. Traditional thatch materials have been replaced by galvanized roofs.

To determine the minimum data needed to select the projects, the study team developed a manual on project identification and formulation. It also set common standards and formats for the use of the Panamanian agencies that were to supply data. In addition, the "project package" approach adopted for this study maximized savings by grouping complementary production and support projects together so as to improve their combined cost-benefit ratios. The technical unit supplemented the project packages with transport and communications projects designed to knit the settlement areas into a coherent region. (See Table 4 and Map 8.)

Four other project-selection criteria were also applied:

1. The use of relatively simple technologies adaptable to local labor and entrepreneurial capabilities;

2. The rational use of natural resources;

3. The stimulation of population concentration through the creation of jobs and service facilities; and

4. The need to keep projects and packages relatively small in view of limited government funds and unknown international funding prospects.

Table 4 - SHORT-TERM INVESTMENT PROGRAM FOR ZONES I AND II

	INVESTMENTS				JOBS			
TYPE OF PROGRAM AND NUMBER OF PROJECTS	**ZONE I**	**ZONE II**	**COMMON TO BOTH ZONES**	**TOTAL**	**ZONE I**	**ZONE II**	**COMMON TO BOTH ZONES**	**TOTAL**
	(thousands of 1978 dollars)							
AGRICULTURE (15 projects)	5,558	515	-	6,073	1,901	303	-	2,204
Corn (5)	1,506(4)	365(1)	-	1,871	1,094	265	-	1,359
Plantain (4)	997(3)	150(1)	-	1,147	248	38	-	286
Yucca (2)	953(2)	-	-	953	302	-	-	302
Yam (3)	202(3)	-	-	202	89	-	-	89
Pixbae, Hierba limón, and guandú	1,900(1)	-	-	1,900	168	-	-	168
CATTLE PRODUCTION (9 projects)	1,194	1,785	-	2,979	13	22	-	35
Breeding Centers (3)	937(1)	1,386(2)	-	2,323	4	8	-	12
Demonstration Farms (3)	69(1)	104(2)	-	173	2	3	-	5
Training Centers (3)	188(1)	295(2)	-	483	7	11	-	18
FORESTRY (8 projects)	414(5)	66(3)	-	480	59	12	-	71
FISHING (1 project)	-	510(1)	-	510	-	45	-	45
AGRO-INDUSTRY (4 projects)	10,310(4)	-	-	10,310	308	-	-	308
PRIMARY ROADS (1 project)	-	-	15,100(1)	15,100	-	-	-	-
SECONDARY ROADS (13 projects)	2,006(8)	1,103(4)	40(1)	3,149	-	-	10	10
ENERGY (9 projects)	1,366(5)	784(4)	-	2,150	92	33	-	125
TELECOMMUNICATIONS (1 projects)	-	-	1,972(1)	1,972	-	-	14	14
STORAGE FACILITIES (3 projects)	88(1)	258(1)	795(1)	1,141	16	26	23	65
HOUSING AND URBANIZATION (9 projects)	7,593(4)	2,159(4)	2,148(1)	11,900	-	-	-	-
EDUCATION (4 projects)	260(2)	100(2)	-	360	60	11	-	71

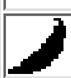
HEALTH (6 projects)	74(2)	66(2)	3,500(2)	3,640	53	46	196	295
TECHNICAL ASSISTANCE (1 project)	-	-	68(1)	68	-	-	48	48
TOTAL	28,863	7,346	23,623	59,832	2,502	498	291	3,291

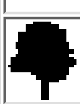
During project identification and selection, the technical unit met frequently with counterpart technical staff in Panamanian agencies. These meetings helped open communication channels that eventually developed into assistance channels, especially at the middle levels of government.

The second round of formal training for counterpart agency staff also tied into project identification and selection, A four-week course on water and land development was organized by CIDIAT (the Inter-American Center for Integrated Development of Land and Water Resources),.and a more general, 13-week course on project formulation and evaluation was presented by CETREDE, In the CETREDE course, participants planned and evaluated several projects proposed for the Darien region - a wholesale market for farm products, a plywood factory, an access road between La Palma and the Pan American Highway, and a centralized maintenance and repair shop for motors. Some of the projects brought to a pre-feasibility level in this training course were later financed.

MAP 8

LIST OF PROPOSED PROJECTS PRODUCTIVE SECTORS

	**Corn**	
	Río Chico	A.1.1
	El Salto	A.1.2
	Río Tupiza	A.1.3
	Río Balsas*	A.1.4
	Santa Fe	A.1.5
	Metetí*	A.1.6
	Setegantí*	A.1.7
	Celorio*	A.1.8
	Sambú	A.1.9
	La Chunga*	A.1.10
	**Plantain**	
	Yaviza	A.2.1
	Río Chico	A.2.2
	Río Balsas*	A.2.3
	Arretí	A.2.4
	Metetí*	A.2.5
	Mogué	A.2.6
	Río Jesús	A.2.7
	**Cattle**	

	Breeding farms	
	Santa Fe	G.1.1
	La Palma	G.1.2
	Sambú	G.1.3
	Demonstration farms	
	Santa Fe	G.2.1
	La Palma	G.2.2
	Sambú	G.2.3
	Training centers	
	Santa Fe	G.3.1
	La Palma	G.3.2
	Sambú	G.3.3
	**Cassava**	
	Yaviza	A.3.1
	Yaviza	A.3.2
	**Yam**	
	Pinogana	A.4.1
	Laja Blanca	A.4.2
	Yaviza	A.4.3
	Santa Fe*	A.4.4
	Metetí*	A.4.5
	Chepigana*	A.4.6
	Setegantí*	A.4.7
	Río Jesús*	A.4.8
	Taimatí*	A.4.9
	**Pixbae, Hierba-Limon. Guandu**	
	Yaviza	A.5.1
	**Fishery**	
	La Palma	P.1
	Agro-industry	
	Yaviza	A-i.1
	Yaviza	A-i.2
	Yaviza	A-i.3
	Santa Fe	A-i.4
	**Forestry**	
	Yaviza	F.1

	El Real	F.2
	Río Chico	F.3
	Camogantí	F.4
	Sambú	F.5
	Taimatí	F.6
	La Punta	F.7
	Yaviza	F.8

INFRASTRUCTURE AND SOCIAL SECTORS

TRANSPORTATION		
	Trunk rood	
	Yaviza	T.1
	Secondary road	
	Metetí	C.1
	Setegantí	C.2
	Taimatí	C.3
	Sambú	C.4
	Garachiné	C.5
	Río Chico	C.6
	Tuira	C.7
	El Real	C.8
	Rio Pirre	C.9
	Laja Blanca	C.10
	Piriaque	C.11
	La Punta	C.12
	Ferry	
ENERGY		
	Power plants	
	Yaviza	E.E.1
	Bajo Iglesias	E.E.2
	Metetí	E.E.3
	El Común	E.E.4
	Laja Blanca	E.E.5
	La Palma	E.E.6
	Sambú	E.E.7
	Garachiné	E.E.8
	Taimatí	E.E.9

	AGRICULTURAL PRODUCT STORAGE	
	Purchasing center and warehouse facilities	
	La Palma, Sambú, El Real, Garachiné, Chepigana. Setegantí, Camogantí, Laja Blanca, Taimatí y Metetí	A.P.1
	Silo	
	Yaviza y Santa Fe	A.P.2
	TOWN DEVELOPMENT	
	Housing	
	La Palma	V.U.1
	Yaviza	V.U.2
	Santa Fe y otras localidades	V.U.3
	Sambú	V.U.4
	El Tigre y El Común	V.U.5
	El Real	V.U.6
	Taimatí y Boca de Trampa	V.U.7
	Bijagual-Vallemón	V.U.8
	Corozal y otras localidades	V.U.9
	TELECOMMUNICATIONS	
	Interurban	T.C.1
	La Palma Yaviza El Real-Pinogana Sambú-Bijagual-Vallemón Santa Fe-Guarachiné	
	Long distance	T.C.1
	Río Iglesias Metetí Laja Blanca La Punta El Común-Corozal	
	EDUCATION	
	Construction of new schools	
	Yaviza, Santa Fe, Metetí, Laja Blanca, El Tigre, El Común, La Punta y otros.	E.D.1
	La Palma, Garachiné y Bijagual-Vallemón	E.D.2
	Reconstruction of existing schools	
	Metetí, Pinogana, El Tigre, El Común, Marragantí, Arretí, La Punta, Santa Fe y Pirre.	E.D.3
	La Palma, La Chunga, Pavarandó, Río Jesús, Venado. Bijagual Vallemón y Setegantí	E.D.4

	HEALTH	
	Health centers	
	El Tigre, Metetí, El Salto, Laja Blanca, Río Iglesias, Villamor, Cucunatí, Puerto Quimba y Bajo Chiquito.	S.1
	Taimatí, Chepigana, Mogocénaga y Quintín	S.2
	Maternal-infant care facilities	
	Santa Fe	S.3
	Sambú y Tucutí	S.4
	Hospitals	
	Yaviza	S.5
	La Palma	S.6
	El Real*	S.7

* Protects to be executed in the medium or long term

AREA OF POTENTIAL USE

Settlement areas

Two different approaches to natural resource management were taken. The first, which was ultimately dropped in favor of the second, was based on a type of ecosystem analysis applicable to both resource evaluation and project formulation. This integrated approach involved classifying the Darien area's ecosystems using the Holdridge Life-Zone method and describing the productive uses, possible products, use restrictions, and seasonal productivity fluctuations of each natural process and component. This approach was proposed in a workshop in Panama City for international and Panamanian specialists, study team members, and DRD representatives. Participants considered the impacts of converting forest land into livestock pastures, allowing more squatter settlements, clearing land near the Gulf of San Miguel, and preserving forest reserve areas. Disease control and some of the cultural practices of the Indian groups were also discussed. After some initial work, however, the national technicians rejected the approach as too theoretical. They decided instead to restrict environmental considerations to estimating potential environmental impacts of some of the more important projects proposed and to suggest ways to ameliorate these impacts. For example, the technical unit later recommended the proscriptive approach of setting up a Land Use Regulation Brigade under the Ministry of Agriculture to control land use along the eight-kilometer strip on both sides of Pan American Highway (per Law N°71) by regulating settlement on the lots and, if necessary, relocating settlers who were using the land inappropriately.

While the Panama-Darien regional studies were being conducted, comparable work was carried out in the Colombian Darien. Both countries wanted to develop the areas that would be opened by the connecting link of the Pan American Highway. But a formal bi-national approach to development of the shared region was not practicable. As an alternative, DRD helped Colombia study its part of the Darien, using the same methodologies and generating comparable data. The technical unit of the Panama-Darien study arranged to have its Colombian counterparts visit the Panamanian study area. A joint telecommunications project was eventually established,

D. Phase II - An Action Program for Short-Term Development

A set-back occurred in early 1978 when external financing agencies cut implementation funds substantially. In response, the executive commission decided to channel all available funding into Yaviza and Sambú - the two settlement areas whose natural resources, population density, economic potential, and political receptivity augured best for success. This decision was made at considerable political cost, but by now the executive commission had become convinced that only with a proper "critical minimum" of investment in a set of complementary projects could an area sustain economic growth.

The technical unit had already identified packages of proposals for self-sustaining projects that would create 3,400 jobs and substantially increase total gross production and income in the Yaviza and Sambú settlement areas. The packages also included proposals for new secondary roads; crop-storage, telecommunications, and electric power facilities; and education, health, and housing improvements.

Funding constraints made additional project adjustments necessary too. Besides the overall funding cut of almost 50 percent, MIPPE announced that the cutbacks would be most severe in the first two years. Thus, the executive commission further narrowed the study project's focus within Yaviza and Sambú and launched an "Immediate Action Program" focussed on projects with the greatest short-term potential to return investments, infrastructure that would be needed by the third year, and plans for obtaining additional funding. In the Immediate Action Program's first phase (years one and two), the Pan American Highway would be completed to Yaviza, and social services and agricultural production would be developed. In the second phase (years three through five), programs to build infrastructure, boost agriculture, and improve social services would continue, and an industrial development program would be initiated. In the five-year plan of activities laid out, investments and other activities were put in sequence and linked to the spatial strategy. (See Table 5.)

When the short-term and immediate action programs were refined, their effects on natural resources were calculated. Then the technical unit proposed adjustments to a number of projects:

- Agricultural projects. To decrease erosion, water-borne sedimentation, and eutrophication in the Gulf of San Miguel, corn should not be grown on specified soils and inter-planting practices should be adopted. Less mechanized crop-production techniques should be employed, wooded areas should be used as dikes and filters for run-off waters, plantain (rather than yucca) should be planted on erodible soils, and natural fertilizers and pesticides should be used.

- Yucca starch processing. Since the processing plant proposed could contribute to eutrophication by discharging organically rich effluent into waterways, these residues should be converted into natural fertilizers. In addition, the sulfurous acid used in starch making should be limited.

- Sawmill operations. Pending further research on the forest's regenerative capacity, logging on highly erodible slopes should be confined to 500-meter contoured bands. Forest concessions should be monitored closely and support for the Ministry of Agriculture's Renewable Natural Resources Unit (RENARE) should be increased.

- Livestock projects. Since land would have to be cleared for pastures, livestock projects should be confined to flat or slightly sloping land and anti-erosion belts should be established along rivers and coasts. Raising livestock in corrals which requires less surface area per animal and thus permits crop rotation should be considered along with grazing in Sambú's forests, which would entail cutting down old trees, pruning branches, and using treated pulp for cattle feed, but not clear-cutting. (This technique is also more labor-intensive than traditional open-field livestock operations).

- Housing projects. Since management of household wastes and sewage effluents posed a serious problem, such "natural process technology" as fertilizing soil with treated wastes and using settlement tanks for water purification and fertilizer production should be studied.

Table 5 - FIVE-YEAR ACTION PLAN

1. Year 1

- Continue work on the Pan-American Highway.
- Implement corn and plantain banana growing projects in Rio Chico, Sambú, Yaviza, and Rio Jesus.
- Implement forestry exploitation projects in Yaviza and Rio Chico areas.
- Implement a project for small-scale fishermen in La Palma and the Gulf of San Miguel.
- Construct secondary roads in the Rio Chico, Taimati, Sambú-Garachine and La Punta areas.
- Build a power project In the El Comun area.
- Build and repair schools In Yaviza, Santa Fe, and other communities.
- Start a technical assistance and credit program for farmers of areas I and II. Carry out program In accordance with existing production programs.
II. Year 2
- Complete the Pan-American Highway up to Yaviza and a 5.5 km stretch running south from there.
- Carry out a corn-growing project in the El Salto area.
- Start a pilot livestock development plan in the Sambú area.
- Carry out new forest development and exploitation projects in the El Real and Sambú areas.
- Build an agro-industrial plant in Yaviza for selecting and packaging plantain bananas and processing of flour from plantain rejects.
- Install a ferry between La Palma and La Punta.
- Develop electric power projects In the Yaviza and Sambú areas.
- Construct storage facilities for farm products in Yaviza and other localities.
- Start an expansion and Improvement project for education centers In the Garachine area.
- Start building a regional hospital in Yaviza.
III. Year 3
- Carry out corn, plantain, and banana growing projects in Rio Tupiza, Santa Fe, and Arreti.
- Carry out projects for introducing modern methods for growing yucca and yams in the Yaviza and Pinogana areas.
- Start model livestock development plan In the Santa Fe and La Palma areas.
- Carry out an agro-industry project for caster oil extraction.
- Construct secondary roads In the Seteganti and Sambú areas.
- Build a power project in the Meteti area.
- Start farm products storage programs in various localities.
- Start a housing and urban development program in the Yaviza, Sambú, El Tigre, Tamiti-Trampa, and Bijagual-Vallemon areas.
- Build and repair schools In La Palma.
IV. Year 4
- Carry out a yam-growing project in Laja Blanca.
- Carry out a pixbae-lemon grass and pigeon pea raising program in the Yaviza area.
- Carry out forestry exploitation projects in Camoganti and La Punta areas, and wood-processing projects In the Yaviza area.

	- Carry out an agro-Industrial project for processing yucca starch in the Yaviza area.
	- Build secondary roads In the Tuira and Piriaque areas.
	- Construct electric power projects in La Palma and Garachine.
	- Start a telecommunications project at the province level.
	- Start a housing and urban development program in the La Palma, Santa Fe and Meteti, and El Real areas, and other new localities.
	- Start a hospital project in the La Palma area.
V. Year 5	
	- Continue programs for growing corn, plantain bananas, yucca, yams, pixbae, lemon grass, pigeon peas, and caster oil plants.
	- Continue various livestock, forestry, and wood-processing programs.
	- Continue agro-industrial development projects and develop a project In Yaviza for canning hearts of palm and pigeon peas, and distilling essential oils.
	- Build secondary roads in the El Real, Rio Pirre, and Laja Blanca areas.
	- Continue developing power and telecommunication programs.
	- Continue various housing and urban development programs.
	- Continue the hospital construction program in the Yaviza and La Palma areas.

E. Final Training Activities

These findings and recommendations were reviewed in a four-week training program co-sponsored by the study team, MIPPE, and the Inter-American Center for Regional Development (CINDER) (with headquarters in Maracaibo, Venezuela). Attended by nearly 30 experts from central planning, execution, and financing agencies, the training session also covered planning concepts and the management of regional plans and projects. Like earlier training activities, this program brought together the technical staff whose assistance and support would be critical during project implementation.

IV. Implementing the recommendations

Programs and project proposals grew out of laborious efforts to reconcile possibilities, expectations, and constraints. From the outset the technical unit took institutional limitations into account, and from 1977 local institution-building was a high priority. Given extreme institutional deficiencies at the provincial level and the centralization of fund allocation, the team proposed setting up a new autonomous and decentralized organization, the "Agency for Development of the Eastern Region."

The new agency's goals would be to define policy, submit plans and programs to higher authorities, establish budgets, coordinate all development programs in Darien, and evaluate periodic progress reports. The Ministers of Agriculture, of Public Works, and of Public Health and Education and of MIPPE would participate in an executive commission that would oversee the agency while an executive committee would propose short-and mid-term activities and supervise their implementation. The regional directors of the same ministries would serve on the executive committee along with the provincial governor, the provincial vice-president of the National Assembly of Representatives, the chief of the military zone, and the MIPPE provincial planner. An executive director designated by the ministers would manage the agency. Capital resources would come from sectoral funds earmarked for the province, funds allocated to the agency itself, and income from services. The Minister of MIPPE would chair the highest commission and the MIPPE planner would chair the executive committee, so the new agency would have access to the national planning and budget offices.

The continuity of the planning process depended upon whether this new agency was set up and whether the Panamanian group trained during the study was kept together. In early 1978, MIPPE's minister decided to keep the technical team intact to follow up the planning project's recommendations and to identify additional sources of financing, but no decision about the new agency was made,

In 1978, the executive commission approved the final report of the technical unit, *Project of Integrated Development of the Eastern Region of Panama-Darien,* which DRD then published. A summary of this longer document was also circulated, and a film on the region and the project was produced. Later, the document's conclusions and recommendations were submitted to the Provincial Council, and the executive commission authorized DRD to publish the study's findings internationally,

V. Epilog: Four years later

In the face of worldwide recession, limits on the availability of external funding, and inflation, the Panamanian Government has decided to contain government spending and to focus on bringing high unemployment rates down. With the signing of the Panama Canal Treaties, it also shifted its attention to incorporating the Canal Zone into the national territory and developing the relatively rich central and western regions. For these reasons, government investment in the Darien province is unlikely to rise above recent levels.

Eastern Panama has now been designated as a potential reserve, and the government's current focus within Darien is to strengthen Yaviza's economy. The MIPPE provincial planning office continues to use the Darien study as a frame of reference, but the targets have not yet been met and only selected elements of the packages have been implemented.

More infrastructure projects than production projects have been launched. In particular, road-building has been extensive. New roads interconnect Sambú, Seteganti, Rio Balsas, Meteti, and Yaviza - five of the eight areas originally recommended for settlement. The La Palma road has been re-routed and extended, the Yaviza road extended, the Sambú road paved, and the El Real and Jaque roads improved. Most important, with Inter-American Development Bank financing, a link from the Pan American Highway to Yaviza will be built - a key recommendation of the study.

Several other projects are also under way. Eight three-year "basics" schools and the region's first vocational and technical institute have been established in the Darien, and the University of Panama has launched extension activities in the area. Through the health-facility construction program of the Integrated Health System, the number of doctors and nurses in Darien rose from 26 in 1977 to 45 in 1980. Programs to control hoof-and-mouth disease and cattle plague continue, and a checkpoint for confiscating animal products exists on the westbound road. Storage and silage facilities have been constructed by the Crops and Livestock Marketing Institute, and radio transmitters and microwave-relay stations have been installed in the townships.

On the other hand, financial constraints have stalled the National Housing Institute's housing program, construction of the Pan American Highway link to Colombia, and the natural resource-management proposals. The Ministry of Agriculture set up a Land-Use Regulation Brigade to control land use along eight-km strips on both sides of the Pan American Highway, but the new office merely grants lots to immigrants since funds are not available for removing illegal settlers. The agency tries to restrict grants to flat lands, but it does not have the capacity to monitor and control the approximately 6,000 new settlers the National Malaria Eradication Service estimates will enter the Darien. The recommendations of the environmental analysis have not been implemented either, most likely because they were add-on environmental impact considerations rather than integral parts of projects being formulated.

Attempts to find outside funding to establish the new provincial development institute have been unsuccessful. The failure of development corporations established in other Panamanian provinces may be one reason.

Indigenous planning capacity has definitely increased as a result of the Panama-Darien study. Before the project's national technical unit dissolved in 1979, it had begun diagnosing the resources of the Bocas del Toro province, thereby applying the expertise and experience acquired in the Darien study.

Whether the study team's remaining recommendations will be adopted, it is still to soon to say.

VI. Lessons learned

The **DESIGN STAGE** of the Darien study illustrated the benefits of:

1. Narrowing the focus of study as rapidly as possible by tentatively identifying the sectors, problems, or geographic areas that merit greatest attention. A rapid preliminary study designed to establish the terms of reference for the major study can effectively achieve this goal.

2. Carefully tailoring the objectives to fit the available time and resources (funds, manpower, access to the area, and institutional capability). In the Darien study, the scope of work was cut down to a reasonable level by:

    a. Limiting the time frame of the development plans;

    b. Limiting the scope of the study by eliminating all issues only marginally connected to the study; and

    c. Targeting specific development zones within the study area.

3. Getting government to specify both the amount of capital that will be available to implement recommendations and the role of the area within national plans. In the Darien study, these obstacles were overcome by:

    a. Asking the government to choose between three alternative investment levels; and

    b. Emphasizing that the Panamanian Government had already made the Darien region a high development priority within Panama's framework for regional development.

4. Defining environmental management explicitly before work on the project begins. Criticism that the ecosystem analysis approach to environmental problems was too theoretical led to "add-on" environmental studies that were the first to suffer under budget cuts, as well as to a proscriptive approach to environmental management that has failed for want of enforcement mechanisms.

The **EXECUTION STAGE** of the study showed the advantages of:

1. Collecting only that information needed to identify development problems and opportunities, to delineate development zones, and to generate project ideas. Despite streamlining, the diagnosis phase of the Darien projects still took too much of the study's total time and resources.

2. Including an "urban" or market/service center plan and an associated transport plan, even in undeveloped regions. Given the high cost of energy, however, such plans in humid tropical areas should consider river as well as road transport.

3. Collecting project ideas from the outset of the study using all possible sources - existing project proposals, plans and project ideas of sectoral ministries, proposals of local citizens and groups, and fieldwork. In the Darien study, the team collected a surplus of ideas, then established a system for

quickly evaluating, comparing, and selecting those that merited formulation at the pre-feasibility level.

4. Balancing production activities, production- support services, and social services so that the services spawn and support the production activities, which in turn generate enough wealth to pay for the services. In an area as undeveloped as the Darien, the need is for balanced "packages of projects" that collectively have a high cost-benefit ratio even though the ratio for some individual projects may be low.

5. Limiting the total cost of the proposed projects to the amount of capital available. When the investment budget for the Darien region had to be cut, the Minister of Planning decided to defer implementation of some entire "project packages" rather than implement one or two small projects in each locality, none of which would have been sufficient to catalyze local development.

6. Reducing environmental management problems by formulating and implementing mutually reinforcing and compatible projects.

a. To prevent the spread of hoof-and-mouth disease from Colombia, the regional plan incorporated Panama's plan to create a broad national park along the border between the two countries to serve as a buffer zone.

b. To minimize damage to soils and vegetation caused by indiscriminate clearing and cultivation of new areas unsuitable for sustained agriculture, projects were formulated to provide agricultural extension, credit, transportation infrastructure, and social services which would help to guarantee the long-term settlement of new colonists in suitable areas.

The **IMPLEMENTATION STAGE** of the study illustrated the importance of:

1. Involving an optimal combination of agencies to make sure the study recommendations get carried out. These include (1) a planning agency with an integrated approach to development and access to the budget process and (2) the sectoral ministries that would implement most of the investment projects.

2. Bringing together those who will be formulating projects with those who will later be responsible for financing and implementing them. Such connections were fostered formally and informally throughout the Darien study, especially through regional development seminars, which had twofold objectives: (1) training, and (2) establishing relationships between those responsible for project formulation and project implementation,

3. Creating an effective team through on-the-job training, supplementary courses and seminars, and the close working relationships required by the integrated approach. This approach worked so well that the Department of Planning kept the Darien planning team intact for almost a year to help implement the projects.

4. Recognizing the drawbacks of proposing a new agency to coordinate the implementation of the action programs. Doing so may have been reasonable in this case, given the weakness of local governments and the inability of the national sectoral agencies to manage multisectoral development. But it was a last-resort measure that did not work.

5. Understanding that only politically acceptable projects will be implemented and that the loss of political favor is an unavoidable hazard of development. The Darien study enjoyed political favor, but then national priority shifted to developing the Canal Zone. The planning study was not a failure because many of the proposals that addressed pressing needs for infrastructure have been

implemented, but the packages of projects will not be implemented in their entirety until political winds change.

6. Sectorally integrating project implementation as well as project formulation. After early budget cutbacks, the size of the territory of each package of projects was reduced. With further cutbacks, however, priority was given to the implementation of transportation infrastructure projects and the idea of "package" implementation began to break down.

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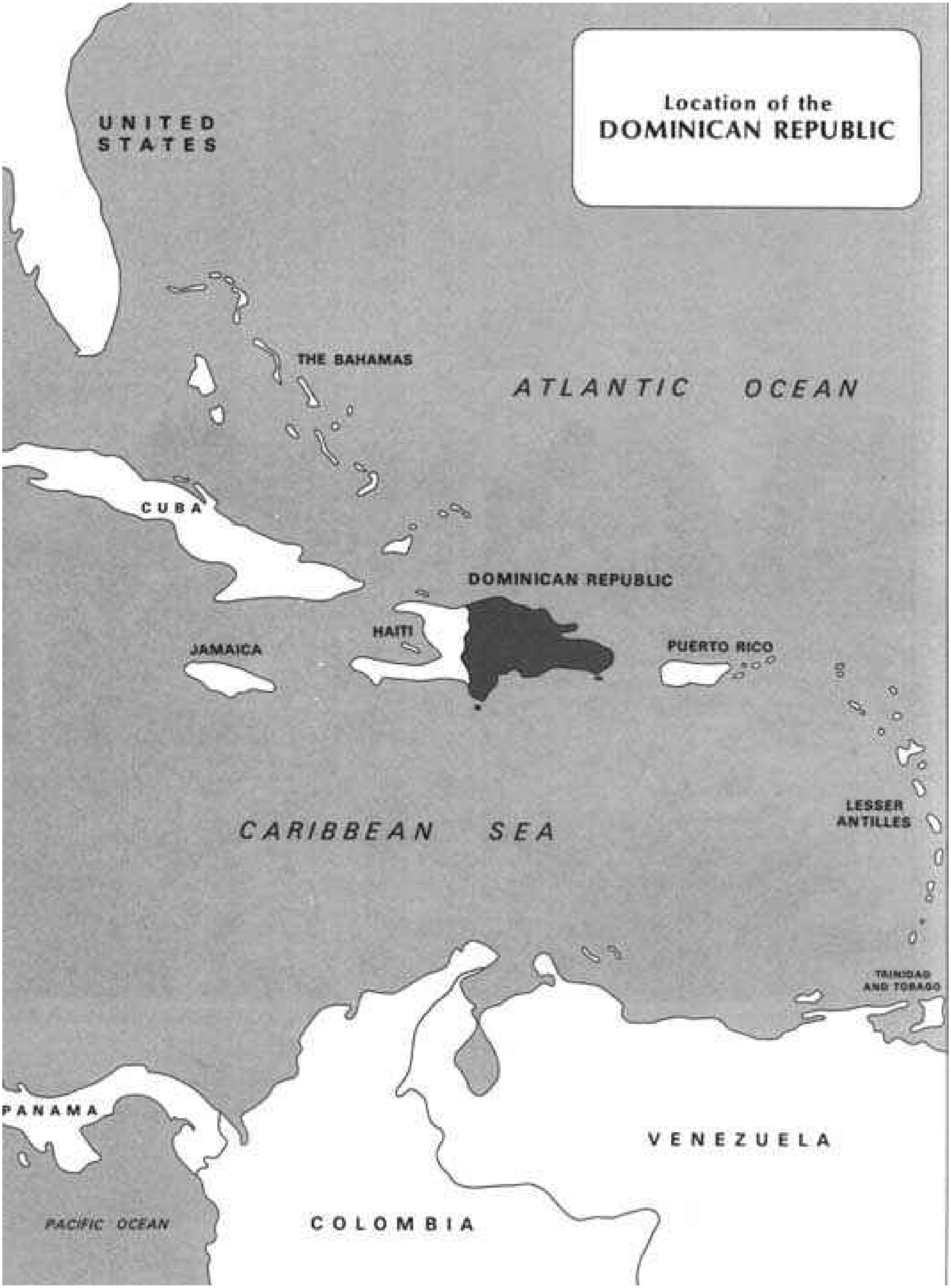
Location of the
DOMINICAN REPUBLIC
UNITED STATES
THE BAHAMAS
ATLANTIC OCEAN
CUBA
DOMINICAN REPUBLIC
HAITI
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LESSER ANTILLES
CARIBBEAN SEA
TRINIDAD AND TOBAGO
PANAMA
VENEZUELA
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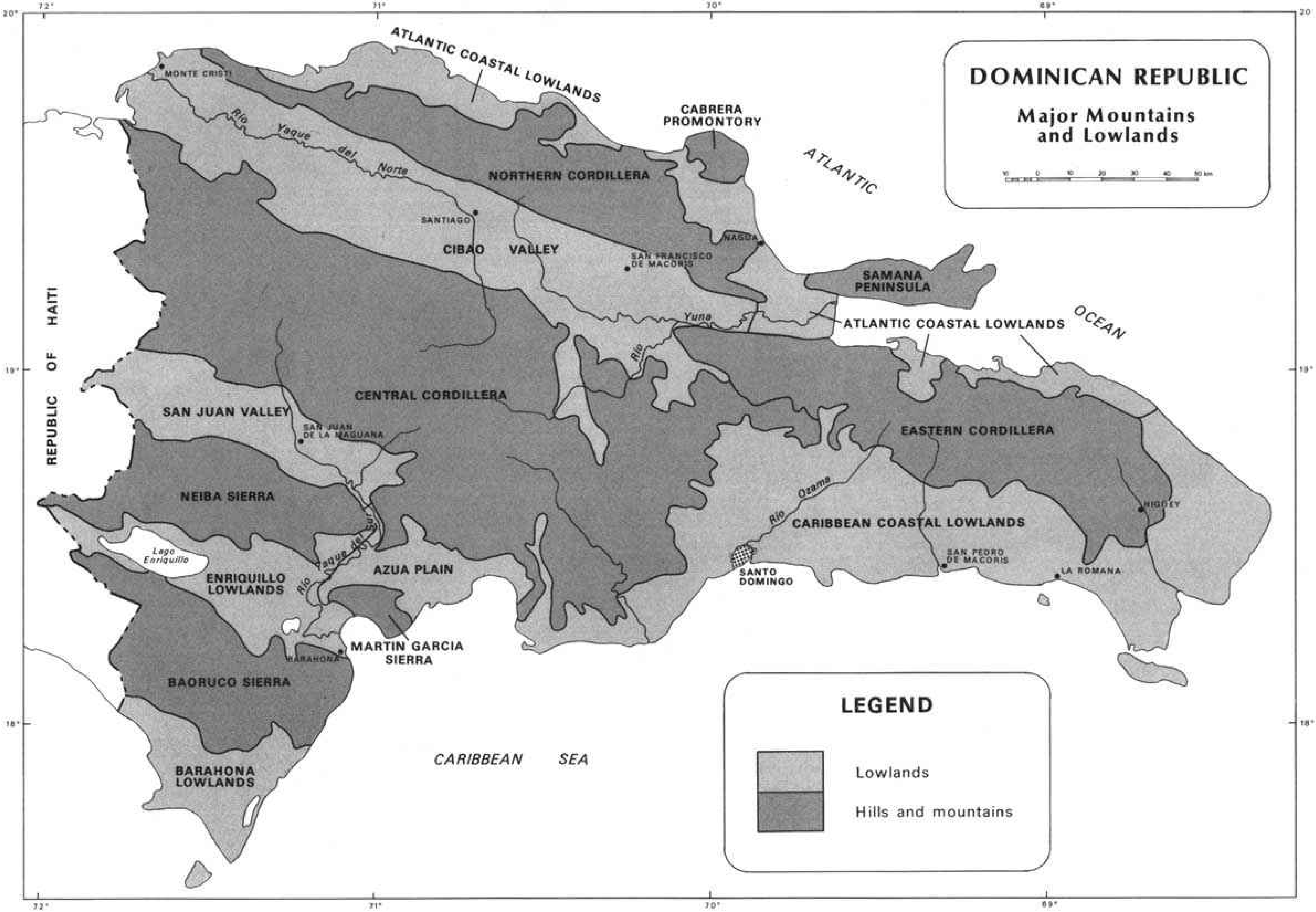
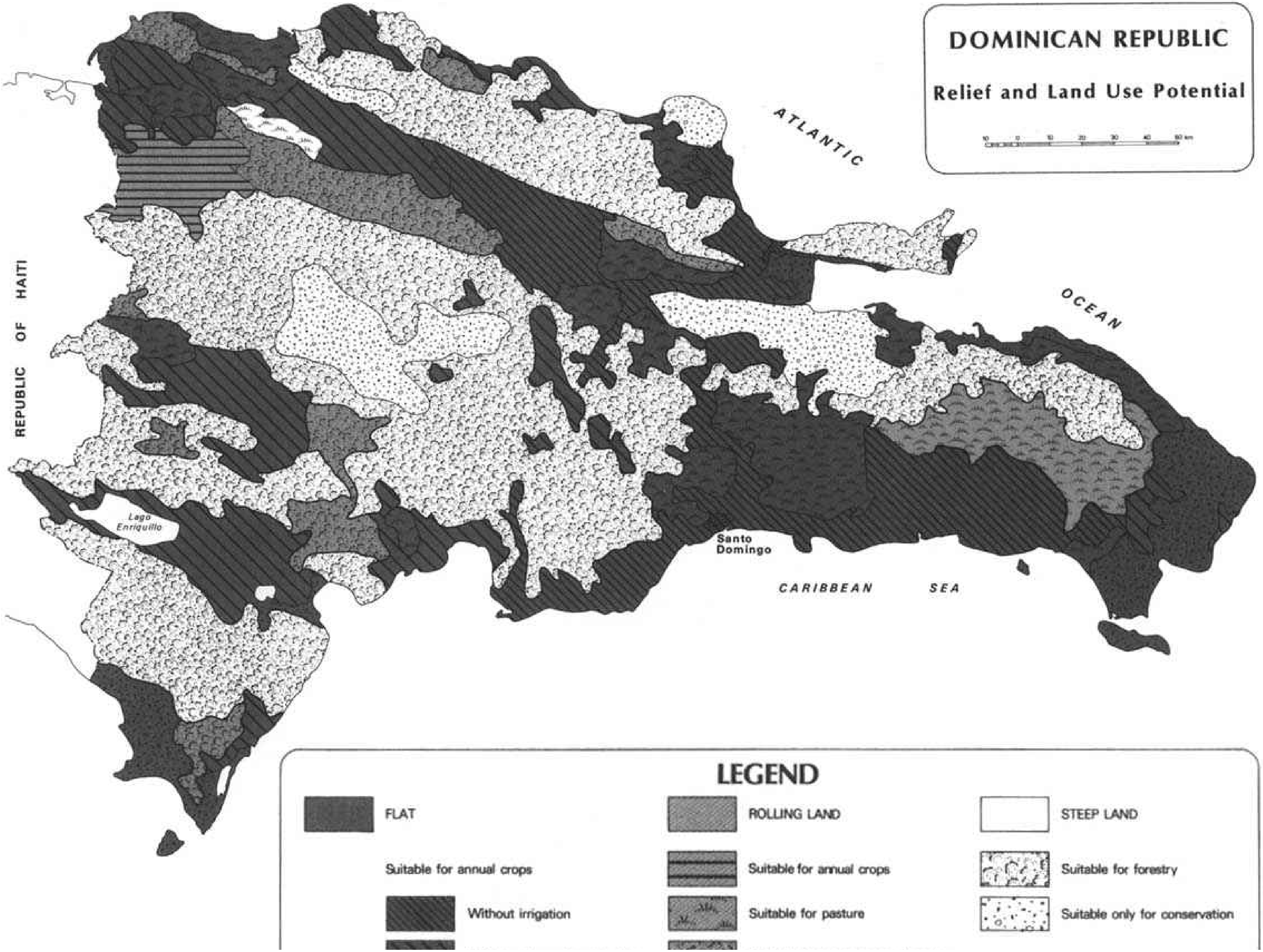
COLOMBIA


DOMINICAN REPUBLIC
Major Mountains and Lowlands
ATLANTIC COASTAL LOWLANDS
MONTE CRISTI
CABRERA PROMONTORY
ATLANTIC
OCEAN
Rio Yaque del Norte
NORTHERN CORDILLERA
SANTIAGO
CIBAO VALLEY
NAGUA
SAN FRANCISCO DE MACORIS
SAMANA PENINSULA
Rio Yuna
ATLANTIC COASTAL LOWLANDS
REPUBLIC OF HAITI
CENTRAL CORDILLERA
SAN JUAN VALLEY
SAN JUAN DE LA MAGUANA
EASTERN CORDILLERA
NEIBA SIERRA
Rio Ozama
HIGUEY
CARIBBEAN COASTAL LOWLANDS
Lago Enriquillo
Rio Yaque del Sur
AZUA PLAIN
ENRIQUILLO LOWLANDS
SANTO DOMINGO
SAN PEDRO DE MACORIS
LA ROMANA
MARTIN GARCIA SIERRA
BARAHONA
BAORUCO SIERRA
CARIBBEAN SEA
BARAHONA LOWLANDS
LEGEND
Lowlands
Hills and mountains


DOMINICAN REPUBLIC
Relief and Land Use Potential
ATLANTIC
OCEAN
CARIBBEAN SEA
REPUBLIC OF HAITI
Lago Enriquillo
Santo Domingo
LEGEND
FLAT
Suitable for annual crops
Without irrigation
ROLLING LAND
Suitable for annual crops
Suitable for pasture
STEEP LAND
Suitable for forestry
Suitable only for conservation

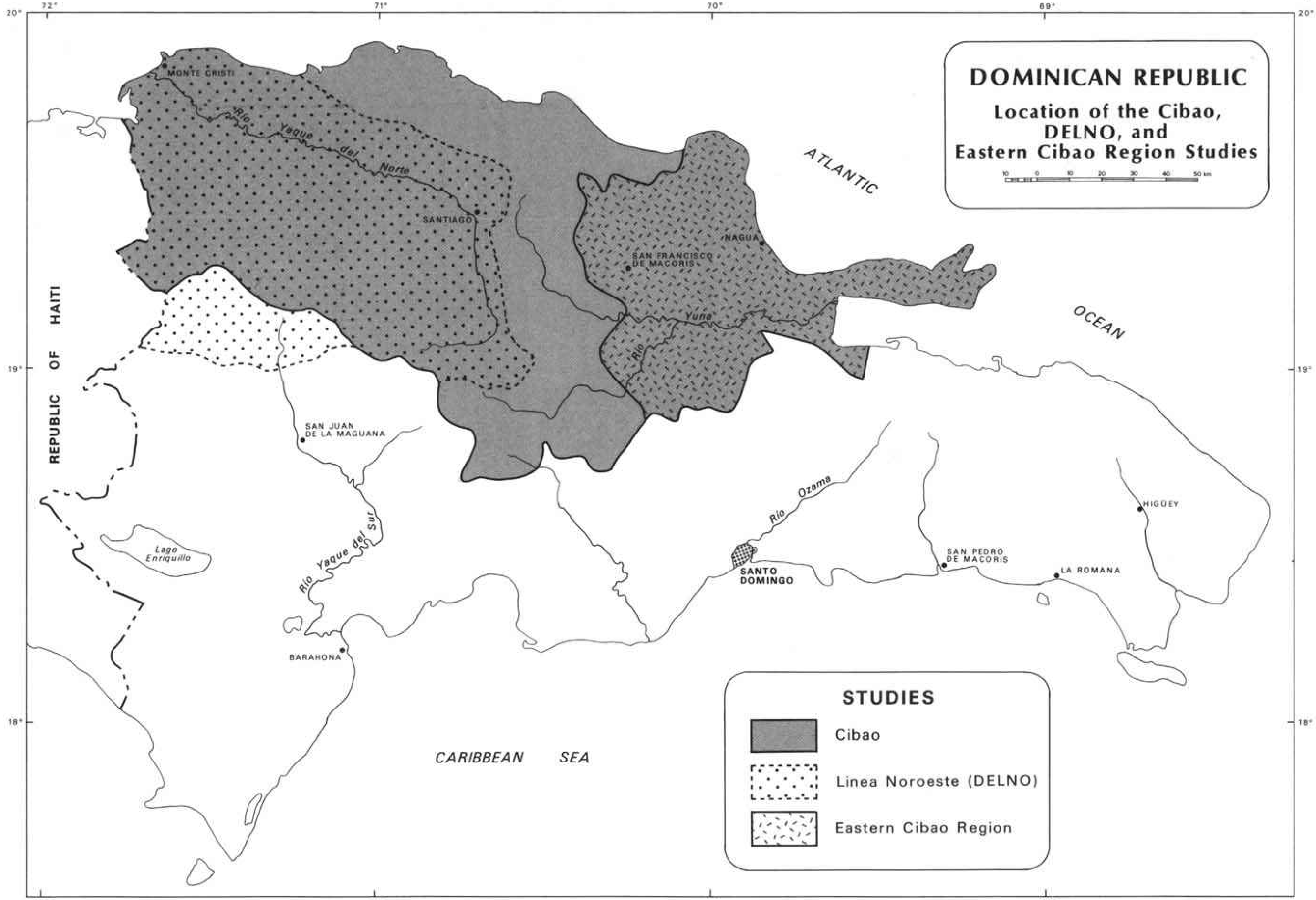
With supplementary irrigation

Suitable for tree crops or forestry

With irrigation

Suitable for pasture

Suitable only for conservation


DOMINICAN REPUBLIC
Location of the Cibao, DELNO, and Eastern Cibao Region Studies
10 0 10 20 30 40 50 km
STUDIES
Cibao
Linea Noroeste (DELNO)
Eastern Cibao Region
ATLANTIC OCEAN
CARIBBEAN SEA
REPUBLIC OF HAITI
MONTE CRISTI
Rio Yaque del Norte
SANTIAGO
NAGUA
SAN FRANCISCO DE MACORIS
Rio Yuna
SAN JUAN DE LA MAGUANA
Rio Yaque del Sur
Lago Enriquillo
BARAHONA
Rio Ozama
SANTO DOMINGO
SAN PEDRO DE MACORIS
LA ROMANA
HIGÜEY
72°
71°
70°
69°
20°
19°
18°

EXECUTIVE COMMISSION

President: Secretary, State Secretariat for Agriculture (SEA)

Executive Secretary: National Project Director (Technical Secretariat of the President—STP)

Members: Director, OAS/Department of Regional Development (OAS/DRD)
National Project Co-Director (STP/National Office of Planning—ONAPLAN)
International Project Director

ADVISORY COMMITTEE

Sectoral ministries at regional level
Development agencies
Regional business interests

PROJECT CO-DIRECTORS

National Director (STP)

National Co-Director (STP/ONAPLAN) (responsible for national technical staff)

International Director (OAS/DRD) (responsible for OAS/DRD technical staff and consultants)

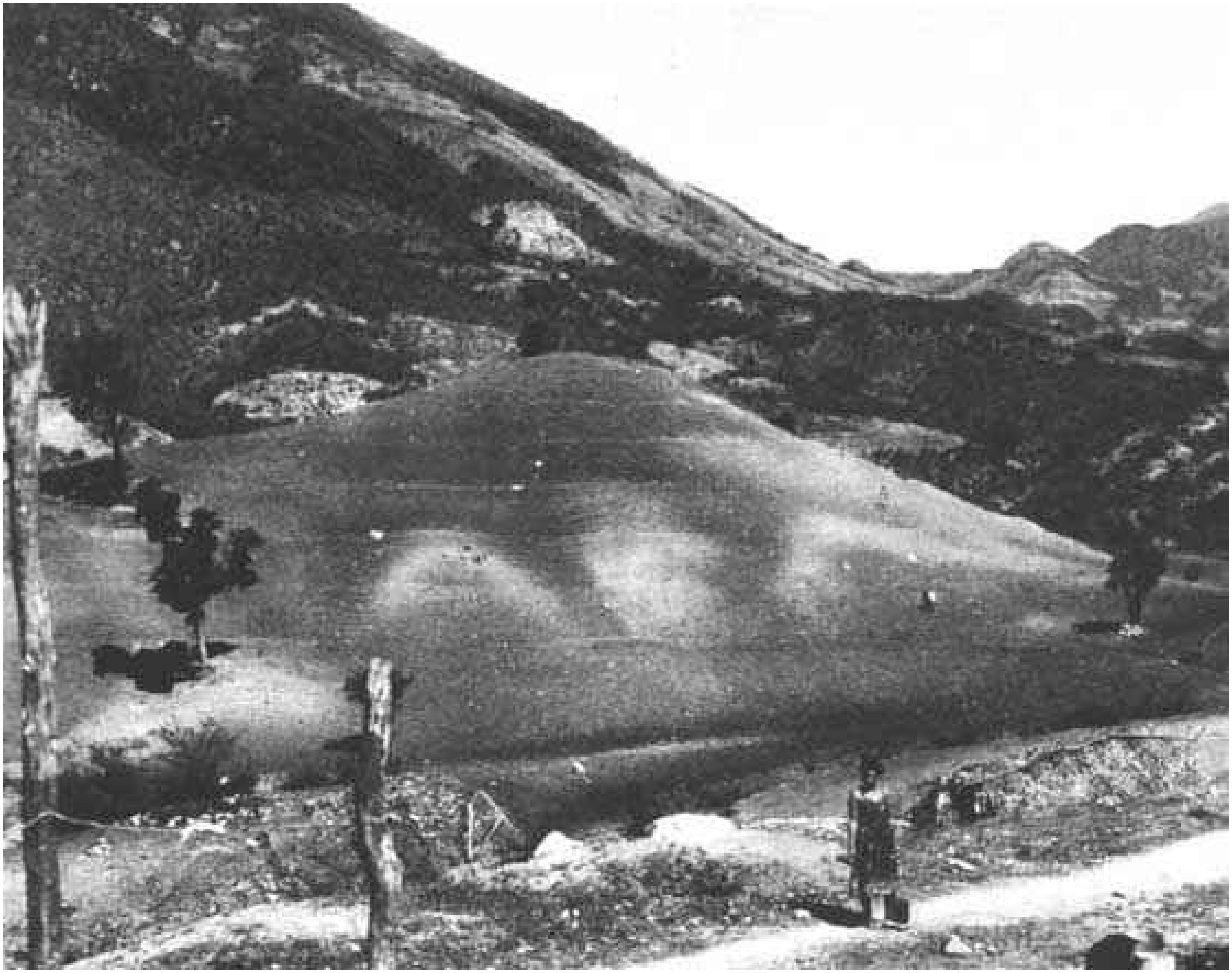
TECHNICAL UNIT

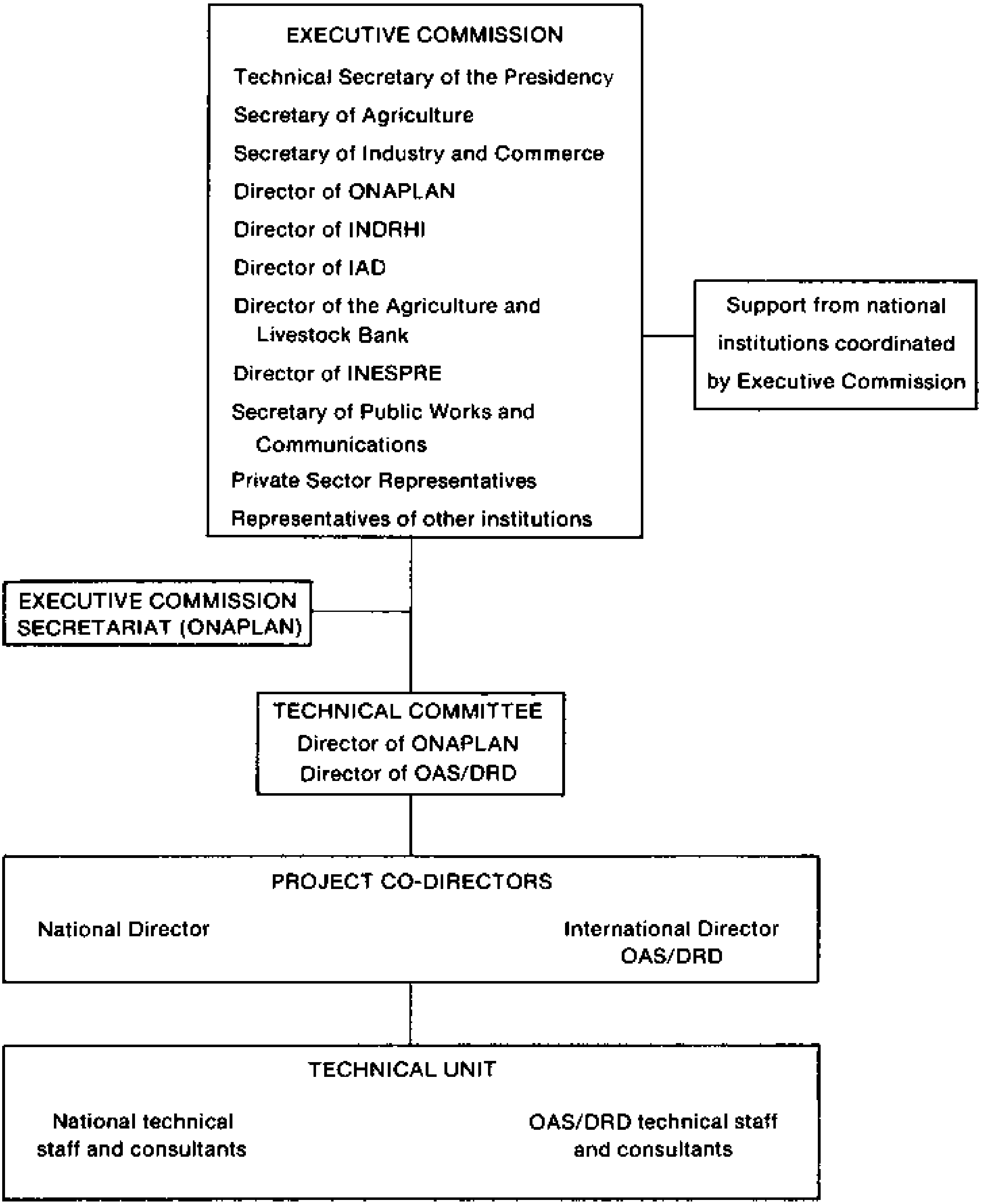
National: Ist Phase—STP/ONAPLAN Technical staff with support from other public agencies

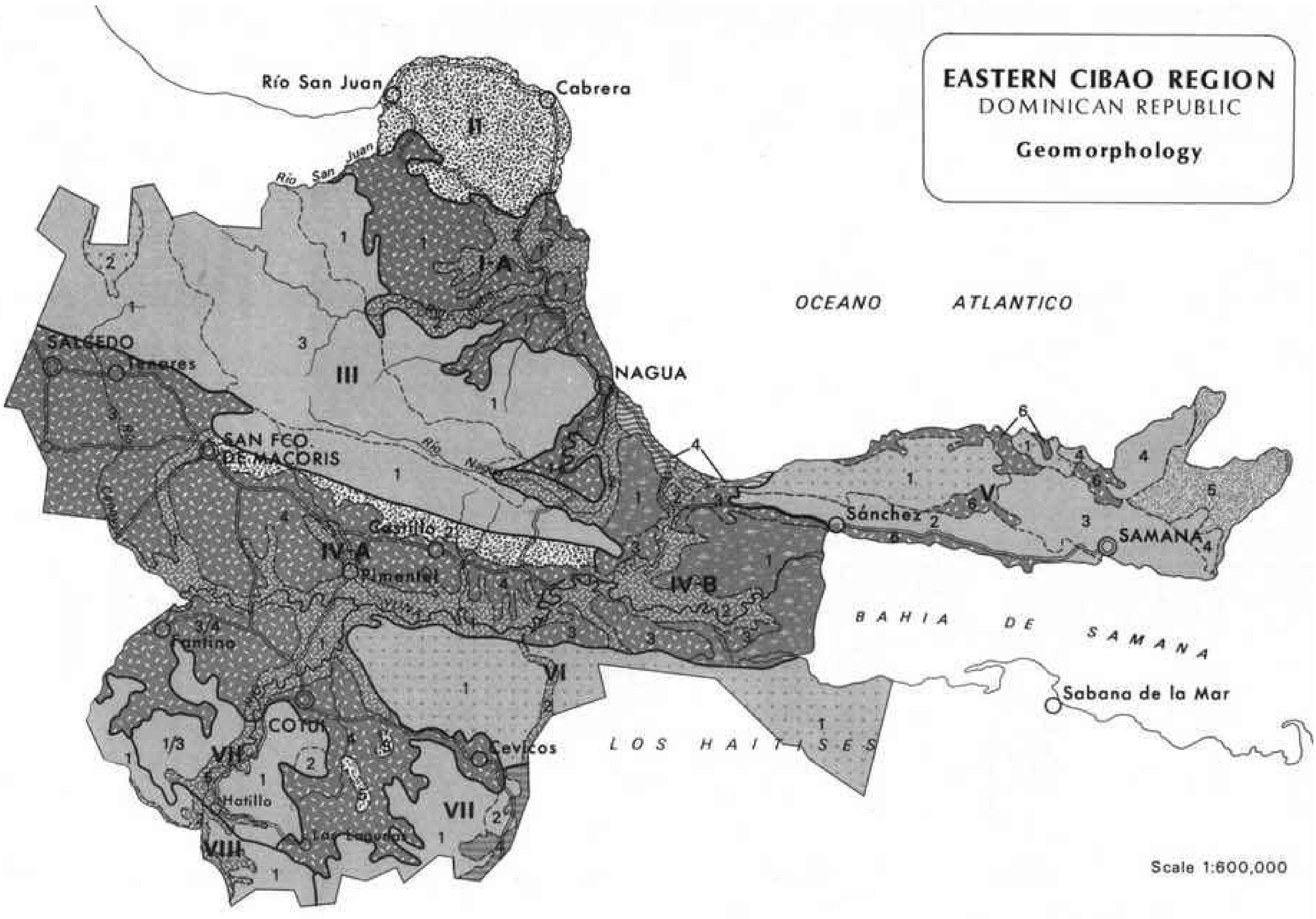
2nd Phase—SEA technical staff with support from other public agencies

International: OAS/DRD Technical staff and consultants

EXPERTS		M/M
1. Project Chief (Engineer / Economist)		38.3
2. Water Resources Specialist	1	12.0
	2	2.3
	3	1.0
	4	5.0
3. Forest Development Specialist	1	9.3
	2	6.3
4. Marketing Specialist		0.9
5. Telecommunications Specialist		4.1
6. Infrastructure Development Specialist	1	2.3
	2	0.8
	3	0.8
7. Public Health Specialist		1.0
8. Agro-Economist		4.0
9. Soil Specialist	1	7.0
	2	2.5
	3	1.3
	4	1.0
10. Cattle Production Specialist	1	5.0
	2	1.3
11. Computer Programming Specialist		1.0
12. Labor and Manpower Specialist		0.8
13. Regional Planner		1.3
14. Agronomist	1	3.0
	2	1.2
15. Irrigated Agriculture Specialist		5.0
16. Geologist		1.8
17. Sedimentologist		1.0
18. Agro-industry Specialist		0.6
19. Education Specialist	1	1.0
	2	1.0
20. Transportation Specialist		4.0
21. Editor		3.7
22. Economist	1	1.3
	2	1.6
TOTAL		134.5




EXECUTIVE COMMISSION
Technical Secretary of the Presidency
Secretary of Agriculture
Secretary of Industry and Commerce
Director of ONAPLAN
Director of INDRHI
Director of IAD
Director of the Agriculture and Livestock Bank
Director of INESPRE
Secretary of Public Works and Communications
Private Sector Representatives
Representatives of other institutions
Support from national institutions coordinated by Executive Commission
EXECUTIVE COMMISSION SECRETARIAT (ONAPLAN)
TECHNICAL COMMITTEE
Director of ONAPLAN
Director of OAS/DRD
PROJECT CO-DIRECTORS
National Director
International Director OAS/DRD
TECHNICAL UNIT
National technical staff and consultants
OAS/DRD technical staff and consultants


EASTERN CIBAO REGION
DOMINICAN REPUBLIC
Geomorphology
Río San Juan
Cabrera
OCEANO ATLANTICO
SALCEDO
Tenares
NAGUA
SAN FCO. DE MACORIS
Castillo
Pimentel
Sánchez
SAMANA
BAHIA DE SAMANA
Fantino
COTUI
Cevicos
LOS HAITISES
Sabana de la Mar
Hatillo
Las Lagunas
Scale 1:600,000

LEGEND

GEOMORPHOLOGICAL REGIONS, SUBREGIONS, AND UNITS

I Atlantic Coastal Plain

I-A Nagua and Rio San Juan
- 1 Non-calcareous marine deposits
- 2 Alluvium

II Promontory of Cabrera

III Northern Range
- 1 High hills of calcareous rocks and schist
- 2 Karst plateau
- 3 Mountains of calcareous, volcanic, and metamorphic rocks

IV Cibao Valley

IV-A Eastern Cibao Plain
- 1 Alluvium
- 2 Piedmont
- 3 Calcareous marine deposits
- 4 Non-calcareous marine deposits
- 5 Low hills

IV-B Yuna Delta
- 1 Marsh
- 2 Alluvium
- 3 Non-calcareous marine deposits
- 4 Beach deposits

V Samaná Península
- 1 Karst plateau
- 2 Hills of calcareous and conglomerate material
- 3 Low hills of schist and marble
- 4 Mountains of marble
- 5 Lowlands of calcareous reef deposits
- 6 Non-calcareous marine deposits

VI Los Haitises
- 1 Karst plateau
- 2 Alluvium

VII Sierra of Yamasa
- 1 High hills of volcanic rock
- 2 High hills of diorite
- 3 Hills of calcareous rock
- 4 Terraces
- 5 Alluvium

VIII Central Range
- 1 Hills of metamorphic rock
- 2 Alluvium

GEOMORPHOLOGICAL BOUNDARIES

II / III — Region boundary and symbols

IV-A / IV-B — Subregion boundary and symbols

3 / 6 — Unit boundary and symbols

LANDFORMS AND RELIEF

ZONES OF HIGH RELIEF

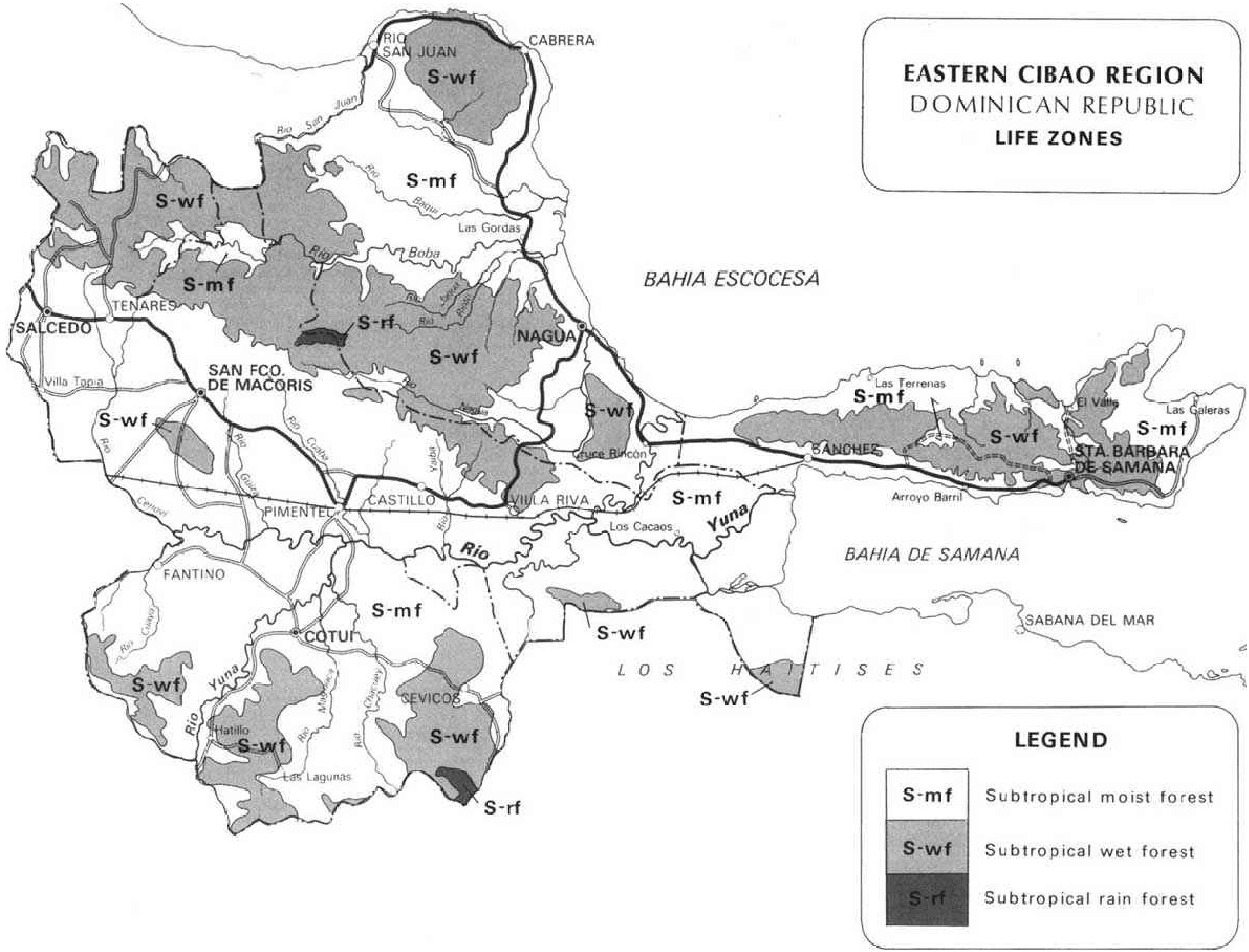
- Mountains and high hills
- Karst topography

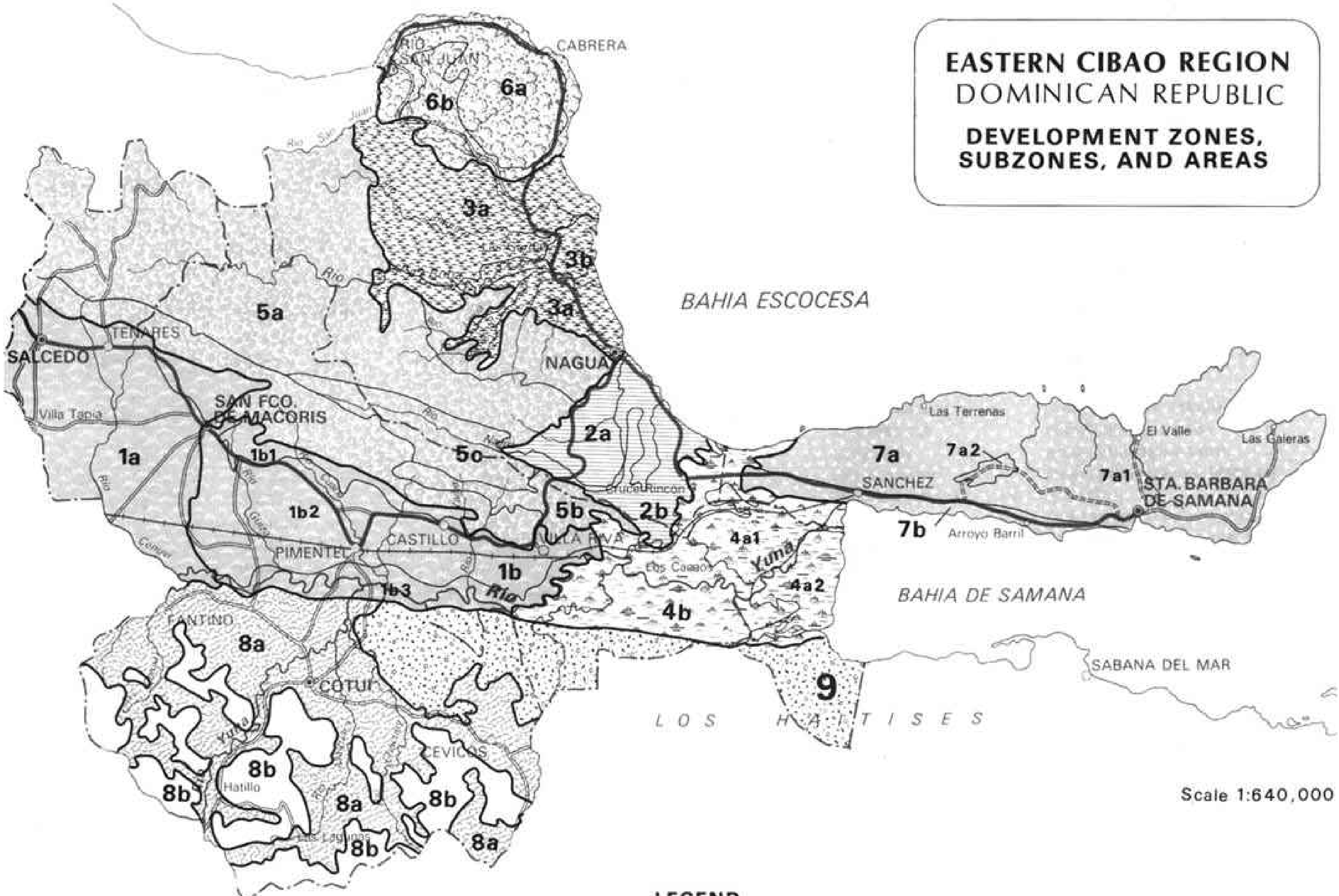
ZONES OF MODERATE RELIEF

- Low hills and plateaus
- Calcareous reef deposits

ZONES OF LOW RELIEF

- Terraces and piedmont
- Marine deposits
- Beach deposits
- Marsh
- Alluvium


EASTERN CIBAO REGION
DOMINICAN REPUBLIC
LIFE ZONES
LEGEND
S-mf Subtropical moist forest
S-wf Subtropical wet forest
S-rf Subtropical rain forest
BAHIA ESCOCESA
BAHIA DE SAMANA
LOS HAITISES
RIO SAN JUAN
CABRERA
Las Gordas
TENARES
SALCEDO
NAGUA
SAN FCO. DE MACORIS
Villa Tapia
CASTILLO
VILLA RIVA
PIMENTEL
Los Cacaos
FANTINO
COTUI
CEVICOS
Hatillo
Las Lagunas
Las Terrenas
El Valle
Las Galeras
SANCHEZ
STA. BARBARA DE SAMANA
Arroyo Barril
SABANA DEL MAR
Rio Yuna
S-wf
S-mf
S-rf

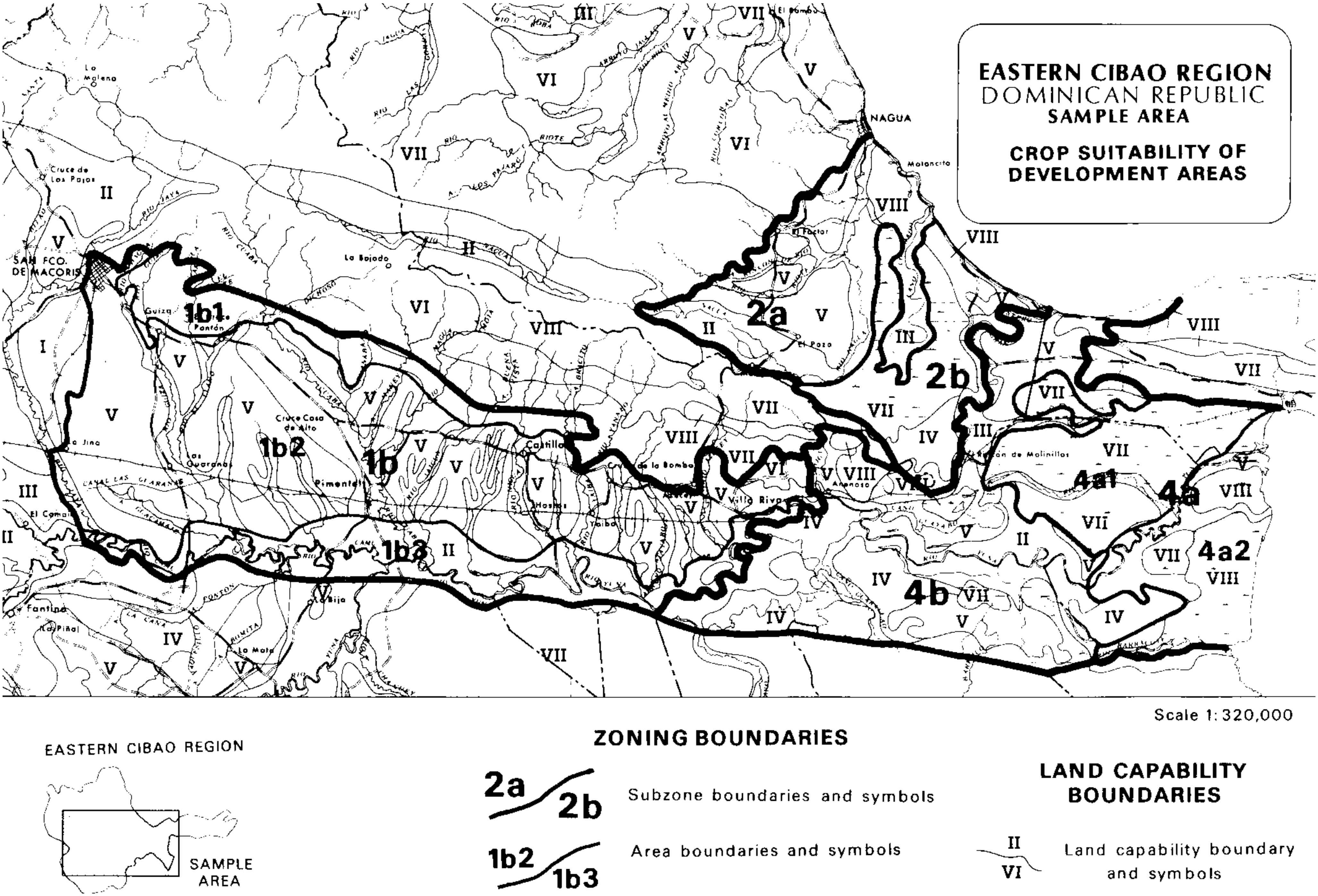


LEGEND

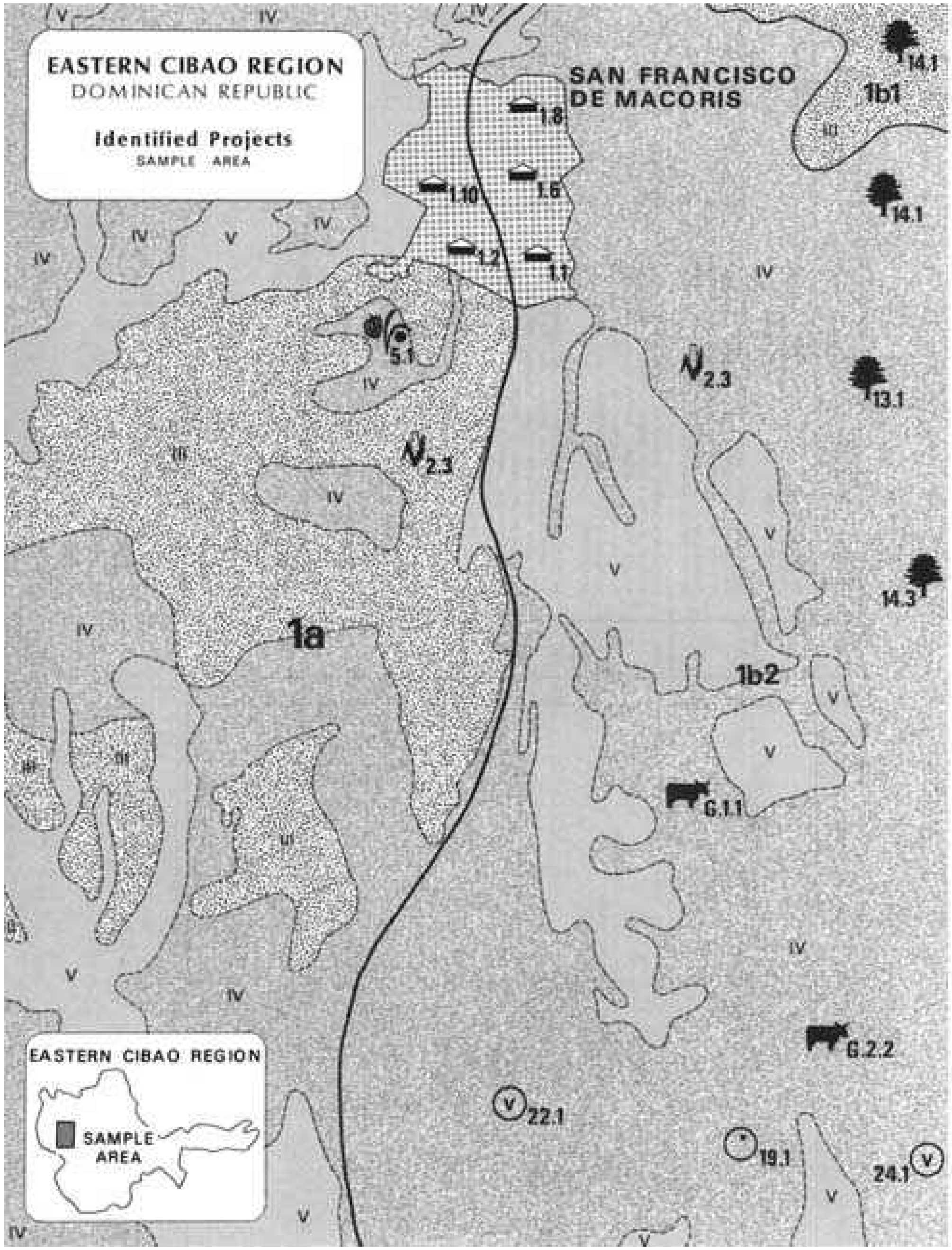
DEVELOPMENT ZONES, SUBZONES, AND AREAS OF THE EASTERN CIBAO REGION

ZONE CLASSIFICATION	MAP SYMBOL	DEVELOPMENT DIVISION			RECOMMENDED USE
		ZONE NAME	SUBZONE	AREA	

	SYMBOL	ZONE NAME	SUBZONE		AREA		
Agriculture, grazing, agroindustry	1	Eastern Cibao Plain	1a	Salcedo			Intensive agriculture with wide range of crops
			1b	San Francisco de Macoris			Agriculture with limited range of crops
					1b1	Piedmont	Permanent crops (especially cacao)
					1b2	Savanna	Pasture (rice in 30% of area)
					1b3	Alluvial	Short cycle crops, rice
	2	Nagua Plain	2a	Western			Annual crops (rice); sugar cane, banana; pasture
			2b	Eastern (marsh)			Conservation
Agriculture, grazing, forestry	3	San Juan-Rio Boba Plain	3a	Savanna			Pasture (rice in 30% of area)
			3b	Rio Boba alluvium			Short cycle crops and rice; pasture
	4	Yuna Delta	4a	Eastern (subject to inundation)	4a1	Peat	Very limited agriculture
					4a2	Mangrove	Conservation
			4b	Western (little inundation)			Bananas, vegetables, rice; pasture
Forestry, agriculture	5	Northern Cordillera	5a	Mountains			Forestry (mahogany, etc. in Subtropical Moist Forest Life Zone; pine, etc. in Subtropical Wet Forest Life Zone); coffee in very limited areas
			5b	Hills			Tree crops (Fruit, coffee, cacao, plantain)
			5c	Very steep, eroded			Conservation
	6	Cabrera Promontory	6a	High elevation			Forestry
			6b	Low elevation			Pasture
Forestry, agriculture fishing, tourism	7	Samaná Peninsula	7a	Mountains	7a1	Steep	Coconuts, forestry
					7a2	Terraces	Rubber
			7b	Southern coast			Annual crops (corn, cassava); banana
Mining, agriculture, grazing	8	Cotui	8a	Plains and hills			Pasture (rice in 30% of area), limited annual crops
			8b	Mountains			Forestry
Conservation	9	Los Haitises					Conservation: National park



EASTERN CIBAO REGION
DOMINICAN REPUBLIC
SAMPLE AREA
CROP SUITABILITY OF DEVELOPMENT AREAS
NAGUA
SAN FCO. DE MACORIS
La Bajada
Castillo
Pimentel
Villa Riva
Arenoso
Hostos
El Pozo
El Factor
Matancita
Cruce de Los Pajas
La Jina
Las Guaranas
Cruce Casa de Alto
Fantino
La Piña
La Mata
La Bija
El Coma
1b1
1b2
1b
1b3
2a
2b
4a1
4a
4a2
4b
Scale 1: 320,000
ZONING BOUNDARIES
2a 2b Subzone boundaries and symbols
1b2 1b3 Area boundaries and symbols
LAND CAPABILITY BOUNDARIES
II VI Land capability boundary and symbols
EASTERN CIBAO REGION
SAMPLE AREA



LEGEND

IDENTIFIED PROJECTS

AGROINDUSTRY

1.1	Cassava starch plant in San Francisco de Macoris
1.2	Vegetable canning plant in San Francisco de Macoris
1.6	Fruit juice plant in San Francisco de Macoris
1.8	Cattle feed plant in San Francisco de Macoris
1.10	Model slaughterhouse in San Francisco de Macoris

CORN

2.3	Cultivation of corn in San Francisco de Macoris area

BEANS

5.1	Cultivation of beans in San Francisco de Macoris area

COFFEE, CACAO

13.1	Cultivation and rehabilitation of coffee plantations in Duarte Province near San Francisco de Macoris
14.1	Rehabilitation of cacao plantations in Duarte Province near San Francisco de Macoris
14.3	Construction of cacao fermentation facilities in Duarte Province near San Francisco de Macoris

CITRUS

19.1	Orange groves in La Gina area

AVOCADO, MANGO

22.1	Avocado plantation in La Gina area
24.1	Mango plantation in La Gina area

LIVESTOCK

G.1.1	Cattle extension center in San Francisco de Macoris area
G.2.2	Demonstration project for cattle production, pasture development, and irrigation in Guiza area

DEVELOPMENT SUBZONES AND AREAS OF THE EASTERN CIBAO REGION

1a	Salcedo Subzone
1b	San Francisco de Macoris Subzone
1b1	Piedmont area
1b2	Savanna area

LAND CLASSIFICATION UNITS

III IV V Land capability classification

Urban area

1978 (O N D) — 1979 (J F M A M J J A S O N D) — 1980 (J F M A M J J A S O N D) — 1981 (J F M)

EXPERTS	M/M
1. Project Chief (Geographer)	29.8
2. Agricultural Economist	23.0
3. Project Specialist	8.8
4. Transportation Specialist 1	15.5
2	1.1
5. Demographer	1.2
6. Water Resources Planner 1	7.3
2	7.9
7. Regional Planner 1	1.8
2	2.5
8. Sociologist	2.8
9. Agronomist (Soils) 1	6.7
2	2.4
10. Ecologist	1.0
11. Hydrologist	4.3
12. Cartographer	5.4
13. Regional Economist 1	0.5
2	2.3
14. Editor	4.8
15. Tourism Specialist	1.6
16. Agro-industry Specialist	2.0
17. Forest Engineer	1.1
18. Agricultural Project Specialist	1.0
TOTAL	134.8

Case study 3 - The Pilcomayo river basin study: Argentina, Bolivia, Paraguay

PROBLEM SUMMARY

Developing a Multinational River Basin Plan for the Multipurpose Use of the Pilcomayo (Argentina, Bolivia, Paraguay)

The Pilcomayo River Basin study (1975-77) was undertaken to find ways to regulate and develop the Pilcomayo River and its 272,000 km^2 trinational basin. DRD helped Argentina's National Institute for Water Science and Technology-INCyTH, Paraguay's Undersecretary of the Foreign Ministry for Economic Affairs, and Bolivia's Ministry of Transportation, Communication, and Civil Aeronautics develop proposals for US$1.07 billion in hydroelectric generation investments. Besides eight dams, the study team also proposed irrigation projects, agricultural development schemes, and cattle-development programs. A follow-up study (1979-80) of a smaller tripartite area within the basin, which was requested by the three governments, proposed an additional US$380 million in investments,

Negotiations over these development proposals proceeded within a three-tier management structure devised to allow the three countries maximum latitude in decisions affecting within-country projects and to nurture political understanding through technical discussions.

ARGENTINA, BOLIVIA, PARAGUAY - PILCOMAYO RIVER BASIN STUDY **- Fact Sheet**

Project area:			272,000 km^2
Population:			1,313,000 (early 1970s)
Physical characteristics:			
	- Land form-vegetation units:		
		Andean steppes	
		Pastures in temperate valleys	
		Mountain rain forests	

		Forests in transition
		Dry Chaco forests
		Moist Chaco savannas
	- Elevation range: 52 to 5,000 m	
	- Land capability classification;	
		Arable soils: 29%
		Non-arable soils: 71%
Duration of Project:		
	Preliminary Mission: 5/1973	
	Preparatory Mission: 1974	
	Fieldwork: 2/1975-10/1977 (Phases I and II)	
	1/1979-12/1980 (Follow-up Tripartite study)	
	Publication of Reports: 1977 and 1980	
Technical contributions:		

DRD disciplines (33)	Number of DRD Experts		
	Phases I & II (43)	Tripartite (23)	Total (66)
Agricultural Planner Project Chief Phases I and II	1	-	1
Ag. Economist	2	3	5
Ag: Engineer (cattle production)	-	1	1
Agro-industry Specialist	1	2	3
Agro-meteorologist	1	-	1
Agronomist	1	-	1
Basic Infrastructure Specialist	-	1	1
Cartographer	2	-	2
Cattle Production Specialist	2	1	3
Computer Programmer	1	-	1
Dryland Agriculture Specialist	-	1	1
Ecologist (vegetation)	1	-	1
Economist (including industry specialist)	1	1	2
Edaphologist	3	2	5
Environmental Management Specialist	1	1	2
Fluviomorphologist	2	-	2
Forest Production Specialist	2	1	3
Geologist	1	-	1

Ground Water Geologist	2	1	3
Hydroelectric Project Planner	1	-	1
Hydrologist	1	-	1
Irrigation Specialist	1	1	2
Pastures Specialist	1	-	1
Project Formulation Specialist	-	2	2
Regional Economist	3	-	3
Regional Planner	1	1	2
Sanitary Engineer	2	-	2
Sedimentologist	2	1	3
Sociologist	2	-	2
Soil Conservationist	1	-	1
Transportation Planner	2	1	3
Water Resources Economist	1	-	1
Water Resources Engineer (including Project Chief Tripartite Study)	1	2	3
Total professional person-months:			
	Phases I & II	**Tripartite**	**Total**
DRD:	257	99	257
National Counterpart:	N/A	100	100 (partial)
Financial contribution:			
	Phases I & II US$	**Tripartite** US$	**Total** US$
DRD	275,000	307,200	582,200
UNDP	750,300	-	750,300
National Counterparts:			
Government of Argentina	752,100		752,100
Government of Bolivia	588,400		588,400
Government of Paraguay	622,900		622,900
Combined contribution executed individually		300,000	
Combined contribution executed through OAS/DRD		147,200	

Total investment in projects proposed:

Phases I & II US$	Tripartite US$	Total US$
1,072,000,000	348,208,250	1,420,208,250

MAP 1

I. Introduction

The study of the integrated development of any multinational river basin poses technical and political challenges. But while most of the numerous studies of shared rivers are limited to elements such as navigation, hydroelectric production, health factors, or pollution, the Pilcomayo study's broader focus covered the integral regulation of the Pilcomayo River and the socio-economic development of the basin. The emphasis was on the rational, multipurpose use of water and other resources, but the study also identified constraints to development, ways to mobilize human resources and capital, and investment projects that all three participating countries would find politically acceptable.

Political, economic, physical, and institutional factors all had to be considered in the design of such a far-reaching study. Moreover, the project was initiated in a sensitive period: the legacy of the Chaco War still lingered and such projects as the bi-national Itaipu hydropower project launched by Brazil and Paraguay on the Parana River were newly under way.

Methodologically, several accomplishments deserve mention:

- Building trilateral institutional support for a multi-sectoral and multinational project;

- Creating an international technical team to investigate and carry out studies on a large river basin where climate, water resources, geological formations, and topographical conditions vary widely;

- Focussing the study of the basin on small, promising areas;

- Creating a forum in which the countries have both technical and political representation and using this forum to discuss technical problems, as well as to establish the necessary bases for treating political problems;

- Establishing regional accounts in substantial areas in each country that do not correspond to existing administrative units (See Glossary.);

- Preparing packages of complementary projects for an empty area;

- Integrating specific development planning activities for each country's territory without losing the regional perspective; and

- Developing close ties with the international lenders likely to implement the project proposals.

The Pilcomayo is one of the most complex sub-basins of the Plata River system. It covers 272,000 km^2 (107,000 sq. mi.), about 8.4 percent of the Plata River basin. It is bound on the west by the Bolivian Andes, on the south by the Bermejo River basin, on the north by the Amazon River basin and portions of the Paraguayan Chaco, and on the east by the Paraguay River basin. (See Map 1.)

The area is shared by Argentina, Bolivia, and Paraguay in the following proportions:

Country	Area km^2	Percent of Whole
Argentina	79,000	29

Bolivia	98,000	36
Paraguay	95,000	35
	272,000	100

The two major divisions are the upper basin, which lies almost completely in Bolivian territory and ranges from 5,700 to 400 meters above sea level, and the Chaco region, an extensive plain that slopes smoothly toward the Paraguay River. For the last 40 kilometers in the upper basin, the Pilcomayo River serves as the boundary between Argentina and Bolivia. Then, from Hito Esmeralda, where the boundaries of the three riparian countries intersect, the river forms the border between Argentina and Paraguay. The river channel is well defined for 180 km below the trinational intersection. But the combination of heavy sedimentation and a very low gradient cause it to overflow its channel, forming several temporary bodies of water that are drained by evaporation, infiltration, and several small rivers. About 200 km downstream, the Lower Pilcomayo River originates. Fed by local rainfall and groundwater, it has no hydrological relation to the Upper Pilcomayo. Finally, the Lower Pilcomayo drains into the Paraguay River about 10 km downstream of Asuncion, Paraguay.

The estimated 98 million tons of sediment that the Upper Pilcomayo annually deposits in the Chaco Plain comes from geologic and man-caused erosion in the upper basin. Each year, the point at which the river overflows its banks moves further upstream. Between 1968 and 1976, that point receded more than 100 km (62.5 mi) upriver.

Rainfall in the upper basin varies from 200 mm in the west to 850 mm near Villamontes. Rainfall is lowest in the western part of the lower basin, averaging 400 mm at the border between Bolivia and Paraguay and increasing to 1,300 mm around the Paraguay River. On the relatively impermeable soils of the lower basin, numerous temporary marshes form during heavy rains. This makes agriculture difficult, but cattle-raising can be profitable on these natural pastures.

Owing to the variability of the river regime and heavy sedimentation, most uses of the river would require the construction of dams to regulate the river discharge and sedimentation. Thus, the impact of these structural modifications on floodplains, the river's retrogression, the erosion of the river bed below the dam, aquatic and forest life, and other environmental components and processes must be thoroughly understood.

The basin's total population is 1.3 million, some 951,000 of whom are concentrated in the Bolivian part of the upper basin. The average of 7.4 inhabitants per square kilometer in this area is misleading, however, since everyone lives in the steep and narrow agricultural valleys and in two important cities (Sucre and Potosi) in the northeastern basin. Outside these population centers, vast areas are empty. In the lower basin, the density diminishes to a low of 2,8 inhabitants per square kilometer in Argentina and 0.5 inhabitants per square kilometer in Paraguay.

The Trans Chaco Highway bordering the semi-arid middle portion of the Pilcomayo River basin in Paraguay.

Cattle grazing around a groundwater-fed watering hole in the Lower Pilcomayo basin.

Agriculture, cattle production, and population centers have considerable potential for expansion despite these caveats. All three countries have millions of hectares of agricultural and grazing land with high production potential, and utilizing river water for irrigation could invigorate the economies of the region and the three nations. Yet, **MULTINATIONAL BASIN-DEVELOPMENT STRATEGIES WILL BE ADOPTED ONLY IF ALL THREE COUNTRIES CLEARLY UNDERSTAND WHAT EACH STANDS TO GAIN AND LOSE IN RELATION TO THE OTHERS BY SHARING WATER RESOURCES.** In practical terms, this means initiating an international dialog on development while accommodating strictly national uses of basin resources other than the Pilcomayo's water. For this reason, the historical and political context of the Pilcomayo basin project is of utmost importance.

The riparian countries' interest in developing the Pilcomayo basin dates back to the seventh Inter-American Conference held in Montevideo, Uruguay, in 1933. This initiative failed amid the regional political tension resulting from the Chaco War between Bolivia and Paraguay. In 1941, Argentina, Paraguay, and Bolivia agreed to create an International Tripartite Commission to deal with the Pilcomayo River basin development, But not until the mid-1960s did the conditions in the region augur well for joint cooperative efforts. In February of 1967, the Ministers of Foreign Affairs of Argentina, Bolivia, Brazil, Paraguay, and Uruguay agreed to study the Plata River basin with a view to executing multinational, bilateral, and national projects in the region. The Ministers also established the Intergovernmental/Coordinating Committee (CIC) to oversee the joint activities of the basin countries and agreed to coordinate requests to international organizations for technical and financial support,

In the late 1960s, what is now the OAS Department of Regional Development (DRD) produced several hydro-logical and climatological studies of the Plata basin at the CIC's request. It also surveyed and analyzed the basin's natural resources and infrastructure. Between 1969 and 1971, DRD identified areas within the basin where development lagged far below the potential, Among the 13 areas recommended for more detailed studies were three river basins of the Plata System: the Bermejo, the Upper Paraguay, and the Pilcomayo.

In July of 1972, Argentina, Bolivia, and Paraguay agreed to undertake a joint study of the Pilcomayo basin and requested international technical and financial assistance to:

1. Investigate the Pilcomayo River basin's water and other natural resources;

2. Obtain a broad knowledge of the basin's physical, social, and economic characteristics to determine the optimal water use;

3. Determine which water projects would be necessary to assure the continuity of the Pilcomayo River up to the point where it merges with the Paraguay River;

4. Determine the navigational potential of the Pilcomayo River and find ways to improve navigation on the Paraguay River through flow regulation, sediment control, and forecasting of river flow;

5. Obtain information on the suitability of the basin's groundwater for town water supplies and small-scale irrigation;

6. Evaluate aquatic resources and wildlife so that measures to protect, preserve, and develop the resources could be designed;

7. Formulate criteria and measures for rational resource management and pollution control;

8. Improve the economic, social, and cultural conditions in the basin;

9. Formulate and recommend preliminary projects for the use of the basin's water resources in combination with other human and natural resources; and prepare short-, medium-, and long-term programs to regulate the river's flow and reduce soil erosion and sediment, supply drinking water to towns and livestock settlements, establish drainage and irrigation systems, and produce hydropower energy; and

10. Train personnel of the three basin countries to execute the project's recommendations and to carry out other similar projects in the Plata basin.

In December of 1972, the three Ministers of Foreign Affairs reaffirmed the importance of the Pilcomayo basin study, and the Intergovernmental Coordinating Committee asked the United Nations Development Programme (UNDP) to initiate field activities. These project activities started on February 1, 1975. The UNDP designated the Inter-American Development Bank (IDB) as the executing agency, and the Bank contracted the OAS/DRD to implement the work. Study headquarters was established in Asuncion, Paraguay, and regional offices were set up in Formosa, Argentina, and Tarija, Bolivia.

II. Designing the study

A. The Preliminary Mission

During 1973, a preliminary mission composed of technicians from DRD, the IDB, and the UNDP visited the three project countries to define the study's objectives and operating structure. Reviewing available data to confirm the technical feasibility of the study and identify data gaps, it decided that the study should focus on water and soil resources related to flood control and irrigation, agriculture, livestock development, and transportation infrastructure.

National counterpart agencies were appointed by each government. Argentina named the National Institute for Water Science and Technology (INCyTH), Bolivia chose the Ministry of Transportation, and Paraguay designated the Subsecretariat for Economic Affairs of the Ministry of Foreign Affairs.

An important factor examined by the preliminary mission and the countries was the institutional structure needed to manage the study. A multinational development effort has little chance of success unless an "equivalence of interests" among the countries involved can be obtained. To obtain such equivalence, each country should clearly define its national interests at the project's outset and decide what financial, political, or economic price it is ready to pay to implement the joint project. However, in this case, the information available on the basin's physical, and socio-economic resources was scarce, so the project participants had no way of knowing if an equivalence of interests could be reached.

In 1974, creating a tripartite development commission for the Pilcomayo study would have been premature. What was needed instead was informal technical and political dialog among the countries and with international lenders. Only when the countries better understood the basin's potential and their own options could they envision common development possibilities and develop the institutional capabilities needed to carry out the project proposals.

B. The Organizational Structure

The organizational structure ultimately adopted for the study reflected these interrelated political and technical concerns. (See Figure 1.) Each country was to create a national commission to provide the technical, financial, and administrative support needed to implement the study. Each national commission would work with international experts provided by the DRD under the direction of its international director, forming a technical unit in each country. A coordinating commission composed of representatives of each of the three governments and each of the three international agencies would oversee and periodically revise the study's activities. A novel feature of the organizational structure was the executive committee, composed of the national technical directors, the DRD technical director, and the IDB project coordinator. Charged with the technical management of the study, the group frequently recommended to the coordinating commission solutions to problems which were there by defused before becoming politicized.

This project structure afforded several advantages. First, key decisions were left up to the countries. Each country selected its own national technical director and its representatives on the coordinating commission. Through the national commissions, each country took responsibility for project continuity at the national level and for accommodating provincial authorities' participation. In addition, including international agencies in the coordinating commission and requiring unanimous approval before a recommendation could be implemented fostered mutual cooperation and a broad planning perspective.

C. Special Design Problems

Other technical factors were also considered in the study design phase. Since the Pilcomayo extends over such a vast area, the time and funds spent on information gathering, analysis, and planning had to be carefully minded, and conducting detailed studies for the entire basin was out of the question. Yet, since the use of the river waters in the upper basin in Bolivia would affect the two downstream countries, their rights and goals had to be formally recognized. Furthermore, the three countries were to remain free to pursue in-country development that had no impact on the river waters. Existing agreements governing the use of water in the Pilcomayo and Plata River basins also had to be taken into account: accords existed between Argentina and Bolivia (1971) and between Argentina and Paraguay (1958, 1967, and 1971), but not between Bolivia and Paraguay.

Given these factors, the study's focus was narrowed to development actions affecting the direct use of water from the river. The study team also recognized that resolving water-rights issues was a delicate political task that could not be rushed. Each country's political and economic interests had to be integrated thoroughly enough to permit technical, administrative, and financial cooperation. Lines of authority and responsibility had to be clearly drawn, and technical tasks and their political context clearly defined.

Once the basic institutional arrangement was accepted, two major determinants for study execution were identified:

- The priority geographical and technical areas would have to be selected carefully to maximize project impact since major water development projects would eventually compete for scarce financial and human resources at the national level.

- Formal agreements would be necessary at each step, given geopolitical factors and the considerable investment and maintenance costs all three countries would have to assume.

The study was then divided into two parts. In Phase I, natural resources, socio-economic conditions, the production system, and the infrastructure would be evaluated, and development options would be presented to the national authorities. In Phase II, which would begin after the countries had decided which economic sectors to stress and the degree of development to be expected, the development proposals would be revised and the countries would select the project alternatives most compatible with regional and national objectives. (Figure 2, Methodological Organization, shows graphically the main elements of the study and their relationships to each other.)

Figure 1 - ORGANIZATIONAL STRUCTURE

III. Executing the study

A. Phase I

The Pilcomayo basin study illustrates the necessity and process of narrowing down a study's focus from a large area to smaller areas that have the potential to become centers of development. To select these smaller promising areas, the study team had to gather two different kinds of information - data on the natural resource endowment and its geographic distribution and data on the area's population, social and economic history, and physical and institutional infrastructure. It also had to study the plans national governments had for their respective portions of the basin. Accordingly, the team was divided into the natural resources unit and the socio-economic unit, each with a separate director accountable to the international director.

Figure 2 - METHODOLOGICAL ORGANIZATION

The natural resources unit's investigations covered climatology, surface hydrology, hydrogeology, sedimentology, fluviomorphology, soils, vegetation, and ecology. Two basic methodologies of particular note were the use of remote sensing in data-gathering and the integration of data collected by different countries using different mapping units and different scales.

The large size of the area, the lack of adequate access to large portions of it, and budget constraints made it necessary to rely on remote sensing information - both aerial photography and satellite imagery - for the general reconnaissance studies in soils, vegetation, and ecology. Through photo-interpretation, areas with soils and other environmental conditions suitable for agriculture and livestock development were identified. These analyses were then field-checked. Overall, the objective was to select areas ripe for development projects, not to carry out purely scientific or sectoral studies. Where available information supported the photo-interpretation, fieldwork was kept to a minimum. Similarly, no attempt was made to describe the physical features of soils or vegetation exhaustively, unless detailed information was needed to delimit the areas with the most development potential. (Map 2, showing potential land use is an example of the maps prepared to depict and interpret natural resource endowment.)

Assembling existing data from three different countries and making it compatible proved complicated and laborious. Since no general procedures or technical criteria had been set, the professional judgment of the international and national advisors and the general objectives of the study project served as guidelines for determining the level of detail needed to select the "most promising areas" and to present the research findings.

In some cases, the availability of detailed information on soils for an area in one country allowed the natural resources unit to infer the soils characteristics of a neighboring area in another country with reasonable certainty. In others, detailed information on one tiny area of the basin had to be ignored so the selection of the "most promising areas" was consistent and systematic on a basin-wide basis. Where the level of detail on various areas varied, the information was used to select the most promising areas but not published for use as reference. In general, making disparate data compatible forced the three national commissions and the international consultants to exchange information and opinions continually.

Compared to previous DRD studies, this one emphasized social and economic problems. Of methodological interest was the calculation of the value of regional production in the three national portions of the basin using information compiled for the study. After exhaustively analyzing regional activities, the team calculated the geographic product per capita for the three sub-national areas in the river basin, the services available to the respective populations, and the services needed. In Argentina and Paraguay, the special needs and opportunities of aboriginal populations were studied.

With respect to regional dynamics, all national plans, programs, and projects that could affect the basin region were analyzed along with regional economic and demographic trends. Through discussions with the national commissions, the team helped make regional projects (especially those involving physical infrastructure) compatible with national development plans. (See Table 1.)

Throughout Phase I, international consultants and permanent project team members visited each of the study's subcenters. (Figure 3 shows the timing of the international consultants' participation in the study.) These meetings revealed that some counterparts agencies constrained the national commissions' capacity to deal with multisectoral planning issues. Success in overcoming the constraints depended largely on how centralized each country's planning was. For example, Argentina's national commission worked directly with provincial planning offices. This arrangement facilitated the preparation of technical information under the auspices of INCyTH, which had gained provincial and national political support through consultations before presenting its technical ideas to the coordinating commission.

Salinity measurement of the water of the Pilcomayo River.

MAP 2

Table 1

ARGENTINA: IMPACT OF THE IDENTIFIED PROJECTS ON NATIONAL PRIORITIES

PROJECTS	**PRIORITIES**			**Level of Project Impact**
	I Increase Population and Productivity in the Frontier Areas	**II Increase Regional Exports**	**III Increase the Income of the Rural Population**	
Dryland Agriculture in the Pocitos-Tartagal area	Medium	Very High	High	3rd
Irrigation in the Semi-arid Chaco	Very high	High	Medium	1st 3rd
Colonization of the Central Zone of Formosa Province	Medium	Very High	High	

Production of Fruit and Vegetables in the Clorinda-Espinillo	Medium	High	Very High	5th
Dairy Operations in Pirané	Medium	Low	Very High	6th
Livestock Development in the Chaco	High	Very High	Medium	2nd

BOLIVIA: IMPACTS OF THE IDENTIFIED PROJECTS ON NATIONAL PRIORITIES

PROJECTS	PRIORITIES				Level of Project Impact
	I Increase Exports and/or Import Substitutes	II Increase the Gross National Product	III Increase the Income of the Rural Population	IV Equalize Population	
Irrigation and Agro-industrial Development in the High Basin	Medium	High	Very High	Medium	1st
Hydro-electrical Generation	Very High	Medium	Low	Low	3rd
Dryland Agriculture in the Villamontes-Yacuiba Area	Medium	Medium	High	Very High	4th
Irrigation in the Chaco	High	Medium	Medium	Very High	2nd
Livestock Development in the Chaco	High	Medium	Medium	High	3rd

PARAGUAY: IMPACTS OF THE IDENTIFIED PROJECTS ON NATIONAL PRIORITIES

PROJECTS	PRIORITIES			Level of Project Impact
	I Increase Population and Productivity in the Chaco	II Increase Exports and/or Substitutes	III Increase the Gross National Product	
Irrigation in the Semi-arid Chaco	Very High	Medium	Medium	1st
Livestock Development	High	High	Medium	2nd
Agro-industrial Development in the Mennonite Area	High	Medium	Low	3rd
Enlargement of the Sugar-Production Area in Benjamin Aceval	Low	Medium	Low	4th

Figure 3 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES, PILCOMAYO RIVER BASIN STUDY (1975-1977)

In contrast, the Bolivian and Paraguayan National Commissions depended much more on decisions made at the ministerial level. This made conducting sectoral activities difficult - a problem that was exacerbated by shortages of integrated development planners and detailed sectorally integrated technical information in these two countries.

To minimize these differences and to avoid lengthy technical discussions in the coordinating commission meetings, it was decided to hold meetings of the executive committee at least every two months to coordinate project activities, smooth differences of opinion, and prepare an integrated technical report for the coordinating commission.

Besides the informal training conducted through the work of national experts with international consultants, two international courses were held on water resources issues and project formulation. The Inter-American Center for Integrated Development of Land and Water Resources (CIDIAT) sponsored a seminar on water resources development in 1975, and DRD sponsored a course in Tarija, Bolivia, on project formulation and evaluation. Both activities helped the sectoral experts on the national commissions view their work in the overall context of the study.

The study activities were monitored primarily by the coordinating commission. Through regular meetings, the three governments adjusted the study's direction and resolved several political issues.

In September of 1975, the coordinating commission decided to expand the study's technical focus. As the distinct resource-based subdivisions within the basin became discernable, the commission accepted the technical unit's recommendation to give particular attention to the probable impacts of modifying the basin's natural vegetation, (See Map 3.) The commission decided to bring in additional experts to develop more information on sedimentation and fluviomorphological conditions and that certain development projects be taken to the pre-feasibility level instead of merely to the "profile level." (See Glossary.)

Broader political concerns also came to the fore at this point. The all-important issue of water-withdrawal rights was raised. At this stage, the Paraguayan portion of the basin was the least known of the three subregions, and most of the country's development efforts were directed to Itaipu's area of influence. Nevertheless, Paraguay wanted to keep its future options open in the Pilcomayo basin. Thus, although Argentina and Bolivia presented concrete proposals, further discussion on water-withdrawal rights was postponed until the riverine resources for each segment of the Pilcomayo could be documented and verified.

The workplan for the three-year Pilcomayo basin study called for the presentation of an interim Phase I report to the coordinating commission as soon as information on physical characteristics, socio-economic conditions, and development possibilities was analyzed. Completed in July of 1976, this report proposed basin-development strategies based on a preliminary diagnosis of the Pilcomayo basin's resources.

In the interim Phase I report, priority areas for development were identified within the basin. Cattle-raising, irrigated crop, and forest projects were proposed for these areas. The study team concluded that the availability of water drawn directly from the Pilcomayo River was the main determinant of each subarea's natural resource development potential and specified the additional technical information needed to resolve the water-withdrawal rights issue. Critical here was additional information on sediment deposits, the origin of the water in each segment of the river, flooding cycles, aquifer formation, and recharge characteristics.

B. Phase II

Responding to the Phase I report, the three countries approved proposals to carry basin-development strategies farther. They also directed the study team to identify national development projects not directly dependent on the extraction of water from the Pilcomayo and to further elaborate the type and scope of technical studies needed on the river system itself.

By March of 1977, the national commissions completed the field work on their portions of the basin and produced several sectoral reports. Three months later, the technical unit finished analyzing the region's natural resources, ecological subsystems, human resources, socio-economic conditions, and national development plans and projects.

A draft of the final report was presented to the coordinating commission in June of 1977. The report specified a wide range of development projects as highest priority. (See Map 4.) It also recommended carrying out further studies of eight proposed hydroelectric facilities in Bolivia that would generate 2,352 MW of electrical power, provide flood and sediment control in the lower basin, and irrigate approximately 180,000 ha. Further studies on water rights were also recommended.

MAP 3

MAP 4

1 HYDROELECTRIC PROJECTS

Dams: Icla - San José - Santa Elena
Machigua - Yuquirenda - Chorro
Pescado - Carrizal
Installed power: 2,350 MW
Cost: US$1,070 millions

2 INTEGRATED RURAL DEVELOPMENT AND IRRIGATION

Projects identified for five selected areas: Culpina-Incahuasi, Vitichi, Impora, La Lava-Hornos, Lequezana-Betanzos

3 IRRIGATION IN THE VILLAMONTES-SACHAPERA AREA

Reclamation of 50,000 ha for irrigated agriculture to produce oleaginous crops, alfalfa, citrus

4 DRY FARMING IN THE VILLAMONTES-YACUIBA AREA

Conversion of 50,000 ha of scrub forest into agricultural land for production of oleaginous crops and cotton farming

5 IRRIGATION IN ITIYURO

Reclamation of 6,000 ha for irrigated agriculture in the Province of Salta

6 DRY FARMING IN THE POCITOS-TARTAGAL AREA

Increase of existing cultivated areas to include products for extra-regional export

7 IRRIGATION IN THE BANDA SUR-TUCUMANCITO AREA

Reclamation of 50,000 ha for irrigated agricultural production of oleaginous crops, alfalfa, citrus, cotton

8 IRRIGATION IN THE ARGENTINE CHACO

Reclamation of 65,000 ha in selected areas for agricultural production of forage, cotton, and tobacco

9 YEMA LAGOON

Irrigation of 10,000 ha for the production of cotton, sorghum, corn, and alfalfa (possibility of expanding irrigated area to 30,000 ha)

10 COLONIZATION IN THE CENTRAL ZONE OF THE PROVINCE OF FORMOSA-ARGENTINA

Conversion of 50,000 ha of forested land for pastures and dry farming production of oleaginous crops, sorghum, cotton, and corn

11 REHABILITATION OF THE RIACHO PORTEÑO IRRIGATION SCHEME

with possibility of expanding the irrigated area by 40,000 ha

12 AGRICULTURAL DEVELOPMENT OF THE CLORINDA-ESPINILLO AREA

Agricultural diversification oriented Coward the production of subtropical fruits and vegetables

13 EXPANSION OF THE "BENJAMIN ACEVAL" SUGAR CANE AREA

Guarantee supply of raw materials so sugar mill capacity can be expanded

14 AGROINDUSTRIAL DEVELOPMENT OF MENNONITE COLONIES

Increase production of palo santo essence, tannin, cooking oil; create industrial capacity to produce spurge, sorghum, oleaginous flours, leather, and dairy products

The issue of preserving the physical continuity of the Pilcomayo River was also addressed. Without one or more reservoirs in the upper basin to regulate the river's flow, any channel between the Upper and Lower Pilcomayo Rivers would fill up with sediment. Before the three countries could construct a reservoir for flow regulation, precise topographic fieldwork would have to be carried out and a detailed fluviomorphological study undertaken.

The final report also proposed irrigation, agricultural, and agro-industry projects for the Bolivian section of the basin. Dryland agriculture was recommended for the piedmont. For the lower basin, irrigation, agriculture, cattle and milk production, and agro-industrial projects were identified for further study. These projects were evaluated qualitatively in view of the capital, manual labor, soil-protection measures, space, and timeframe each would require.

As specified by the coordinating commission in 1976, the level of project elaboration varied. Several projects were taken to the pre-feasibility level, while others were merely outlined and recommended for further study. All the projects were ranked according to their contribution to the three countries' national development plans.

Even though institutional deficiencies were great at both provincial (or departmental) and national levels, and the allocation of funds was centralized in all three countries, the study team did not propose setting up a tripartite authority to manage the integrated development of the river basin. In its judgment, the political climate was still not conducive to such an agreement. Nevertheless, the technical findings of the report confirmed the importance of technical information in political decision-making, and the study project's structure enabled the three countries to sustain cooperative development while data gaps were filled.

After the final report was released in July of 1977, the three governments jointly undertook some technical activities of common interest. Since then, Bolivia has implemented some of the recommendations stemming from these follow-up studies.

C. Follow-Up Studies

1. The Tripartite Area Study

The first activity resulting from the recommendations in the final report was a request from the three countries that DRD provide assistance in the execution of a detailed study of the so-called "tripartite zone" - an area included within a circle of 150-km radius from Hito Esmeralda (where the three countries' borders intersect). Besides indicating the three countries' willingness to continue frontier-integration activities in the basin, the new study would reveal the amount of land in each country that could be irrigated for agriculture at the lowest cost and the possibilities for joint agro-industrial ventures in the zone with the most potential for developing new water works to regulate the Pilcomayo's flow.

The study's objectives were to describe the most important socio-economic and physical characteristics of the area, to prepare a development strategy to be implemented in five-year periods over 20 years, and to elaborate on and coordinate the projects identified in the final report of the Pilcomayo basin study team. In this follow-up study, the institutional organization, the terms of country participation, and DRD's role were modelled on those of the Pilcomayo basin study. However, the OAS was the only international organization to participate. (The Chronogram of international technician activities in the tripartite study is shown in Figure 4.)

Several types of projects were prepared in this study. The technical units elaborated irrigation projects that had been identified by the Pilcomayo basin study team: 60,000 ha in Argentina and Paraguay and 30,000 ha in Bolivia. Dryland agricultural projects were identified for 80,000 ha in Argentina and 20,000 ha for Bolivia, Agro-forestry projects were identified for Paraguay on 20,000 ha where both wood and cattle could be produced, and several agro-industrial projects were proposed for Argentina and Paraguay. Other proposals were for the main highways and feeder roads needed to develop an estimated US$110 million in agricultural projects in the three countries and several basic education and public health projects.

2. Fluviomorphological Study and Ranking of Water Projects

The results obtained in this follow-up study prompted the three countries to ask DRD in 1980 to prepare a proposal for undertaking sedimentological and fluviomorphological studies and for ranking water projects. These studies, which the original Pilcomayo study team had recommended, would provide the countries with the information needed to negotiate concretely the development of the basin and the equitable use of the Pilcomayo River water. The proposal DRD prepared was discussed and amended at a coordinating commission meeting in late 1980 in Buenos Aires and formally approved in early 1981. Because the studies would cost an estimated US$2,800,000, the countries decided to submit this proposal officially to the Financial Fund for the Development of the Plata Basin (FONPLATA).

One serious problem arose in 1981, when one riparian country altered the river's course to use the flood waters of the Lower Pilcomayo, Since an understanding had been reached not to use the river's water until additional studies had been completed, coordinating commission meetings and negotiations with FONPLATA were suspended until the problem could be rectified amicably.

In 1983, the original hydrological conditions of the Lower Pilcomayo were restored. Soon the countries will be able to resume negotiations. Argentina has already assigned high priority to this study, while Bolivia and Paraguay are close to reaching a decision.

Figure 4 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES, TRIPARTITE AREA STUDY (1979-1980)

Another follow-up activity - a major technical innovation - was the use of radioactive isotopes to trace surface and groundwater movement in the Pilcomayo River basin. With technical assistance from the International Atomic Energy Agency (IAEA) in Vienna, the three countries used deuterium, tritium, and oxygen-18 to determine whether infiltrated water from the Pilcomayo eventually makes its way into the Verde, Montelindo, Negro, Pilcomayo Inferior, and other Paraguayan rivers or instead moves south to feed Argentine rivers. They were also used to determine whether wells in the Chaco are recharged by water from the Pilcomayo, by rainfall, or both. These investigations were still in progress in 1983.

3. National Studies

Separately, the three countries have carried out follow-up activities proposed by the Pilcomayo basin study team. These projects do not require the use of the Pilcomayo River water.

The Government of Paraguay asked DRD as part of its 1980-81 biennial request to prepare action proposals for the Paraguayan area of the Pilcomayo basin. The DRD proposed integrated projects for production, infrastructure, and social services, the nature and location of which were guided by the Economic and Social Development Plan and the diagnosis prepared for the study area. Specifically, the study team recommended agricultural activities, cattle raising, a slaughterhouse, main and feeder roads, water resources development, and new basic health services, with a total investment of US$49 million.

IV. Implementing the recommendations

In May of 1978, the Government of Bolivia asked the IDB to partially finance a program of small irrigation projects proposed by the Pilcomayo basin study team for implementation in the upper river basin. The Ministry of Small Farmer Affairs and Agriculture of Bolivia (MACA) designated DRD as the executing agency of this two-year study, which began in early 1981.

This study team prepared feasibility studies for irrigation projects for San Lucas, Laitapi, and Padcoyo totalling US$2.9 million. The projects will enable approximately 700 families (3,500 people) to produce such basic food staples as corn, wheat, and beans, as well as apples and peaches for the national market.

Another possibility identified by the Pilcomayo basin study team was developed by the Government of Bolivia with the cooperation of the Government of Canada. Between the departments of Potosi and Chuquisaca on the main course of the Pilcomayo, a hydropower facility with 90,000 KW of generating capacity is to be built at a cost of US$150 million. By regulating the Pilcomayo River's flow, it will make it possible to irrigate an important area downstream in Villamontes. This project will require international financing.

In June of 1983, the President of the National Commission for the Integrated Development of the Chaco Region of Paraguay announced the approval of US$50 million for implementing the projects in the Paraguayan area of the Pilcomayo basin. These projects were recommended by the study team that worked in Paraguay in 1980 and 1981.

V. Lessons learned

The **DESIGN STAGE** of the study demonstrated the importance of:

1. Realizing that the time was not right to create a tripartite development commission for the Pilcomayo study. What was necessary first was informal technical and political dialog among the countries. Only when the countries better understood the basin's potential and their own options could they envision common development potentials.

2. Including international agencies in the coordinating commission and requiring unanimous approval before a recommendation could be implemented. This fostered cooperation and a broad planning perspective.

3. Narrowing the study's focus to development actions affecting the direct use of water from the river and recognizing that resolving water-rights issues was a delicate task that could not be rushed. Each country's potential and economic interests had to be integrated thoroughly before all three could pursue technical, administrative, and financial cooperation. Lines of authority and responsibility had to be clearly drawn, and technical tasks clearly defined within their political context.

4. Selecting priority geographical and technical areas so that major water development projects would not eventually compete for scarce financial and human resources at the national level.

5. Realizing that formal agreements would be necessary at each step. Geopolitical factors and the considerable investment and maintenance costs all three countries might have to assume left no alternative.

The **EXECUTION STAGE** of the study highlighted the advantages of:

1. Narrowing a study's focus from a large area to smaller areas that have the potential to

become centers of development.

2. Relying on remote sensing information - both aerial photography and satellite imagery - for the general reconnaissance studies of natural resources. No attempt was made to describe the physical features of soils and vegetation exhaustively, unless detailed information was needed to delimit the areas with the most development potential.

3. Holding frequent executive committee meetings to discuss differences of opinion among coordinating commission members over technical issues. Assembling technical data from the three countries and making it compatible proved to be a complicated and laborious process, but the technical problems thus identified were ultimately resolved by the executive committee.

4. Calculating the value of regional production, services available to the subarea population, and services needed in the three national portions of the basin using information compiled especially for the project. This process made defining the regional strategy easier.

5. Analyzing all national plans, programs, and projects that could affect the basin, along with regional economic and demographic trends. Through discussions with the national commissions, the team helped make regional projects compatible with national plans.

The **IMPLEMENTATION STAGE** of the study proved the critical importance of:

1. Viewing the selection of the tripartite zone and a follow-up study as indications that the countries were making progress toward identifying common development potentials.

2. Creating a technical forum as the basis for future political discussions. Through the coordinating commission the countries continue to discuss development strategy and action officially but informally. While no tripartite authority yet exists, the open technical and political interchange of the coordinating commission and the growing history of successful joint decisions and actions have prepared the way for its creation. Meantime, it is likely that the three countries will create specific commissions to analyze and implement bilateral or trilateral projects.

Significantly, the Pilcomayo National Commissions were maintained during the period 1981-83 while the issue of the Lower Pilcomayo's water diversion was being treated.

3. Defining technical projects precisely. Countries considering multinational ventures can agree upon their shared interests only when projects have been technically well defined. Mutual interests cannot be defined until national interests have been defined concretely in relation to each project under consideration. Previous general accords (such as the Plata Basin Treaty) can smooth the road toward this objective. However, agreements calling for the construction of a dam, the allocation of water rights, or other specific joint development projects cannot be reached until projects have been developed at least to the pre-feasibility level, Only when the countries have such highly detailed technical information can they commit national resources to multinational projects.

4. Recognizing that only when the national authorities of each country are able to assess the mutual development possibilities will the additional institutional capabilities necessary to execute the projects and programs materialize. Once this critical threshold is reached, the

financial and human resources needed to undertake those projects and programs should also be evaluated.

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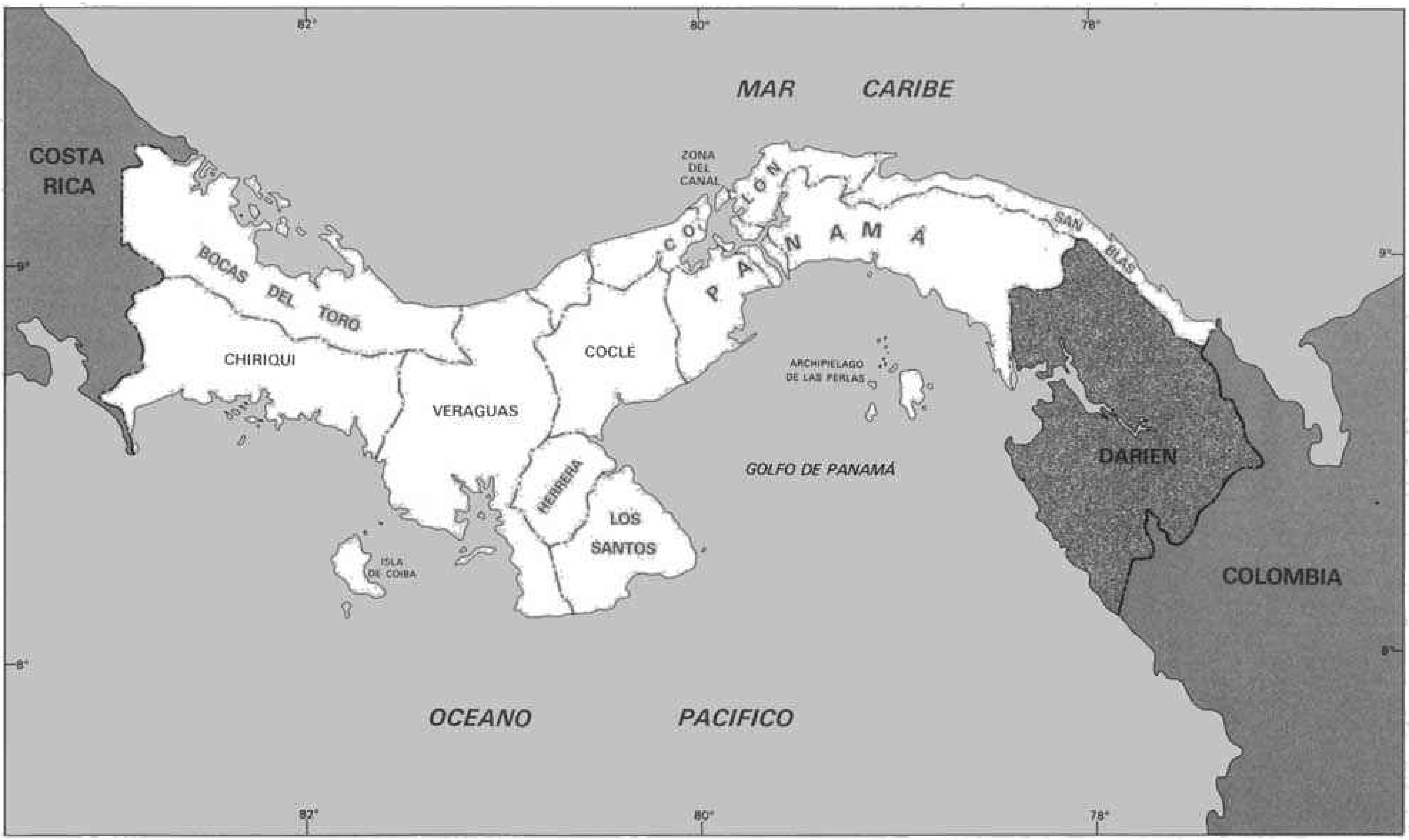
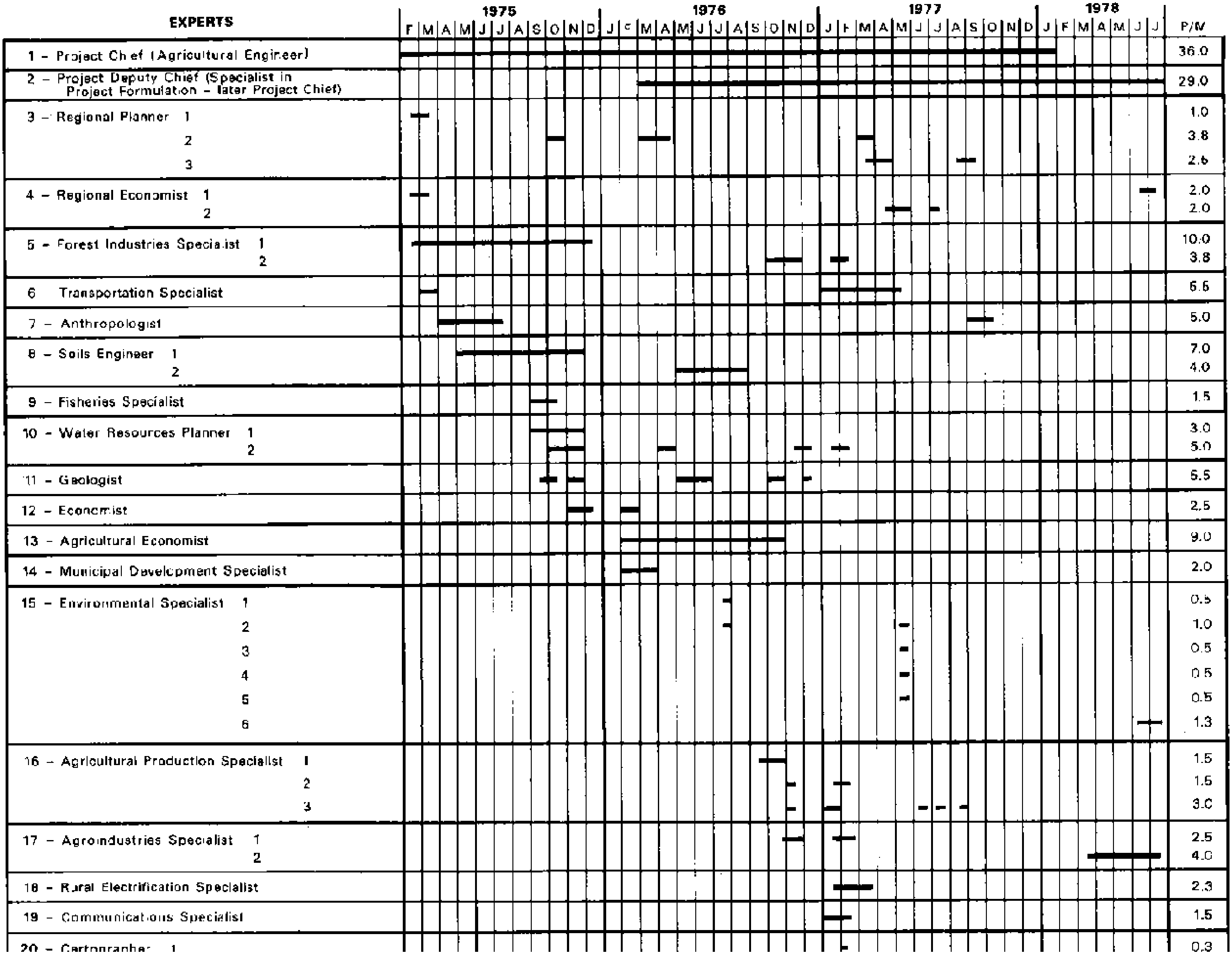
OEA/República del Paraguay. *Desarrollo Regional del Area Paraguaya del Proyecto Pilcomayo.* Washington, D.C., OEA, 1982.



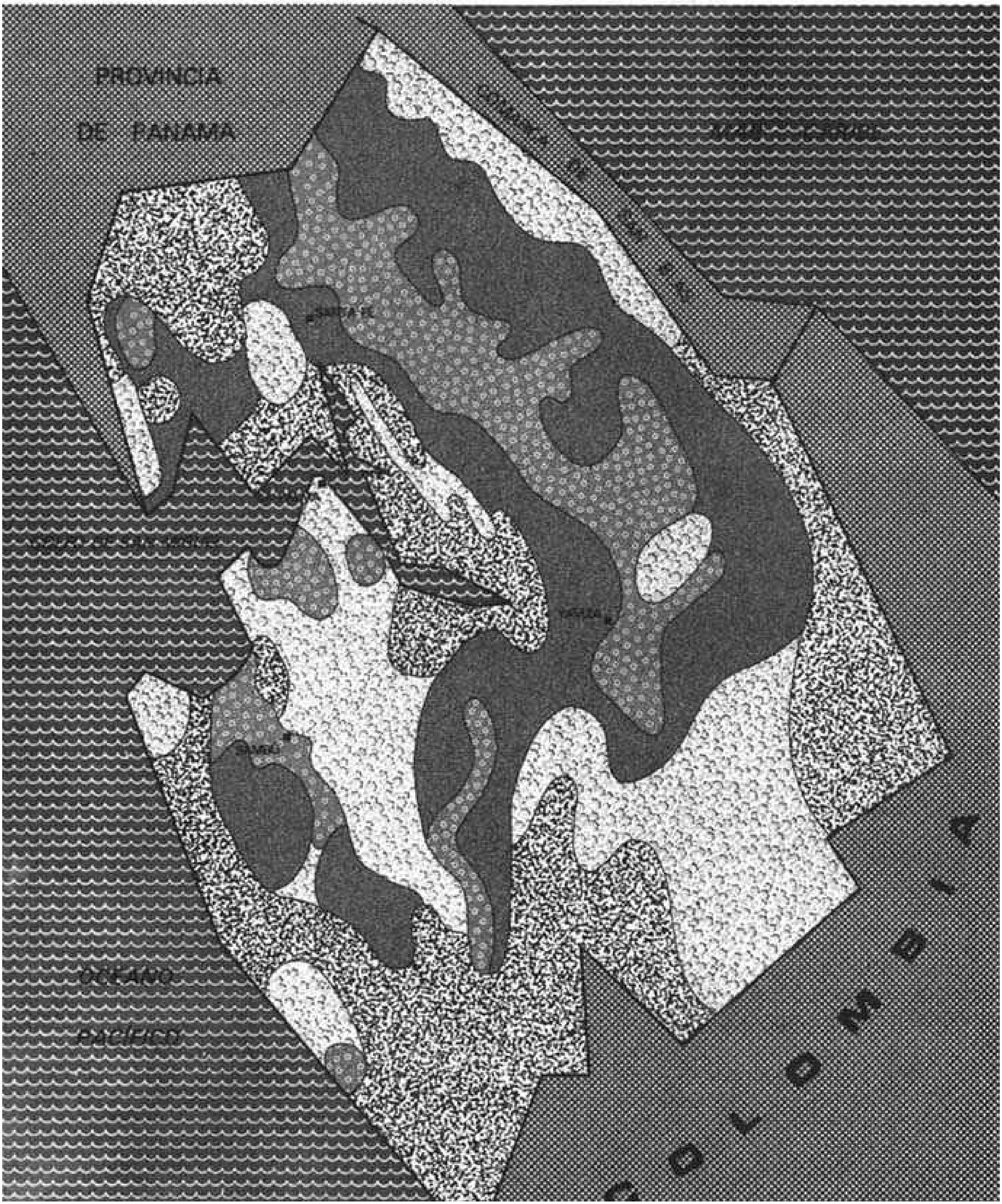
Location of the Darien Region, Panama

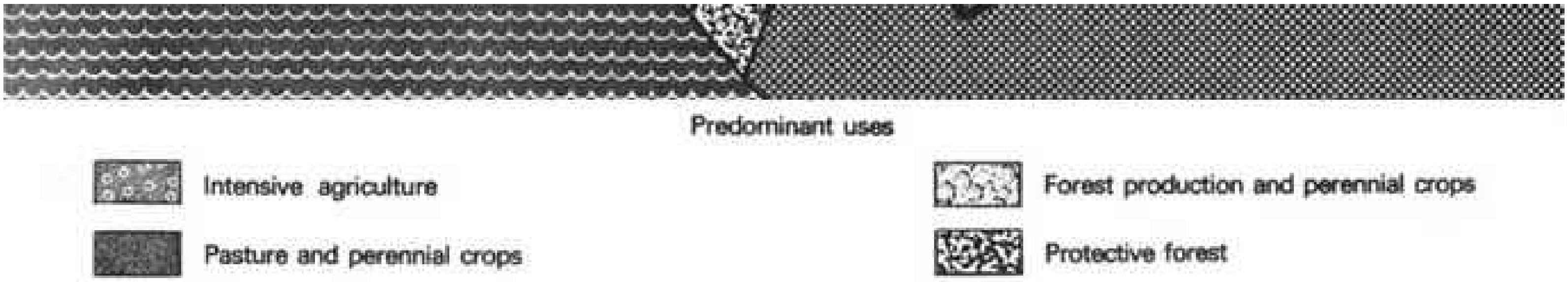

MINISTERIO DE OBRAS PUBLICAS
CARRETERA DEL TAPON DEL DARIEN
EL GOB.REVOLUCIONARIO CONSTRUYE


EXPERTS
1975
F M A M J J A S O N D
1976
J F M A M J J A S O N D
1977
J F M A M J J A S O N D
1978
J F M A M J J
P/M
1 - Project Chief (Agricultural Engineer) 36.0
2 - Project Deputy Chief (Specialist in Project Formulation - later Project Chief) 29.0
3 - Regional Planner 1 1.0
2 3.8
3 2.6
4 - Regional Economist 1 2.0
2 2.0
5 - Forest Industries Specialist 1 10.0
2 3.8
6 Transportation Specialist 6.5
7 - Anthropologist 5.0
8 - Soils Engineer 1 7.0
2 4.0
9 - Fisheries Specialist 1.5
10 - Water Resources Planner 1 3.0
2 5.0
11 - Geologist 5.5
12 - Economist 2.5
13 - Agricultural Economist 9.0
14 - Municipal Development Specialist 2.0
15 - Environmental Specialist 1 0.5
2 1.0
3 0.5
4 0.5
5 0.5
6 1.3
16 - Agricultural Production Specialist 1 1.5
2 1.5
3 3.0
17 - Agroindustries Specialist 1 2.5
2 4.0
18 - Rural Electrification Specialist 2.3
19 - Communications Specialist 1.5
20 - Cartographer 1 0.3

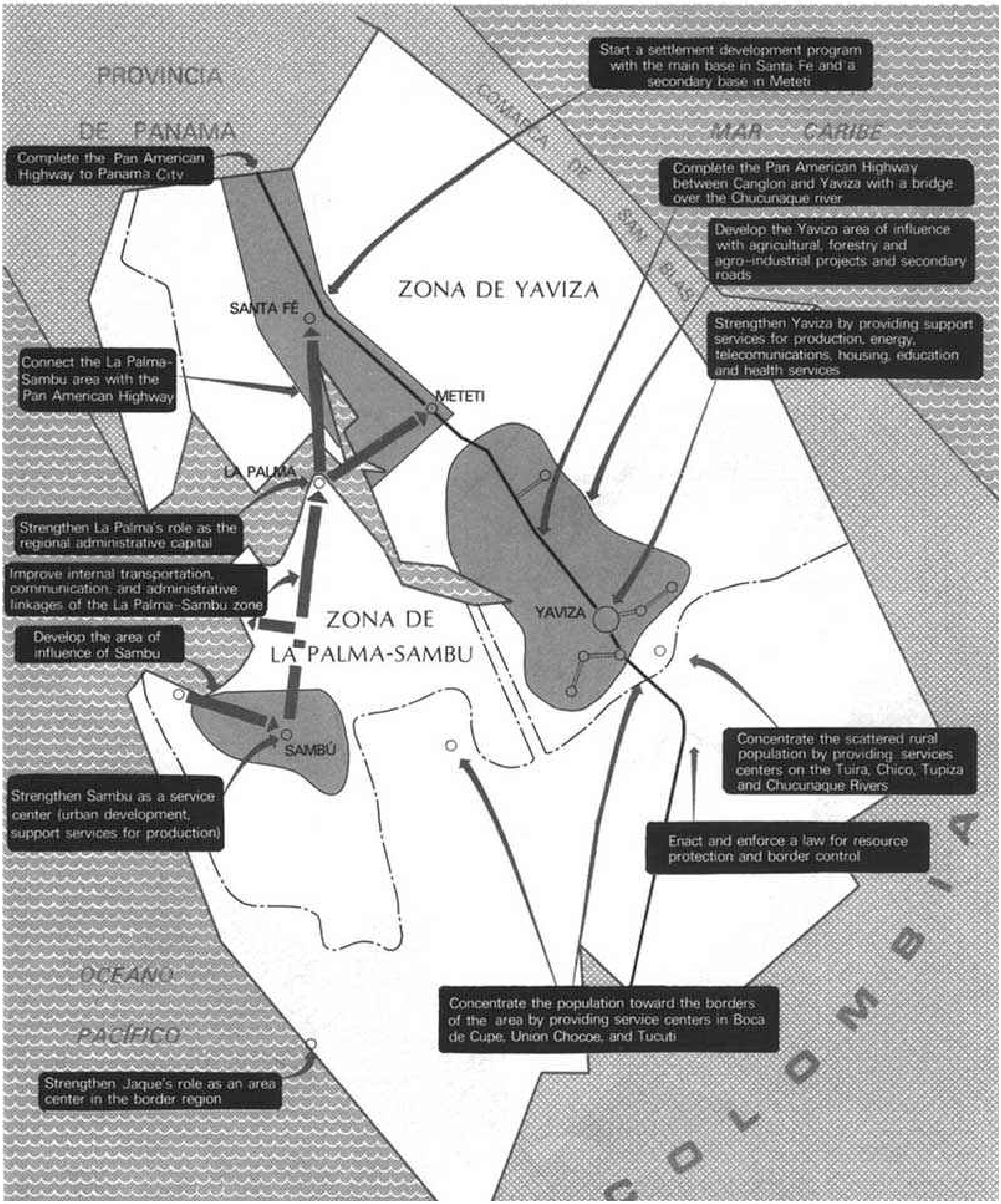
2	1.3
21 Institutional Development Specialist	2.0
22 - Project Implementation Specialist	2.0
23 - Cooperative Development Specialist	1.2
24 - Editor	1.0
25 - Health Specialist 1	2.5
2	2.5
3	2.5
	TOTAL 176.0
COURSES	
CIDIAT	
CETREDE	
CINDER	

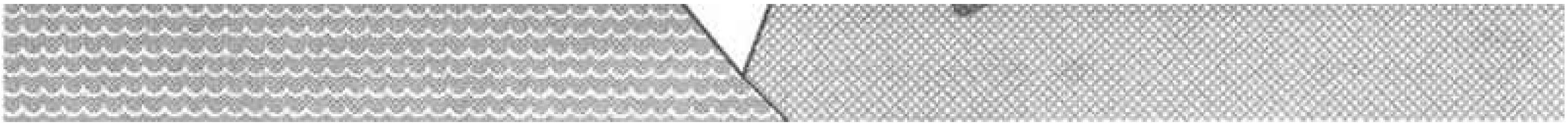
Potential Land Use, Darien Region, Panama



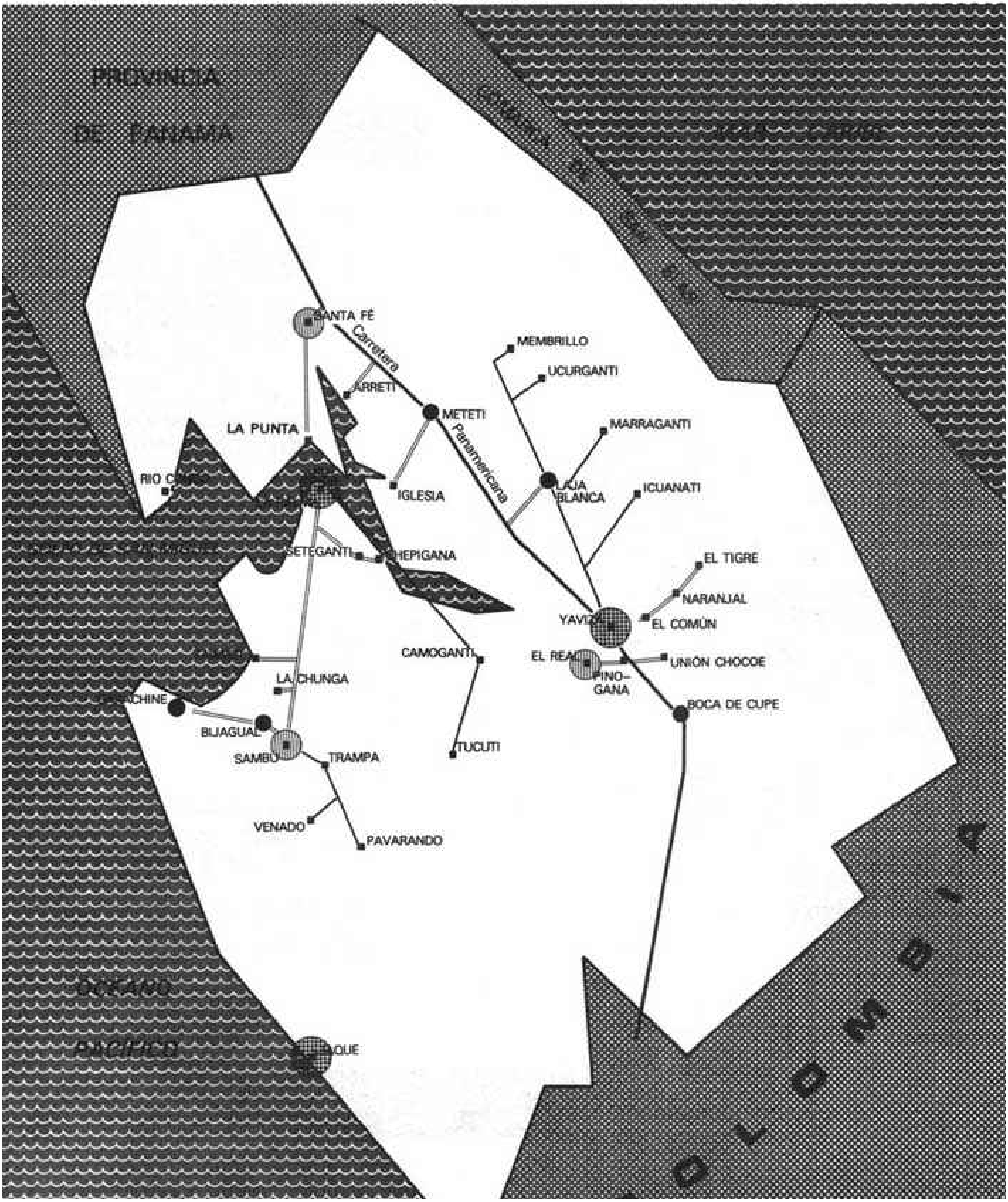

Predominant uses
Intensive agriculture
Pasture and perennial crops
Forest production and perennial crops
Protective forest

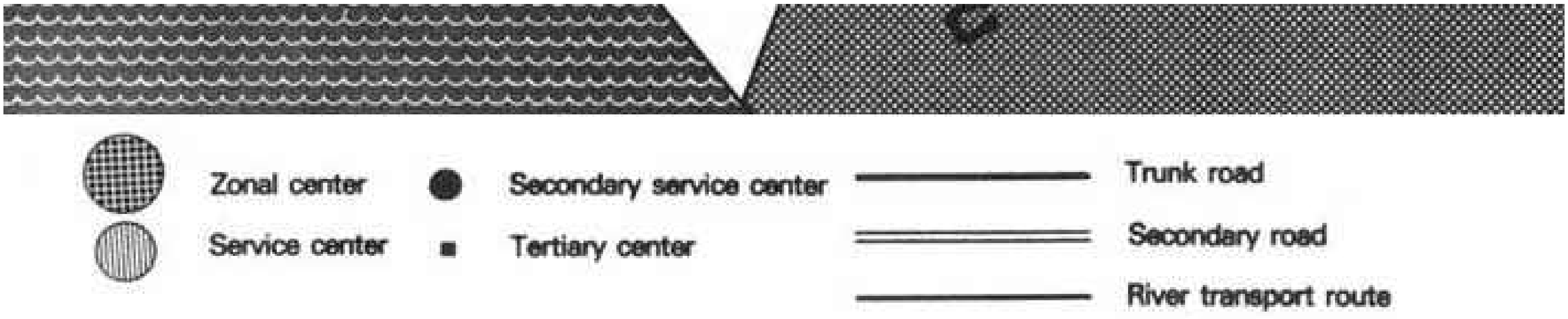
Spatial Strategy, Darien Region, Panama



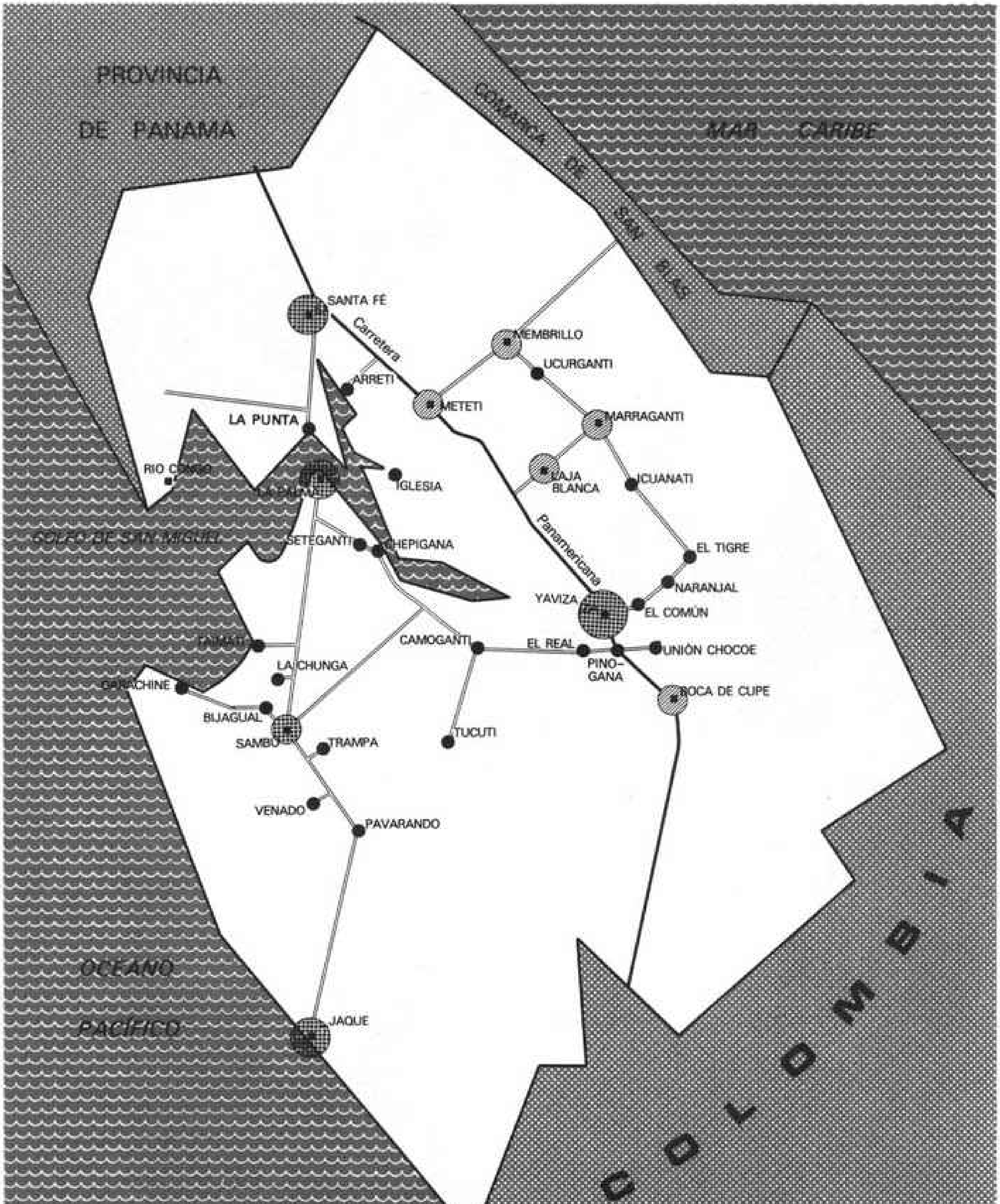


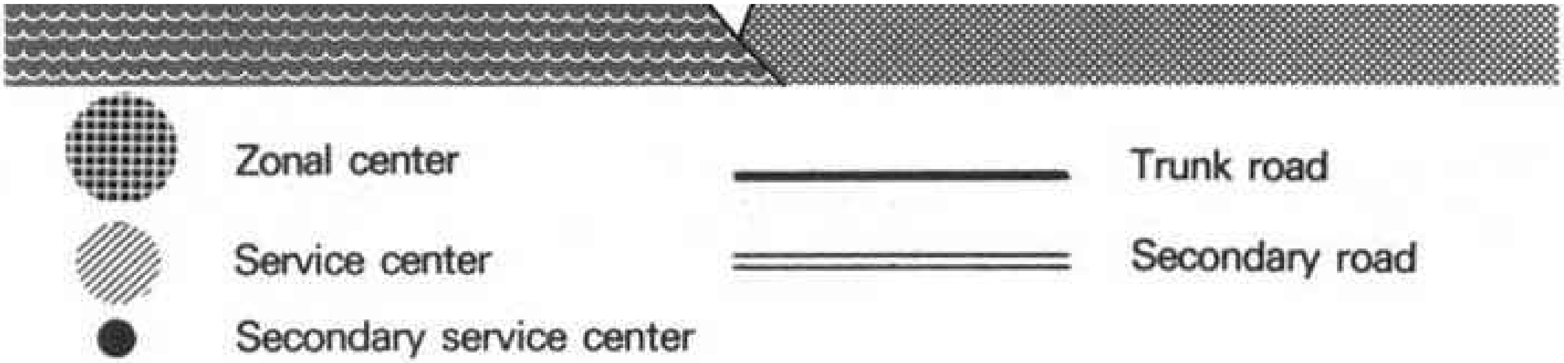
Population Center Network Projected to 1985, Darien Region, Panama



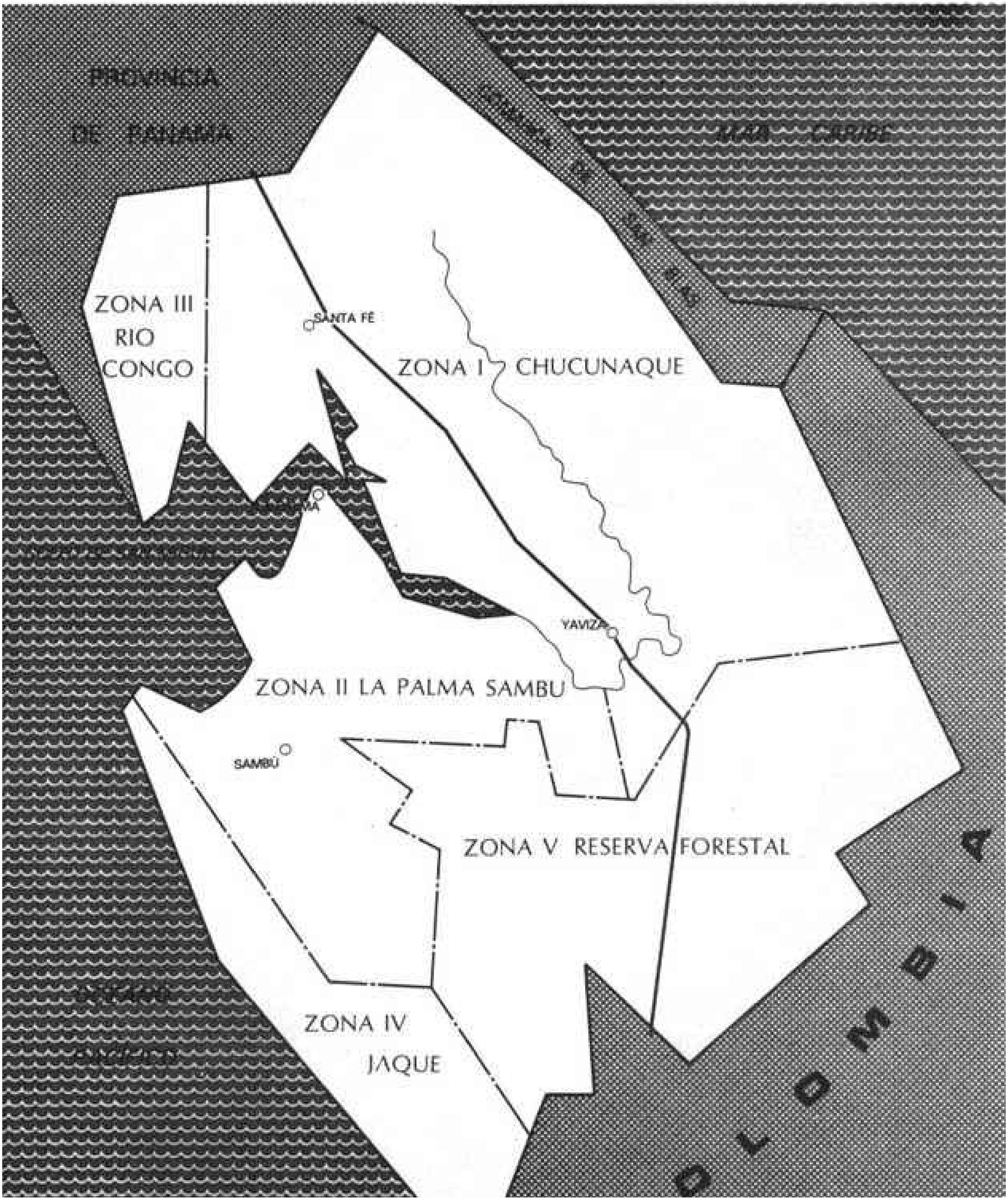

Zonal center
Secondary service center
Trunk road
Service center
Tertiary center
Secondary road
River transport route

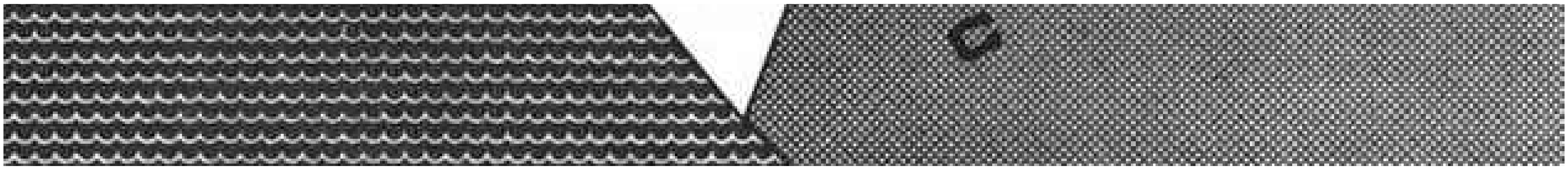
Population Center Network Projected to 2000, Darien Region, Panama



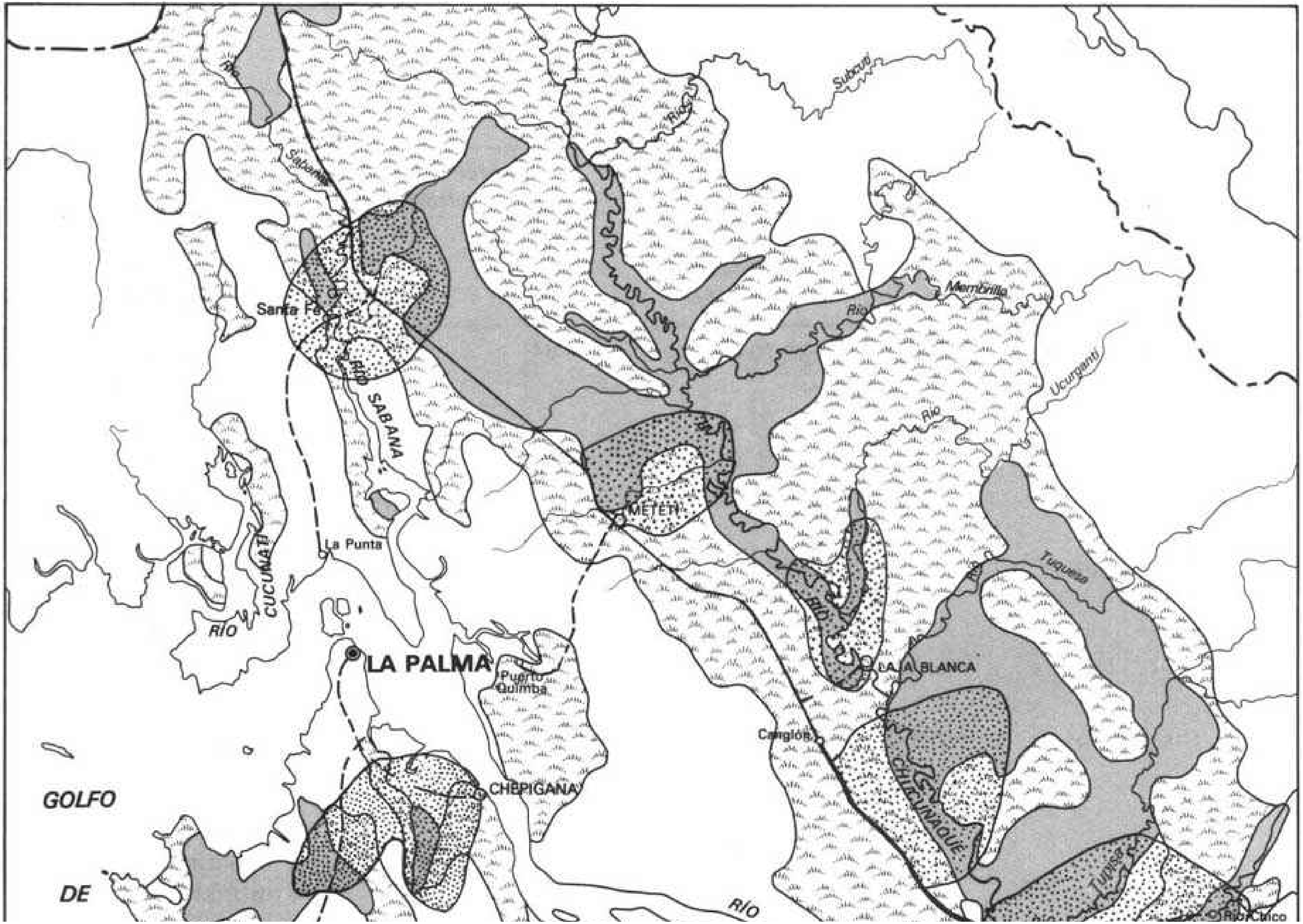

Zonal center
Service center
Secondary service center
Trunk road
Secondary road

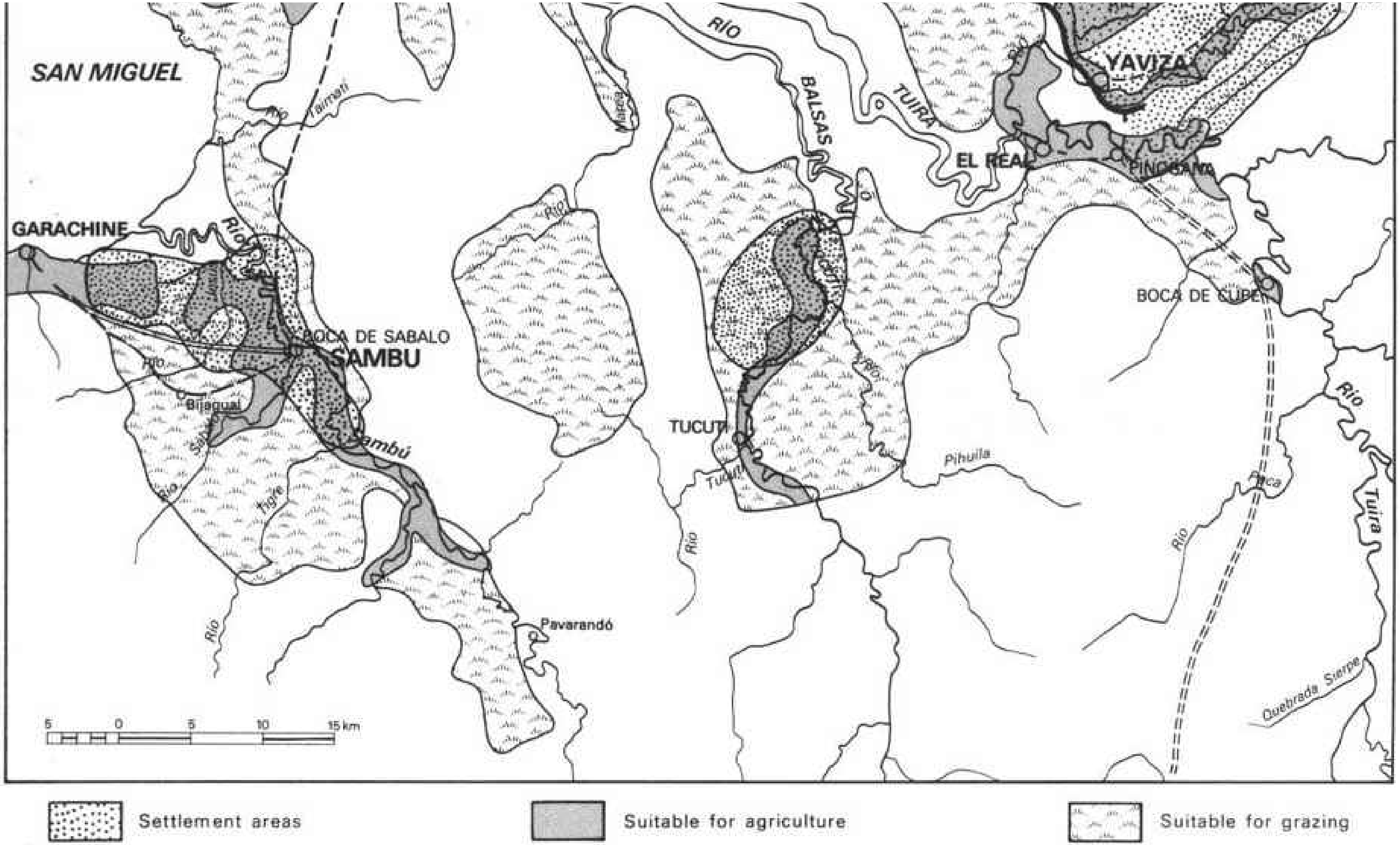
Programming Zones (Subregions), Darien Region, Panama





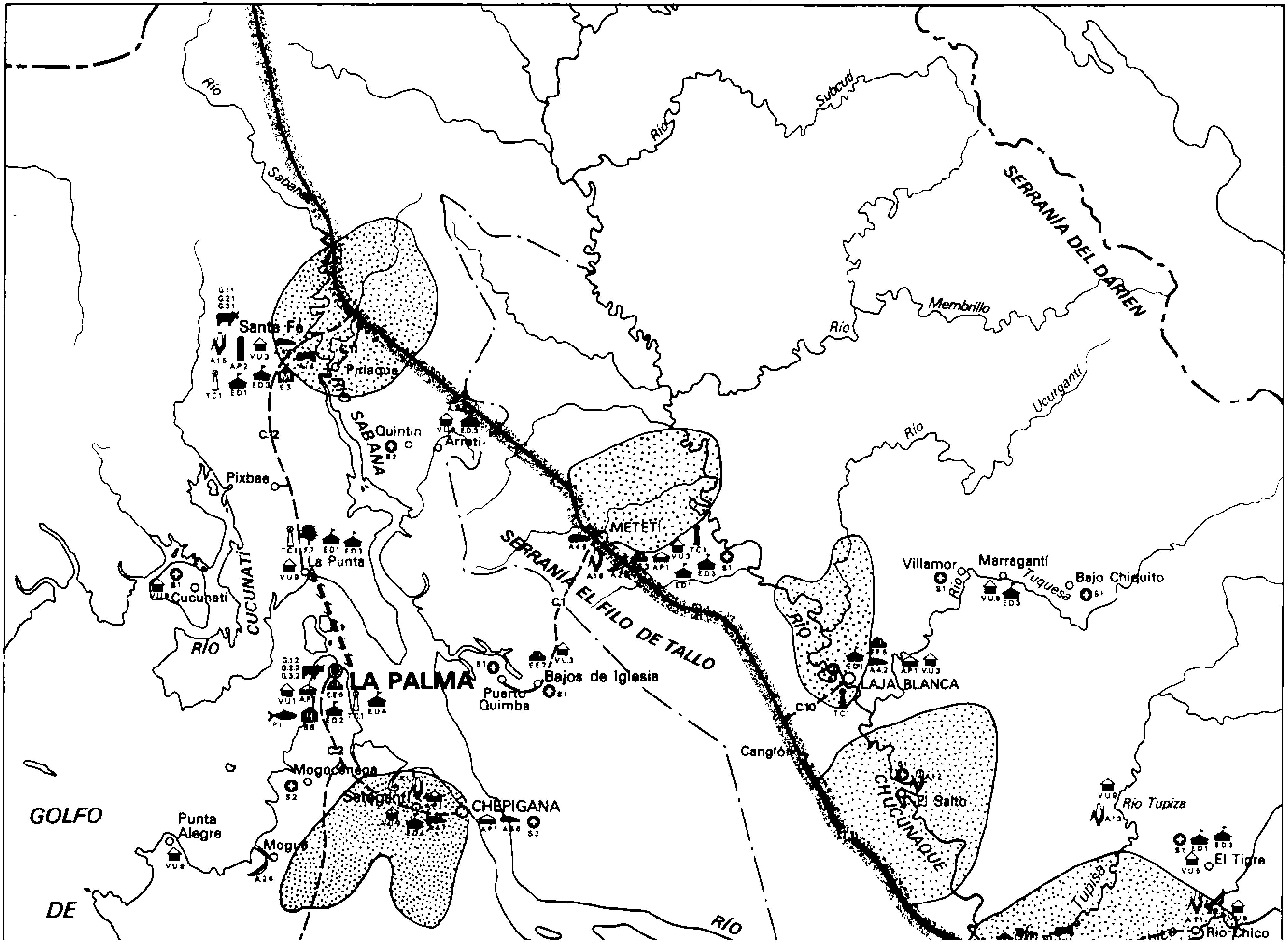
Settlement Areas of the Chucunaque and La Palma-Sambu Programming Zones Darien Region, Panama

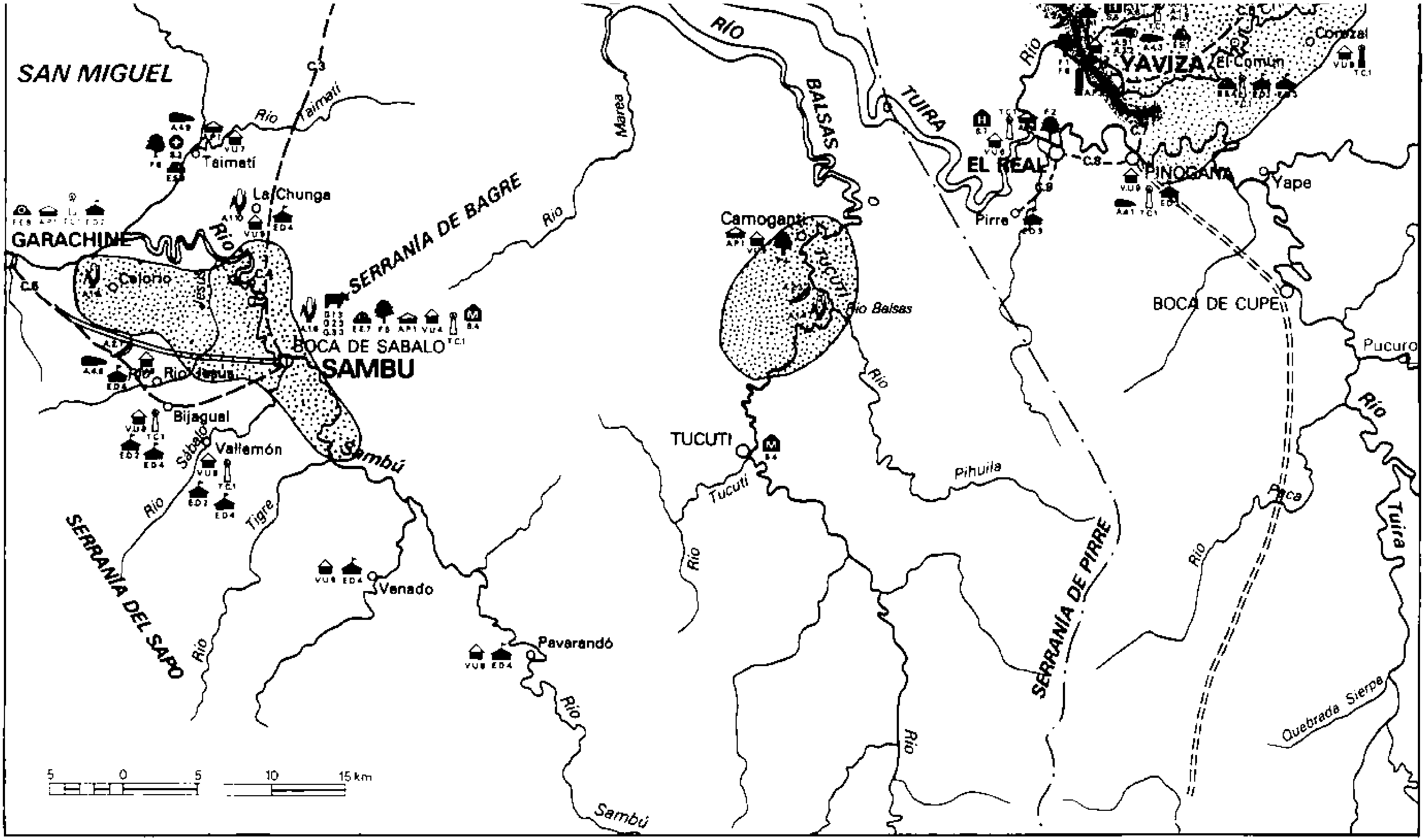



SAN MIGUEL
GARACHINE
BOCA DE SABALO
SAMBU
Bijagual
Pavarandó
TUCUTI
BALSAS
TUIRA
EL REAL
YAVIZA
PINOGANA
BOCA DE CUPE
Pihuila
Quebrada Sierpe
5 0 5 10 15 km
Settlement areas
Suitable for agriculture
Suitable for grazing


CENTRO
NDIGENA
DE
SAMBU

Proposed Projects, Darien Region, Panama




SAN MIGUEL
Río Taimatí
Taimatí
La Chunga
GARACHINE
Cejorio
SERRANÍA DE BAGRE
Río
BOCA DE SABALO
SAMBU
Río Jesus
Bijagual
Vallemón
Sabalo
Río
Tigre
Sambú
SERRANÍA DEL SAPO
Venado
Pavarandó
Río
Sambú
Río
Marea
RIO
BALSAS
TUIRA
Camoganti
TUCUTI
Río Balsas
Río
TUCUTI
Tucuti
Río
Pihuila
Río
SERRANÍA DE PIRRE
YAVIZA
El Común
Corozal
Río
EL REAL
PINOGANA
Yape
Pirre
BOCA DE CUPE
Pucuro
Río
Tuira
Paca
Río
Quebrada Sierpe
5 0 5 10 15 km

Case study 4 - Study of the Santiago and Mira river basins, Ecuador

PROBLEM SUMMARY

Combining River Basin Development and Regional Development in Diverse Subregions - The Santiago-Mira Basin Study (Ecuador)

The Santiago-Mira Planning Study (1978-81) was conducted on the heels of a study of the Esmeraldas River basin (1972-76) to re-orient development in a resource-rich but underdeveloped border region undergoing rapid population growth. The objective was to develop a regional plan that would be compatible with Ecuador's national development plan. Special attention was paid to water-resource management in the 24,853 km^2 region and to integrating its geographically and culturally diverse sub-regions. Emphasis was placed on the identification and formulation of specific development projects within a short-term investment program for the period 1981-84.

Working with two counterpart agencies - the national planning board (JUNAPLA) and the national water resources agency (INERHI) - the planning team itemized all development activities ongoing or planned for the region and identified projects for improving use of local fisheries, land, and other resources. It then evaluated resource, transport, and infrastructure-development proposals on the basis of a survey of the region's natural goods and services. Project proposals and recommended management practices for the sustained use of the region's forests, estuaries, semi-arid land, and agricultural land were coupled with institution-building proposals aimed at integrating the projects and reinforcing the region's socio-economic base - the cornerstones of the regional development plan.

ECUADOR - STUDY OF THE SANTIAGO AND MIRA RIVER BASINS - **Fact Sheet**

Project area:	24,853 km^2
Population:	570,655 (1974)
Physical characteristics:	
- Holdridge life zones (principal zones):	
Tropical Thornwood	
Low Montane Very Moist Forest	
Subtropical Very Moist Forest	
Tropical Very Moist Forest	
Subtropical Rain Forest	
- Elevation range: Sea level to 4,939 m	
- Land capability classification:	
Class II:	2%
Class III:	5%
Class IV:	12%
Class V:	11%
Class VI:	3%

Class VII:	14%
Class VIII:	53%
Duration of Project:	
Preliminary Mission: 7/1978	
Fieldwork: 1/1979-6/1981	
Publication of Final Report: 1981	
Technical contributions:	
DRD disciplines (17)	Number of DRD Experts (24)
Engineer/Economist (Project Chief)	1
Agricultural Project Identification Specialist	3
Agro-economist	1
Agro-industry Project Identification Specialist	2
Agronomist (soils)	1
Cartographer	1
Demographer (employment)	2
Forest Engineer	2
Housing Specialist	1
Institutional Development Specialist	1
Irrigation Project Designer	2
Physical Planner	1
Project Formulation Specialist	1
Regional Planner (including International Director)	2
Telecommunications Specialist	1
Water Resource Planner	1
Editor	1
Total professional person-months:	
DRD: 128.7 Gov. of Ecuador: 520	
Financial contributions:	
DRD: US$500,000 Gov. of Ecuador: US$960,000	
Total investment in projects proposed: US$983,912,000	

The Andean zone - intensive cultivation on steep slopes with terraces. Agriculture in this zone predates most of Europe Civilization.

I. Introduction

The part of northeastern Ecuador that contains the Santiago and Mira River basins comprises an underdeveloped but resource-rich region. In this border territory, population growth is rapid and Ecuador trades a high volume of goods with Colombia. Most of the Esmeraldas River basin is also in this region, and Quito's centripetal influence extends throughout. Physically, economically, and culturally, the region is diverse. One of the three provinces, Esmeraldas, is coastal, while Carchi and Imbabura are primarily Andean.

From 1978 through 1981, Santiago-Mira was the site of an integrated regional development study that clearly illustrates several regional planning challenges:

- Streamlining the design phase of a regional development study by using a brief preliminary mission before the study begins;
- Introducing the concept of integrated regional planning in a country where national sectoral planning has been the norm;

- Designing an integrated regional plan for one region that could serve as a planning model in other regions;
- Conducting a comprehensive environmental analysis in an area where integrated development is being proposed; and
- Working with more than one counterpart agency.

II. Designing the study

In 1978, Ecuador's national planning board (JUNAPLA), later the National Development Council (CONADE*) expressed interest in initiating development planning in Region I, the northernmost of the eight regions to which Ecuador had been recently divided. The national water resource agency (INERHI) had worked with the OAS Department of Regional Development (DRD) from 1973 to 1978 on a study of development of the Esmeraldas River basin which comprises part of Region I. The Government of Ecuador therefore asked the DRD to provide technical assistance to make a study of the Santiago and Mira River basins which constitute the remaining area of Region I and to assist in preparing a development plan for the whole region.

> * JUNAPLA became CONADE during the project, but to minimize confusion this counterpart agency is referred to here as JUNAPLA.

A. The Preliminary Mission

DRD immediately sent a water resources engineer to Quito to collect the economic reports and resource maps needed to build a preliminary data base. Soon after, a preliminary mission composed of a regional planner from DRD headquarters and an engineer/economist (the designated project chief) travelled to Quito for two weeks to (1) assess the project area's natural resource potential; (2) identify the major social, environmental, and economic constraints to regional development; (3) determine what new information on potentials and constraints would be needed to formulate a regional plan; (4) formulate project objectives; and (5) begin outlining the project workplan.

This preliminary mission met at length with counterpart technicians - economists, water resource specialists, demographers, transportation experts, rural development specialists, and foresters. These technicians helped define the project's objectives and list the region's resource potentials and development constraints. The preliminary mission coordinated the discussion, helping participants reach a consensus based on a multidisciplinary overview.

The composition of this team - one representative from headquarters and the study chief-designate - proved politically advantageous. The headquarters representative from Washington handled sensitive issues so the project chief could avoid controversy at the outset but still help define the study's scope and objectives.

In addition, sending a two-person team to the field for two weeks following a quick data-collection effort represented a relatively low-cost mechanism for study design. (In earlier studies, DRD had spent up to US$30,000 fielding larger multidisciplinary teams for longer periods to conduct surveys, assess regional resources, and identify projects.)

B. Initial Assessment of the Region

As a result of the discussions in Quito, the preliminary mission concluded that the Santiago-Mira is not a region in socio-cultural or economic terms and that the planning team would have to promote integration among a patchwork of contrasting sub-regions. With this revised goal in mind, the preliminary mission compared the economic, socio-cultural, and demographic features of the three major physiographic units - the Andean zone, the transition zone, and the coastal zone. (See Map 1.)

In the **ANDEAN ZONE,** high population density and related land-use problems were undercutting the area's natural resource potential. Rural settlements in this ethnically diverse zone were supported by agricultural production. Scarce resources had been over-exploited, and limited water resources were managed with a complex system involving groundwater extraction and irrigation. In some areas, salinization was becoming a problem, and pesticide/herbicide run-off from agriculture threatened the region's lakes.

Despite these problems, the Andean was the most prosperous zone. Its transportation system (a section of the Pan American Highway that links Quito to Colombia) was good, and its relatively well established institutions provided the region's most complete social services. Yet, "all roads led to Quito," so directing commerce and social services to other parts of the region stood out as a major planning challenge. The regional development plan would have to reduce population density in the Andean zone and create employment in the region's under-populated area.

MAP 1

In the **COASTAL ZONE,** which consists of the lower Mira and Santiago River basins and the lower Esmeraldas River basin, the lack of east-west connections to the Andean zone seriously hampered development. The large port of Esmeraldas had a good connection to Quito but lacked easy access to the north. The northern port of San Lorenzo was isolated from the rest of the region, connected to

Esmeraldas only by river and to Ibarra only by a dilapidated railroad.

Geographically, the coastal zone consists of dry tropical savanna on rolling hills to the south and potentially valuable lowlands and wet tropical forests to the north. Vast undeveloped wetlands - seasonally inundated lands, freshwater swamps, mangrove swamps, and an extensive estuary - surround San Lorenzo. In the northern coastal zone, approximately 1,000 farm families are living without title on 300,000 hectares of exhausted forest concessions, principally along the rivers.

Although more data was needed for confirmation, the team tentatively concluded that exploitative concessions and spontaneous colonization were degrading forest resources and impeding proper forest management. The coastal zone's socio-economic problems also turned out to be considerable. The urban centers, Esmeraldas and San Lorenzo, both suffered from significant underemployment, and neither offered adequate social services.

The third subregion, a sparsely populated and relatively undeveloped **TRANSITION ZONE** between the Andean zone and the coast, consists of steeply sloping forested mountain spurs (*estribaciones*). At first glance, this zone appeared suitable for hydroelectric development. But basic data were needed to determine whether such development would serve the whole region well and how hydroelectric development in the mountain spurs would affect water-use patterns downstream in the middle and lower Santiago and Mira valleys.

Drawing on their assessments of the region's resource potential and constraints, the preliminary mission spelled out the five main regional planning challenges. First, the study team would identify potential east-west links. To make this possible, JUNAPLA would have to define the region's role in the national economy - a major undertaking. Second, the team would identify projects that improved urban life and also strengthened inter-settlement links. Third, it would collect data on natural resources, socio-economic characteristics, rural-urban links, agricultural and livestock production systems, commerce, and financing. Fourth, it would attune agricultural, livestock, and commercialization programs and policies to the ethnically diverse customs and values of affected populations. Fifth, in the Andean zone, where only modest increases in crop productivity could be expected, the team would find ways to improve the processing, marketing, and distribution of agricultural and livestock products and to boost tourism and artisanal industries.

The Coastal zone - an agricultural settlement along the Santiago River. Log canoes and other small boats are a principal means of transportation.

The Transition zone - steeply sloping mountain slopes with large precipitation provide hydroelectric potential but are easily damaged by improper development.

Opportunities for developing the region's forestry and fisheries resources were plentiful. But significant constraints on their development made collection of baseline data essential before a regional development plan could be drafted.

C. Definition of Study Objectives

Based on the findings of the preliminary mission, the initial study goals were converted into a set of revised objectives for the two-year workplan as follows:

1. Promote internal regional integration by identifying potential economic links between the region and the rest of the country, ways to encourage out-migration from the most densely populated areas, and mechanisms for increasing economic activities in some underdeveloped and sparsely populated areas.

2. Increase the region's production, employment opportunities, income, and social services so as to complement the national development plan.

3. Define institutional options for a regional development authority.

4. Produce a model regional plan having potential use elsewhere in Ecuador by rationalizing development activities in relation to one another and to new proposals.

5. Design development projects that use soil, water, flora, and fauna judiciously and that take local cultural and social realities into account.

6. Develop a regional water-management plan for INERHI.

An extra-regional goal was also defined. The Ecuadorian government in its original request for technical assistance had made it clear that frontier integration with Colombia was an important long-term objective. Specific studies of commercial and monetary flow between the two countries, migration of peoples, and other interactions were therefore necessary. The comparative advantage of the Santiago-Mira region was to be evaluated in terms of its potential for trade in agricultural, forest products, and industrial goods with Colombia, and general proposals regarding complementary actions leading to frontier integration were to be developed. Accordingly, informal technical dialog was opened with Colombia early in the study and continued throughout.

Using an interdisciplinary group to define and then reassess the region's core problems entailed benefits that extended throughout the study's diagnostic and plan-formulation phases. No single discipline was allowed to dominate the study perspective, and bringing high-level authorities and the international director into early discussions of objectives simplified execution of the study.

D. Designing the Management Structure

The preliminary mission made both counterpart agencies' interests and objectives explicit at the outset. JUNAPLA, which shouldered responsibility for planning for seven of the country's eight planning regions, wanted an integrated development model of use in other regions. It also wanted to spur the creation of a regional development authority. INERHI's more specific objective was to formulate a national water plan so it could assess each sector's demand for water and set allocation priorities within a regional framework.

The two counterpart agencies' resource commitments differed too. Although JUNAPLA wanted to obtain a finished plan and acquire expertise in preparing regional plans, the agency could not assign a high internal priority or more than limited resources to the study. In contrast, INERHI accorded the highest internal priority to the study, and it could provide more personnel, logistical support, and financing than a planning agency could. For these reasons, INERHI became the principal counterpart.

This arrangement suited both DRD and INERHI in many respects. Since DRD takes a multisectoral approach to technical assistance, the liaison forced INERHI to stretch its institutional mandate and its development vision. At the same time, INERHI's logistical support and commitment to the planning study enhanced DRD's effectiveness. Nevertheless, the preliminary mission, INERHI, and JUNAPLA concluded that the study should capitalize on the strengths and compensate for the weaknesses of both agencies. Weighing the risk that such elaborate administration might pose problems, they agreed that JUNAPLA should serve as coordinator since it could encourage other agencies to cooperate.

The study would be supervised by an international director (the OAS project chief), the national director (from INERHI), a coordinating committee composed of representatives of all government agencies contributing resources to the study, and an executive commission responsible for making final decisions on the study. (See Figure 1.) INERHI would function as the technical unit, while JUNAPLA would define the regional role and formulate regional development policies. The international director would manage outside consultants while JUNAPLA would guide the national agencies concerned with telecommunications services, road-building, and other sectoral activities.

Figure 1 - ORGANIZATIONAL STRUCTURE

Figure 2 - WORK PLAN MATRIX FOR PHASE I AUGUST 1978 - MAY 1979

E. Workplan Design

Workplan design consisted of three steps: principles for identifying the activities and products of the study were developed; then the project components were identified, and finally the components were sequenced. In step one, the study team used a systems-analysis approach to arrive at these operating principles:

1. A region is an open system that changes as it interacts with external systems. In turn, it is composed of interactive subsystems.

2. The main components of the regional system are a physical subsystem composed of natural resources and infrastructural components; an activity subsystem composed of social and economic components; and a regulating subsystem composed of institutions and technological components.

3. The main objective of regional development is to harmonize within a given timeframe the region's internal systems and the interactions of the region with external systems.

In step two, sketch maps and linkage analysis diagrams were used to get a picture of systems interactions, development opportunities, and development constraints. On this basis, 14 study tasks were identified, each geared toward a well-defined product.

Step three took place in three successive approximations. First, the study components and study outputs were simply listed to identify discrepancies. Time, the availability of information, and technical constraints were introduced and all the incompatibilities between desired products and operational constraints became evident. Finally, when the team had worked out these problems, the study's constraints and objectives were related to the 14 study tasks.

On the basis of the final workplan matrix, six working groups were created. Group I was assigned to cover data collection; Group II focussed on natural resources and physical infrastructure; Group III on public and private institutions; Group IV on economic activities;

Group V on demographic and social services; and Group VI was charged with developing the regional strategy and coming up with the project proposals. The tasks assigned to the groups were defined in terms of specific zones, sectors, and integrating activities. The team also linked tasks to each other. Team members could easily see who they would have to collaborate with on each task, as well as how the tasks related to each other.

Figure 2 shows the main study tasks and integrating activities conducted to produce the final report of Phase I. The legend of Figure 2 shows the principal relationships among the tasks. The original matrix showed when each of these interactions would take place, but this simplified version does not show these connections graphically. The figure demonstrates that a constant and planned interaction took place among the technical components during the execution of the tasks. Results of the tasks were integrated in combinations designed to yield conclusions on specific strategies and projects. A synthesis of all the tasks was completed to arrive at an overall development strategy and a package of projects for the region. Finally, the proposed strategy and projects were analyzed in terms of their physical, economic, social, and institutional feasibility (Integrating Activities G, H, I and J in Figure 2.) The process facilitated the preparation of a final report.

In effect, this two-week diagnosis of the region's development opportunities and constraints was a second and lengthier iteration of the quick analysis made by the preliminary mission. Although the exercise may appear academic, it was, in fact, practical. It minimized "downtime" and confusion among team members, acted as a check against false expectations, limited the number of issues the study team addressed, fostered teamwork, and helped insure project momentum.

These broad tasks were divided into 104 specific tasks. Instead of open-ended data-gathering efforts, all were directed at answering specific questions, filling data gaps, and confirming or rejecting hypotheses. For each task, the basic information, analyses, and publications each technician would have to prepare were specified.

Next, the team developed sub-matrices for analyzing actual and proposed development activities in the context of the support activity and regulating systems mentioned above, With these tools, the team could see, for example, that excessive socio-economic pressures made further development of irrigated agriculture in the Andean zone unwise, Similarly, in the coastal zone, it discovered both underutilized support-system capacity and institutional constraints on some types of development.

These sub-matrices were combined into a larger matrix to identify analytical gaps on current and potential conditions and systems interactions. This aggregated matrix also served as the basis of sequencing study activities, step three.

III. Executing the study

The study was conducted in two phases. In Phase I, the region's resource problems and potentials were assessed. In Phase II, a regional development plan was prepared and projects for implementing the plan were formulated.

A. Phase I - Activities of the Working Groups

The specific concerns of the five working groups created to carry out the 14 tasks defined during work-plan preparation were:

> *Group 1* (Data Collection and Survey of Existing Projects). Existing mapping and aerial photographic coverage, data on urban and rural settlements, relevant legislation, demographic statistics, and investment projects planned or under way.
>
> *Group 2* (Support Systems Study - Natural Resources and Ecosystems). Soils, forest resources, geology, fish resources, water use management, and "environmental units," (See Glossary.)
>
> *Group 3* (Regulating Systems Study - Economic and Institutional Features). Physical and social infrastructure, institutional structure, and other economic factors.
>
> *Group 4* (Activity System Studies - Sectoral Activities), Agriculture, animal husbandry, and forestry.
>
> *Group 5* (Regional Strategy and Project Proposals). Regional development, programs, and projects. (This group also prepared the interim report.)

On the basis of these analyses, a thorough review of Ecuador's National Development Plan (which was conducted to determine the region's role in national development and the impact nationwide development programs would have on the region), and the natural resource inventory described below, the study team refined the development objectives and strategies on which the regional development plan would be based. Specifically, it decided to devote further study primarily to agriculture, livestock production, forest-based economic activities, fishing, hydroelectric development, tourism, and general development obstacles. Obvious socio-economic constraints included severe underemployment, limited markets, low capacity for productive investment, lack of social services and institutional coordination, a rigid social structure, and illiteracy. The major physical constraints included uneven topography and the inaccessibility of the extensive mountain spurs and the humid lowland forests.

B. Phase I - The Natural Resource Analysis

The natural resource analysis conducted during Phase I took relatively little time. But since it significantly affected the study team's recommendations, it warrants detailed discussion here,

1. The Classification Matrix

Early in the Santiago-Mira study, the team's natural resource specialist conducted a field survey of the study area's major ecosystems and drew up a report for the other team members' use. After three weeks in the field with an Ecuadorian counterpart, the specialist mapped eight "environmental units" on a life-zone map. (See Glossary.) These included (1) the high Andean grasslands (the *paramo* or alpine plain), (2) the densely populated intermountain valleys, (3) the mountain spur forests between the sierra and coast (*estribaciones*), (4) the humid lowland tropical forests, (5) the dry tropical grasslands on the coast, (6) the freshwater swamps and mangrove swamp forests that make up the Rio Santiago's extensive estuary, (7) lakes and rivers, and (8) sea and beaches. (See Map 2 and Table 1.)

Using this classification system, the natural resource specialist identified the potentials, constraints, and interrelationships of the natural components and processes of the major ecosystems. He briefly characterized the climate, vegetation, and the other principal resources of each unit and then analyzed the natural goods and services (see Glossary) available from each. (See Table 2.) Such goods and services include:

1. Those that have economic, social, or cultural value (such as lumber from forests, tourism potential, or archeological interest);

2. Those that have scientific value (such as plant and animal resources for which future uses can be expected to be found); and

3. Those that regulate ecosystem functioning (such as nutrient or water storage).

To list the goods and services for the environmental units, the natural resource specialist consulted with all the study team's other members. Instead of trying to quantify all the natural goods and services in each environmental unit, he simply indicated the features of the natural system, leaving it to planners, sectoral specialists, and decision-makers to determine the relative importance of each for their purposes.

The next step was to determine the impacts various development activities would probably have on the availability of the region's natural goods and services. Impacts were categorized as (1) immediate negative impacts, (2) immediate positive impacts, (3) future negative impacts, (4) future positive impacts, (5) a mixture of positive and negative impacts, and (6) unknown impacts. (See Table 3.)

The analysis of the mountain spur forests centered on the impacts the six most likely types of development (forestry, agricultural colonization, livestock production, road-building, hydroelectric development, and the creation of forest reserves) would have on the environmental unit's goods and services. The project team concluded that forestry development would affect most natural goods and services negatively, although it would have a positive short-term impact on firewood and lumber production. Road-building activities would have both positive and negative long-term effects: positive on scenic tourism and agricultural production potential, but negative on flood control, erosion control, wildlife habitat preservation, and other natural goods and services associated with the intact forest.

In contrast, creating extensive ecological reserves in this zone would ensure the long-term health and availability of most of its natural goods and services. With this approach, less grazing land, firewood, lumber, and game meat would be available, but flood-control, water-storage, aquifer-recharge, erosion control, tourism, recreation, fisheries conservation, and wildlife conservation functions would be preserved.

MAP 2

Table 1 ILLUSTRATIVE FINDINGS FOR SELECTED ENVIRONMENTAL UNITS

	INTERMOUNTAIN VALLEYS	HIGH-MOUNTAIN GRASS LANDS (PARAMO OR ALPINE PLAIN)	MOUNTAIN SPUR FORESTS (ESTRIBACIONES)
a. Character	• Precipitation variable. • Long history of human population has left little natural vegetation. • Planted pine and eucalyptus forests. • Good cropland. • High population density.	• Elevation: above 3,200 m. • Temperature: 1.5-9°C. with high velocity winds. • Wildlife: limited due to harsh conditions and human exploitation. • Vegetation: sparse; few species. • Precipitation: 500-2,000 mm.	• Elevation above 500 m; slopes of the western cordiliera • Variable climate, temperature related to elevation. • Precipitation greater than 3,000 mm annually. • Sources of many rivers In this zone. • Non-arable land due to steepness of slopes. Not appropriate for cropping. • Original vegetation still present, because high humidity and steep

			slopes have tended to limit human settlement: consists of tall trees over 50 m In height, with narrow crowns and straight trunks, abundant epiphytic and parasitic plants, abundant bromeliads. • Steepness of slopes created a series of contrasting biological communities along the elevation gradient.
b. Natural Goods and Services	• River water available for drinking, irrigation, industrial uses. • Remaining natural vegetation of use for medicine, food, artisanry. • Scenic beauty. • High-quality clay for ceramics.	• Source of water: snow melt for drinking and industrial use. • Vegetation: feeds wildlife and some livestock • Wildlife habitat. • Source of scenic beauty.	• Storage of precipitation, regulation of water regime downstream. • Excellent sites for hydroelectric plants. • Wood production. • Wildlife habitat. • Source of genetic resources from a range of rare and endangered plant and animal species. • Storage, cycling, and distribution of nutrients. • Scenic beauty. • Recreation and sport potential.
c. Current or Proposed Uses	• Urbanization, agriculture, and livestock production have greatest impact. • Urbanization eliminates productive agricultural land and changes the area's water regime. • High population puts pressure on water resources, leading to contamination from settlements, increased needs for use of fossil energy, and increased conflicts among sectors for use of same basic resources.	• Extensive livestock grazing, which typically leads to over-grazing, resulting in degraded soils and gradually declining pasture quality. • Local efforts to fight declining land productivity consist of short-term solutions with negative long-term effects: burning pasture, killing wildlife species, and raising number of animal per unit area.	• Proposed colonization and agricultural development projects will reduce the capacity of this ecosystem to store and regulate water flows and will cause Increased sedimentation and erosion. These phenomena could have costly effects on the port of Esmeraldas (sedimentation) or the airport of Esmeraldas (threatened by river bank erosion). • Proposed hydroelectric plants would alter available downstream water and would also open up this underdeveloped area to uncontrolled settlement.
d. Recommended Uses	• Control conversion of good cropland to urban development. • Promote improved management of dairy cattle and agricultural production. • Limit urbanization. • Manage plantation forests for firewood and wood production. • Develop tourism capacity around recreation, sites of historical interest, local artisanry.	• Strictly control livestock grazing. • Set up reserves to preserve representative wildlife and water source.	• Creation of an ecological reserve would allow wildlife to recover and allow vegetation to recover (stopping erosion and increasing the land's capacity to control water flow, particularly floods). • Most of the area is protected by law from development activities. Enforcement needed.

Table 2 - NATURAL GOODS AND SERVICES

GOODS/PRODUCTS
1. Potable water (surface and ground)

	2. Industrial water (surface and ground)
	3. Irrigation water (surface and ground)
	4. Lumber and pulpwood
	5. Firewood
	6. Construction materials from wood (post, beams, etc.)
	7. Ornamental plants (Indoor, landscaping, dry)
	8. Vegetable fibers (rope, cloth)
	9. Medicinal plants
	10. Food for human consumption (fruits, gum, honey, sap, shoots, seeds, nuts, leaves)
	11. Food for human work, animal consumption
	12. Food animals for human consumption (fish, fowl, etc.)
	13. Aquatic plants for human consumption (algae, sponges)
	14. Food condiments (spices, salt, bicarbonate of soda)
	15. Plant chemical substances (dyes, stains, waxes, latex, gums, tannins, syrups, drugs, etc.)
	16. Fertilizers (minerals, fishmeal, guano, other dung, etc.)
	17. Aquatic precious/semiprecious materials (pearl, coral, conchs, mother of pearl)
	18. Materials for artisan work (rock, wood for carving, fibers for basketmaking, etc.)
	19. Metallic minerals (bauxite, ores, nuggets, etc.)
	20. Non-metallic minerals (asbestos, clays, limestone, etc.)
	21. Construction materials (sands, clay, cinders, cement, gravel, rocks, marble, etc.)
	22. Mineral nutrients (phosphorus)
	23. Mineral dyes and glazes
	24. Hides, leather, skins
	25. Other animal materials (bones, feathers, tusks, teeth, claws, butterflies)
	26. Other vegetation materials (seeds, pods)
	27. Live fish (ornamental, pets)
	28. Live animals for pets and zoos
	29. Live animals for human work
	30. Live animals for research
	31. Fossil fuels (crude oil, natural gas, coal)
	32. Other fuels (peat, other organic matter, dung, biomass)
	33. Livestock forage
ECOSYSTEM OPERATIONS, MAINTENANCE, ADAPTATION, AND EVOLUTION	
	1. Nutrient cycling
	2. Nutrient storage
	3. Nutrient distribution (floods, dust and sediment transport, etc.)
	4. Photosynthesis-respiration
	5. Adaptation
	6. Self-regulation
	7. Competition testing and design (population control evolution)
	8. Mineral cycling
	9. Habitat for local land, air, aquatic animals, Insects, and other life forms (feeding, breeding, nursery, shelter, etc.)
NON-TANGIBLE GOODS AND SERVICES	
	1. Windbreak
	2. Shade

	3. Recreational use of water (swimming, boating, skating, water skiing, sailing, surfing, scuba)
	4. Recreational use of land (hiking, spelunking, climbing)
	5. Recreational use of air (flying, gliding, parachuting, kiting)
	6. Recreational use of animals (sport hunting and fishing, insect collecting)
	7. Recreational use of ecosystem (sightseeing, tourism)
	8. Scientific tourism (exploring)
	9. Value development and storage
	10. Spiritual development and storage
	11. Historical value
	12. Cultural value
	13. Early warning system (weather and climate change)
	14. Moisture modification (humidity)
	15. Temperature modification
	16. Light modification
	17. Ultraviolet and other radiation filtration
	18. Storage of life form adaptive (genetic) Information
	19. Protection of Indigenous cultures and customs
ECONOMIC SERVICES	
	1. Energy sources (wind, solar, hydro, tides, biomass, geothermal)
	2. Dilution of contaminants
	3. Decomposition of contaminants (oxidation, evaporation, dissolution)
	4. Transport of contaminants (wind, water, animal consumption, air and watershed dilution of contaminants)
	5. Erosion control
	6. Sediment control
	7. Flood control
	8. Ground water recharge
	9. Space for urban, Industrial, agriculture occupations, roadways, canals, airports
	10. Waste and contaminant storage
	11. Physical support for structures
	12. Climate control and protection
	13. Disease control and protection
	14. Storm buffer

Table 3 - DEVELOPMENT IMPACTS ON THE GOODS AND SERVICES OF THE MOUNTAIN SPURS ENVIRONMENTAL UNIT

	ACTUAL AND PROPOSED ACTIVITIES					
NATURAL GOODS AND SERVICE	**FOREST EXPLOITATION**	**COLONIZATION (AGRICULTURE)**	**COLONIZATION (LIVESTOCK)**	**HIGHWAYS**	**ECOLOGICAL RESERVE**	**HYDROELECTRIC DAM IN UPPER (INDUSTRIAL) WATERSHED**
Hydroelectric Energy Resources	■	■	■	■	■	□
Edible Plants	**?**	■	■	-	□	-
Flood Control	■	■	■	■	□	□
Erosion Control	■	■	■	■	□	-

Wildlife Habitat (Terrestrial and aquatic fauna) (Nursery, breeding, shelter, feeding)	■	■	■	■	□	⬓
Gene Bank (Animal)	■	■	■	-	□	-
Gene Bank (Vegetable)	■	■	■	-	□	-
Preservation of Endangered Species	■	■	■	■	□	□
Leather and Skins	?	■	■	-	□	-
Scenic Tourism	■	■	■	□	□	□
Scientific Tourism	■	■	■	■	□	□
Spiritual Value	■	■	■	□	□	□
Scientific Value	■	■	■	■	□	□
Nutrient Storage	■	■	■	-	□	-
Nutrient Cycling	■	■	■	-	□	-
Water Storage	■	■	■	■	□	□
Ground Hater Recharge	■	■	■	-	□	□
Dilution of Water Contaminants	■	■	■	-	□	-
Lumber	■○	■	■	-	□●	□
Fuelwood	■○	■	■	-	□	□
Vegetable Fibers	■	■	■	-	□	-
Ornamental Plants	■	■	■	-	□●	-
Regulation of Ecosystems (Fauna)	■	■	■	-	□	-
Regulation of Ecosystems (Vegetation)	■	■	■	-	□	-
Edible Fauna	■	■	■	-	□●	-
Fishing	■	■	■	-	□●	⬓
Live Animals for Pets	■	■	■	-	□●	-

Live Animals for Medical Research	■	■	■	-	□●	-
Tourism and Sport Hunting	■	■	■	-○	□●	-
Metalic Minerals	?	?	?	?	?	■
Industrial Water	■	■	■	■	□	□
Construction Materials (Vegetative)	■	■	■	-	□	-
Plant Chemical Substances	■	■	■	-	□	-
Medicinal Plants	?	?	■	-	□	-
Feathers	■	■	■	-	□	-
Ornamental Fish (Pets)	■	■	■	■	□	■
Cultural Value	■	■	■	■	□	■
Non-Vegetative Construction Materials	?	?	?	?	-□	■
Agricultural Production	■○	■○	■	□○	■●	■
Endangered Plant Species	?	■	-	-	-	■

Keys.:

● Immediate Negative Impact
○ Immediate Positive Impact
■ Future Negative Impact
□ Future Positive Impact
? Unknown Impact
⬓ Complex of Negative and Positive Impacts. [r]

The Andean region turned out to have more development potential than the mountain spur forests. In the valleys, irrigation projects, urban growth, industrialization, reforestation, and livestock development were options. Urban growth, industrialization, and livestock development would all have both long-and short-term negative effects since the region was already densely populated and some resource-management practices were already in use. But reforestation, animal husbandry, and assistance projects afforded both immediate and long-term benefits, including the reversal of the resource degradation. Irrigation in this area of limited water supply would have both negative and positive impacts: while it would enhance agricultural production, pastureland, fisheries, and flood control, it would also decrease the amount of water available for hydropower development and exhaust the water resource's capacity to dilute agricultural pesticides and other contaminants.

2. Review of Existing Project Proposals

Besides characterizing the area's environmental units, the natural resource specialist evaluated several large projects that national agencies had proposed for the region. Using a sector-by-sector list the study team had prepared on the advice of the programming mission, the specialist located both proposed and existing development projects on a regional map before assessing how each major project would reduce or increase the region's potential for other development opportunities.

For example, proposals for hydroelectric projects in the mountain spurs appeared sound by traditional measures - the vertical drop of the rivers and the volume of flow resulting from precipitation. However, roads for construction and maintenance crews would have to be built before dams and power-generating plants could be constructed. Moreover, road-building would probably give rise to spontaneous colonization, and in this zone of steep slopes and high rainfall, lands cleared by settlers would quickly lose their topsoil and contribute to sedimentation in the lower valleys. A second major drawback to hydroelectric projects would be possible estuary damage. Although a properly managed estuary at the mouth of the Rio Santiago around San Lorenzo could support recreation, additional commercial and artisanal fisheries, and tourism, the natural water regime would be upset if hydroelectric development occurred upstream and other development activities led to deforestation in the mountain spurs.

The natural resource specialist specified the data that would have to be collected on the relations between the mountain spur forests and the estuary before all the costs and benefits of hydropower development in the region could be calculated. In the case of a proposed road that would have caused erosion, he suggested an alternative route that would entail less damage to the ecosystem. He also proposed abandoning plans for shrimp-farming development that involved capital-intensive artificial tanks, and recommended improving management of estuarine shrimp production under natural conditions instead.

Identifying and analyzing such trade-offs early in the planning sequence led to tremendous savings, whether through substituting better alternatives or abandoning projects that would eventually prove unworkable. Overall, the idea was not to halt development but to guide investment toward the best all-round development alternatives - those that offer the greatest returns over time without exhausting the resource base.

3. Conflict Identification and Resolution

To uncover potential resource use conflicts in Santiago-Mira, the natural resource specialist constructed a matrix arraying development sectors along both axes. With respect to each cell in the matrix, he asked "What will be the effect of activity (x) on activity (y)?" For each important conflict, he gave a tentative answer. This exercise helped planners decide initially which resources could be intensively exploited at acceptable costs and which could not.

Table 4 is a partial matrix analysis of the extensive coastal estuary around San Lorenzo. On this matrix, sectoral overlaps indicate potential conflicts, For example, fisheries development in the estuary might impinge upon forestry activities since the mangroves would have to be at least partially cleared to make way for shrimp farms. Alternatively, most of the mangroves would have to be preserved to permit other types of marine life to reproduce. By the same token, forestry sector activities could impinge upon fisheries activities if mangrove harvesting were undertaken at the expense of fish and shrimp habitats.

To construct this matrix, the natural resource specialist sounded out other team members, counterparts in various sectoral agencies, and local citizens. To identify the full range of direct and indirect impacts of development activities, he asked members of both the "target population" and those who could be inadvertently affected what changes they would recommend in the proposed development.

The report also identified the dry tropical portion of the coastal zone as the region's best ecosystem for livestock production and recommended improving the use of trained personnel to increase food and meat production in the Andean valleys. Highest priority was assigned to technical assistance, credit mechanisms, and the development of provincial urban centers.

The report's management proposals emphasized the importance of integrating and coordinating development activities. Besides strengthening existing physical, economic, and social links within the region, the study team recommended closely coordinating sectoral activities and national, regional, and local initiatives.

Table 4 - MATRIX OF POTENTIAL INTER-SECTORAL IMPACTS AND CONFLICTS OVER RESOURCE USE IN THE ESTUARY AT SAN LORENZO

Impact on: Activities	Fisheries Activities	Forestry Activities	Transport Infrastructure
Fisheries Activities	1,2	3,4	5
Forestry Activities	6		
Transport Infrastructure	7		8

Impacts of Fisheries Development on Natural Fisheries:

1. Shrimp farming reduces natural fish populations by destroying breeding and nursery habitat.
2. Shrimp farming reduces natural shrimp populations through habitat destruction and larvae collection.

Fisheries Activities on Forestry Activities:

3. Shrimp farming reduces mangrove forests available for other types of exploitation.
4. Natural fisheries require conservation of mangrove forests for fish nurseries, prohibiting mangrove exploitation.

Fisheries Activities on Transport:

5. Conservation of fisheries breeding areas requires that roads be rerouted or built much more expensively (i.e., with

culverts to allow free passage of water).

Forestry Activities on Fisheries Activities:

6. Extensive logging of mangrove forests reduces shrimp and fish habitat.

Transport Sector Development on Fisheries Activities:

7. Certain types of road construction (e.g., without culverts) destroys fisheries by impeding water flow. For example, formerly brackish areas can turn freshwater or saline.

Transport on Transport:

8. A new road constructed above the railroad along steep slopes in highly erodible areas can significantly increase the railroad's maintenance costs.

Another recommendation was to capitalize on under-exploited forest resources, though not without first studying the probable impacts of greater exploitation. Since the forestry laws were not enforced and the forest administration could not manage a major forestry development program, the study team recommended making improved administration, forest management, and development a national priority. Doing so would entail increasing autonomy, funds, and personnel for the forest department and coordinating its activities with those of the Agrarian Reform and Colonization Institute.

The natural resource specialist also proposed integrating an "environmental quality objective" with the study's other, more conventional goals to help insure that development activities do not unnecessarily foreclose future options and that the welfare of all populations affected by the project would be taken into account.

4. Conclusions and Recommendations of the Natural Resources Working Group

The Santiago-Mira study's environmental report summarized the region's opportunities and development constraints. It also set forth a broad range of recommendations, including management options.

Specifically, the report called attention to the economic importance of the estuary of Limones and San Lorenzo: already a habitat for many coastal marine species and a breeding ground for deep-sea species, it could also supply food for local, regional, and national markets. Because the estuary's fresh water comes from the humid forests in the mountain spurs, the report called for further research on the estuary's relation to upland forests and swamps, the nature of the water regime, and its role in the life cycles of major estuarine species. It also recommended identifying all commercially valuable estuarine species and strictly regulating the use of the mountain spurs, humid lowland forests, and swamps until the economic potential of the estuarine fisheries was assessed.

For the humid tropical forests of Esmeraldas, the study team recommended sustained forest production instead of clear-cutting for agricultural or livestock development. It also recommended developing river transport. Although canals would have to be built and transportation cooperatives set up to finance and maintain motor boats, a river transport system would be less likely than a road system to open the area up to uncontrollable colonization.

Phase I culminated in the production of 32 sectoral reports reviewed and published by JUNAPLA and integrated into a synthesis document, *Bases for the Development of Region I.*

The estuary of Limones and San Lorenzo is an important breeding ground for these deep sea species.

C. Phase II - The Regional Development Strategy

For Phase II, 13 working groups were established. They covered the regional development strategy, the water use plan, institutional arrangements, the mining program, the feeder-road program, agricultural projects, the forest-industries development program, forestry projects, agro-industry projects, irrigation projects, the housing program, the education plan, and final report preparation. The groups' first task was to select the program and project proposals most likely to serve JUNAPLA's overall objectives for the region. The selection was based on a thorough examination of likely economic and social costs and benefits. Next, a four-year investment plan (1980-84) for the projects that fared best in this comparative analysis was developed. This report was submitted to JUNAPLA for review and forwarded to other national sectoral agencies for use in creating sectoral projects for the region.

With the investment plan completed, the study team decided which parts of the study would have to be subcontracted. INERHI hired the Military Geography Institute to take aerial photographs of the region, the National Regionalization Planning Agency (PRONAREG) to study the Santiago River basin, and the Center for Planning and Social Research (CEPLAES) to undertake anthropological studies in the region's rural communities. Other agencies were contracted to diagnose the tourist industry, the manufacturing sector, and regional institutions. Throughout, JUNAPLA coordinated and reviewed all public sector activities.

At the end of Phase II, JUNAPLA and the interdisciplinary groups prepared a report on the proposed development strategy program proposals. The projects in these programs were developed to the pre-feasibility level. (See Glossary.)

D. Phase II - The Final Report

The Santiago Mira study took three years to complete and involved 128.7 person-months of OAS specialists and 520 person-months of Ecuadorian counterparts. (The sequence of participation of OAS specialists is shown in Figure 3.)

The final report contained sector assessments, the full-blown regional development plan, and 110 project proposals grouped in five programs: (1) basic government conservation and research services, (2) integrated rural development and colonization, (3) direct production, (4) economic infrastructure, and (5) social infrastructure.

Agricultural and livestock production held out the most development potential for the region as a whole, though the "agricultural frontier" was nearly exhausted in the densely populated Andean valleys. To increase the yields on currently used lands, the project team recommended investing in training related to the introduction of improved technologies, In Esmeraldas, where productive land could be increased significantly, livestock production could be intensified by raising sheep instead of cattle.

The forestry sector was discussed as a potential source of new jobs. In addition, a river-transport system was proposed to make Esmeralda's chief forest resources accessible.

Three recommendations were put forth for developing the region's considerable coastal, pelagic, and interior fisheries. In the coastal area, new industries for processing, packaging, and distributing fisheries products could be developed. In the Andean zone, such profitable fish as trout could be introduced to help meet the area's food needs and relieve the pressure on agricultural land. The third recommendation was to offer specialized fisheries-management training, credit, and financial support to fishermen.

Since no systematic and comprehensive studies on the area's fisheries, forestry, and mining sectors were available, the report called for additional data on these resources. Besides data gaps, it also identified other development constraints: severe under-employment, limited markets, low regional capacity for investment, limited economic integration among the provinces, a rigid social structure, illiteracy, lack of coordination among regional and national institutions, and lack of regional planning.

The refined version of the regional development plan reflected JUNAPLA's conviction that the region should exploit those resources that give it a comparative advantage over the rest of Ecuador. More specifically, JUNAPLA had determined that (1) the regional GNP should increase at a rate slightly higher than the national GNP (7.3 percent vs. 6.5 percent); (2) the agriculture, livestock, fisheries, mining, and transport sectors should grow especially rapidly compared to these sectors' growth in the rest of the country; (3) regional employment should grow by 4.2 percent (versus 4 percent elsewhere in Ecuador); and (4) development in the region should contribute to border integration with Colombia and strengthen both inter-and intra-regional economic links.

Each of the development projects identified in the final plan was analyzed in terms of its costs, benefits, and relationship to 11 more general regional development objectives set forth by JUNAPLA:

1. Improve the population's standard of living.
2. Redistribute income.
3. Increase the regional GNP.
4. Save foreign exchange.
5. Create jobs.
6. Improve the utilization of natural and human resources.
7. Develop human resources.
8. Improve socio-economic organization and increase the population's participation in development activities.
9. Support rural development.
10. Improve integration within the region and also between the region and the national economy.
11. Increase linkage among sectoral activities within the region.

In the final plan, the time-frame, location, cost, and agency responsible for each project were also specified. The availability of internal and external financing for each project was assessed along with the possibility of using the same source to finance multiple projects serving one development objective.

The study team recommended investing US$984 million in the region between 1981 and 1984. (See Table 5.) The largest investment, 40 percent of the total, was allocated to developing port facilities, a road system, telecommunication services, energy and rural electrification projects, irrigation systems, and other infrastructure. Since regional integration, rural-urban income redistribution, and the development of provincial urban centers were major project goals, roads were accorded the highest priority.

Figure 3 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES

Table 5 - INVESTMENT PROPOSALS (1981 US dollars) ($1,000)

PROGRAMS AND PROJECTS	UP TO 1980 A	1981 B	1982-1984 C	Total 1981-1984 B + C	%
1. BASIC GOVERNMENT RESEARCH ON CONSERVATION	134.1	1,674.3	10,116.2	11,790.5	1.20
1.1 Conservation of Forest and Wildlife	134.1	1,554.3	7,870.4	9,424.6	0.96
1.2 Research on Mineral Resources	-	120.0	2,245.8	2,365.8	0.24
2. MULTISECTORAL DEVELOPMENT IN SPECIFIC AREAS	2,760.0	1,566.0	25,162.0	26,728.0	2.72
2.1 Integrated Rural Development	2,760.0	1,074.8	24,653.2	25,728.0	2.61
2.2 Colonization	-	491.2	508.8	1,000.0	0.10
3. PRODUCTION SECTORS	6,012.0	26,845.2	154,045.1	180,890.3	18.38
3.1 Livestock and Agriculture	40.0	-	13,135.0	13,135.0	1.33
3.2 Agroindustry	42.0	-	180.0	180.0	0.02
3.3 Forests and Related Industries	6,020.0	4,000.0	102,080.0	106.080.0	10.78
3.4 Fishing and Related Industries	-	1,800.0	16,000.0	17,800.0	1.81
3.5 Industry and Crafts	-	245.1		245.2	0.02
3.6 Oil and Natural Gas	-	20,000.0	15,000.0	35,000.0	3.56
3.7 Tourism	-	800.0	7,650.0	8,450.0	0.86
4. ECONOMIC INFRASTRUCTURE	5,581.5	34,180.4	357,874.9	392,055.3	39.85
4.1 Ports	1,400.0	2,800.0	16,600.0	19,400.0	1.97
4.2 River Transport	-	-	12.0	12.0	0.01
4.3 Irrigation	4,724.0	672.0	5,708.9	6,380.9	0.65
4.4 Telecommunications	800.0	1,172.0	11,260.0	12,432.0	1.26
4.5 Population and Market Centers	-	-	800.0	800.0	0.08
4.6 Energy and Rural Electrification	36,942.8	10,900.0	122,537.0	123,437.0	12.55
4.7 Primary Roads	8,780.2	10,092.0	123,949.6	134,041.6	13.62
4.8 Secondary Roads	590.2	5,654.0	81,655.2	87,309.2	8.87
4.9 Urban Infrastructure	2,644.2	2,890.4	5,352.0	8,242.4	0.84
5. SOCIAL INFRASTRUCTURE	57,540.5	77,900.6	294,547.6	372,448.2	37.85
5.1 Housing	12,109.3	18,162.8	90,957.1	109,119.9	11.09
5.2 Potable Water and Sewers	5,383.5	6,724.0	9,628.0	16,352.0	1.66
5.3 Education and Training	36,017.7	39,176.9	170,264.5	209,441.4	21.29
5.4 Health	4,030.0	11,340.0	16,418.0	27,758.0	2.82
5.5 Community Building and Social Welfare	-	2,496.8	7,280.0	9,776.8	0.99
TOTAL	122,418.1	142,166.4	841,745.7	983,912.1	100.0

The second largest investment, 38 percent, was allocated to developing regional social infrastructure - new housing and structural rehabilitation, improved drinking-water supply, improved health services, and increased training and educational opportunities. Of these, education and training received the most funds (21 percent of the total investment) since illiteracy and lack of training reinforced the region's high rate of unemployment. Housing (which received 11 percent of the total investment) was also stressed since the programming mission and the study team concurred that the grave lack of urban social services and infrastructure in the region undermined the region's economic development.

Another major investment (10.8 percent) proposed was for forestry development to create new jobs and to increase local income. The report emphasized the economic value of the region's substantial humid lowland tropical forest and the importance of strengthening the Ecuadorian Forestry Department.

IV. Implementing the recommendations

The Santiago-Mira project's final report was presented to the Government of Ecuador in May of 1981. One year later, a DRD staff member assessed the impact of the plan by interviewing officials in the two former counterpart agencies and in other collaborating agencies. The results of that assessment follow.

A. The Regional Development Authority

The understanding at the outset of the study was that either during or soon after the study a new regional development authority would be created for the region containing the Santiago-Mira basins. One project goal was, in fact, to work closely enough with provincial and municipal authorities to gain their active support for creating such an entity.

In 1978, when project negotiations started, interest in regional development planning was particularly strong in Ecuador. The United Nations Development Programme had helped JUNAPLA design a regional planning system and divide the country into eight development planning regions, There was considerable enthusiasm for regional planning in the Santiago and Mira basins as a pilot effort, and JUNAPLA expressed great interest in DRD's use of resource evaluation as the basis for integrated regional development planning.

One year after the plan was published, the regional authority had not yet been created. JUNAPLA continued to promote such an entity, but at the regional level the lack of agreement on the seat of the authority had slowed progress. The three provincial capitals all wanted to be the seat, and they had been unable to negotiate a compromise. Nevertheless, intense lobbying indicated strong regional interest. In mid-1982, negotiations focussed on safeguards to ensure that the regional seat would distribute regional development funds to the other provinces.

B. Progress to Date

It is too early to tell whether the regional plan will be implemented. INERHI had the study hand-delivered to all the sectoral agencies involved in project identification and formulation, but INERHI itself is taking responsibility for implementing only the water projects. On the other hand, the study has been an unqualified success as a spur to institution-building. The study was designed to break down workplan preparation into manageable serial tasks, starting with data collection and proceeding to increasingly analytical and integrative components. Because all the plan's components had been conceptualized in fine detail, effective terms of reference could be written for the many consultants who joined the study temporarily. Consequently, INERHI plans to design future studies in the same way.

Many project proposals were implemented between mid-1981 and mid-1982. INERHI moved ahead on five of the seven irrigation projects proposed, and the Ministry of Public Works, the Transport Division, the Ministry of Agriculture, and the National Housing Board (JNV) began to execute several of the first-year projects proposed in the plan. Budget cuts had kept both the Ministry of Public Works and JNV from executing more, but the agencies were optimistic about the coming year's budget. In JNV, staff members were routinely using the study's methodology for designing regional housing programs.

As for the study's goal of better integrating the border between Colombia and Ecuador, several factors augur well. This is one of the world's most open borders, with people and goods flowing in both directions and discord almost unknown. Moreover, both national governments are publicly dedicated to the integrated development of the frontier. A regional development study compatible with the Santiago-Mira study was conducted on the Colombian side of the border, and coordinating the studies disclosed several opportunities for the two countries to enjoy economies of scale in the provision of services and the production and marketing of goods. Another major outcome has been numerous informal meetings between Ecuadorian and Colombian technicians and officials. Especially important have been meetings to coordinate the design and installation of communications systems.

According to both the counterpart agencies and the study team, the natural resource specialist's work was also highly successful. The seminar given to the counterpart institutions to explain the methodology for determining environmental units, natural goods and services, and potential conflicts over resource use was praised a year later by JUNAPLA's chief of regional planning, who contended that all the agency's planning projects should feature such an environmental component.

Apart from such institutional benefits, the environmental analysis also helped Ecuadorian planners identify misbegotten development proposals before funds were committed. The proposal for the Esmeraldas landfill project was dropped, for example, and an obscure Ecuadorian law prohibiting land development in the mountain spur zone came to light. While the Ministry of Transport has not yet decided whether to abandon a road proposed for the region in favor of a less erodible route, at least its road-building division is now acquainted with environmental analysis.

Since the creation of the regional authority is still a strong possibility, a final evaluation of the project's success cannot be made. Meantime, the Santiago-Mira basin study serves as a new planning model in several Ecuadorian agencies, and many of the projects proposed by the planning team are under way.

V. Lessons learned

The **DESIGN STAGE** of the Santiago-Mira study demonstrated the importance of:

1. Getting a quick picture of the region's development problems and potentials as the first step in a development planning study. This involved sending an "advance man" to the study area to determine the principal issues and identify experienced local technicians, convening a two-week meeting of these local experts with an outside facilitator experienced in study design, and synthesizing the group's consensus on development problems and potentials to arrive at a tentative regional strategy - the basis for the workplan.

2. Proposing a role for the study region in the national economy. In the Santiago-Mira study, the government tentatively accepted the proposed strategy, becoming more convinced of its validity as the study progressed and finally becoming committed to conducting similar planning activities elsewhere in Ecuador.

The **EXECUTION STAGE** showed the value of:

1. Broadening the planning perspectives of in-country sectoral technicians, The fact that no Ecuadorian agency had both the technical capability and the experience with interdisciplinary studies needed to manage a planning study caused administrative problems. But the pay off was in institution-building: INERHI's concept of planning expanded markedly as a result of its involvement in the Santiago-Mira study,

2. Carefully relating development proposals to assessments of resource capacity and geophysical constraints. Because the Santiago-Mira basin is physically and culturally diverse, the natural resource specialist's efforts to foretell how developing one part of the basin would affect development in the other parts were especially critical.

3. Defining the technicians' tasks in terms of problems instead of sectors or disciplines. The use of a problem-oriented workplan greatly facilitated the briefing of short-term technicians, reduced the need to revise technicians' reports, and made it relatively easy to integrate the work of technicians in different fields. Work on land-tenure problems, for example, specified collaboration by the soil scientist, the legal expert, and the agricultural specialist. The workplan helped them coordinate their work and relate it to work on agricultural development projects.

4. Identifying potential problems early in the planning process. In the Santiago-Mira planning study, this entailed identifying comparatively benign development activities that offered benefits similar to those of environmentally damaging projects, making effective use of natural services as well as natural goods, getting the sectoral agencies and local people affected by development decisions involved in resolving potential conflicts, and considering the environmental impacts of specific projects as part of pre-feasibility analyses.

5. Viewing project proposals as part of a single, coherent development plan instead of as isolated activities.

6. Conducting separate but coordinated studies on both sides of a national border and developing information in comparable detail, Where joint development is not feasible, this approach assures that neither country is disadvantaged in negotiations. It also enables both countries to benefit from economies of scale by serving markets and buying raw materials together.

The **IMPLEMENTATION STAGE** illustrated the benefits of:

1. Training local technicians so international technical assistance can be phased out or reduced in subsequent planning studies. DRD's role in the earlier Esmeraldas study was significantly greater than in the Santiago-Mira study. In the Napo and San Miguel River basin study that followed, DRD played an even smaller role - providing highly specialized technical services at Ecuador's request.

2. Formulating technically and economically sound projects that have a chance of being adopted even if all the features of a development plan are not,

3. Ensuring that the agency that will eventually implement the proposals is dedicated to the development project proposals and has the resources to follow through.

4. Including in-service training of the personnel of national agencies participating in studies so as to foster institution-building.

5. Avoiding both excessive planning and the identification of out-of-context investment projects. In this study, the project agreement between the Ecuadorian Government and DRD explicitly indicated how much time would be spent on planning, and how much on project identification. By holding to this schedule, the study team struck the necessary balance between the two major study activities.

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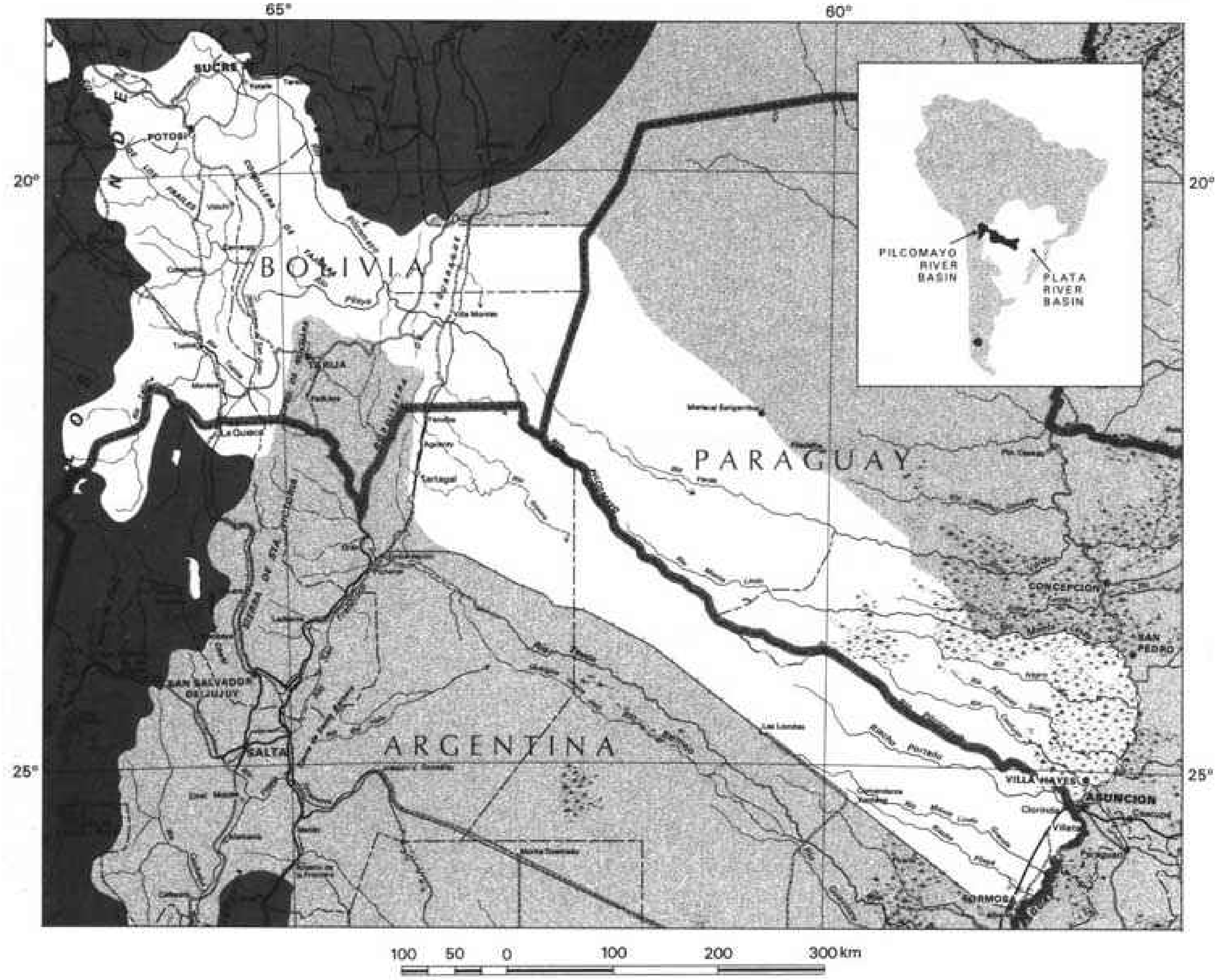
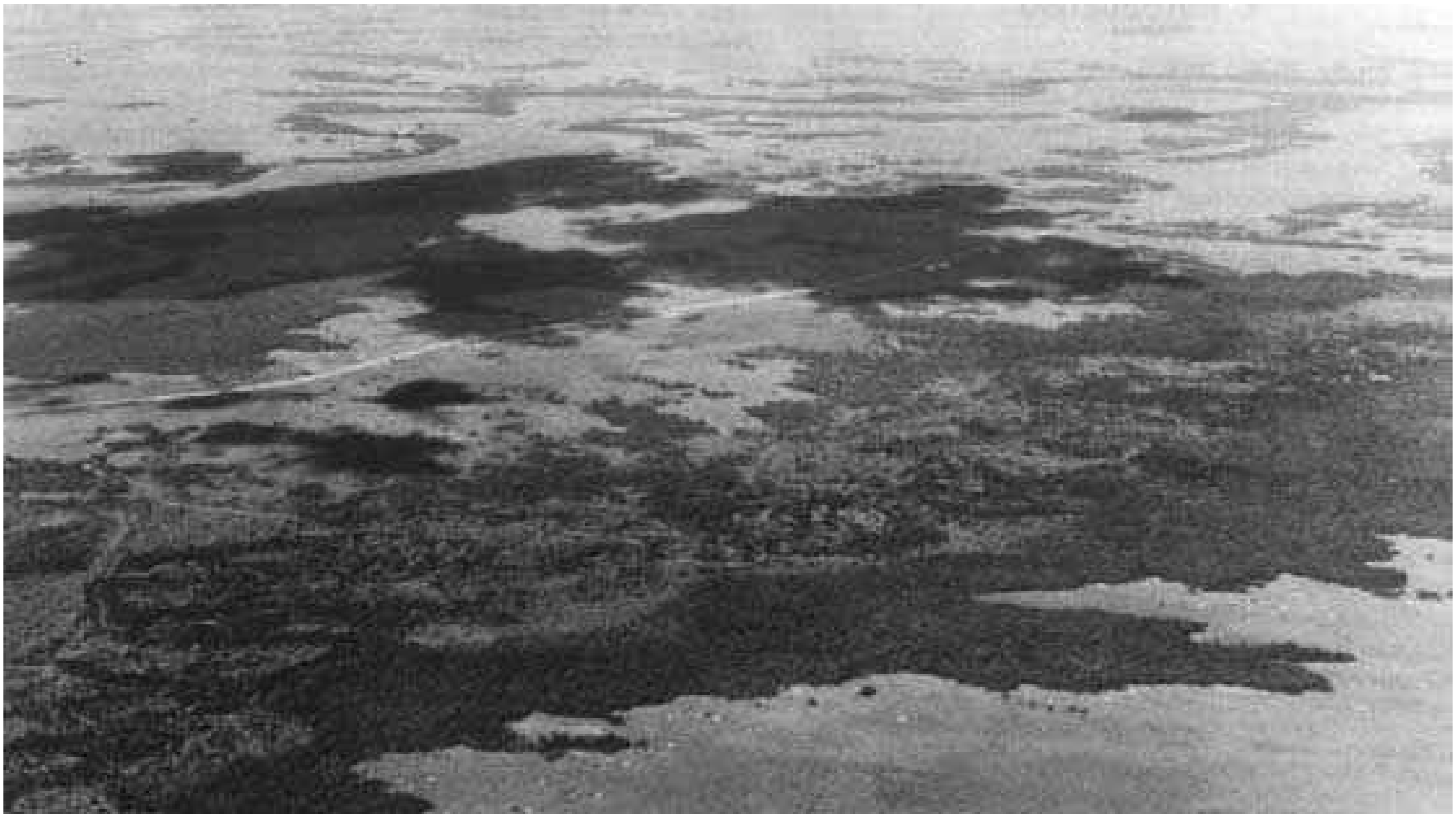
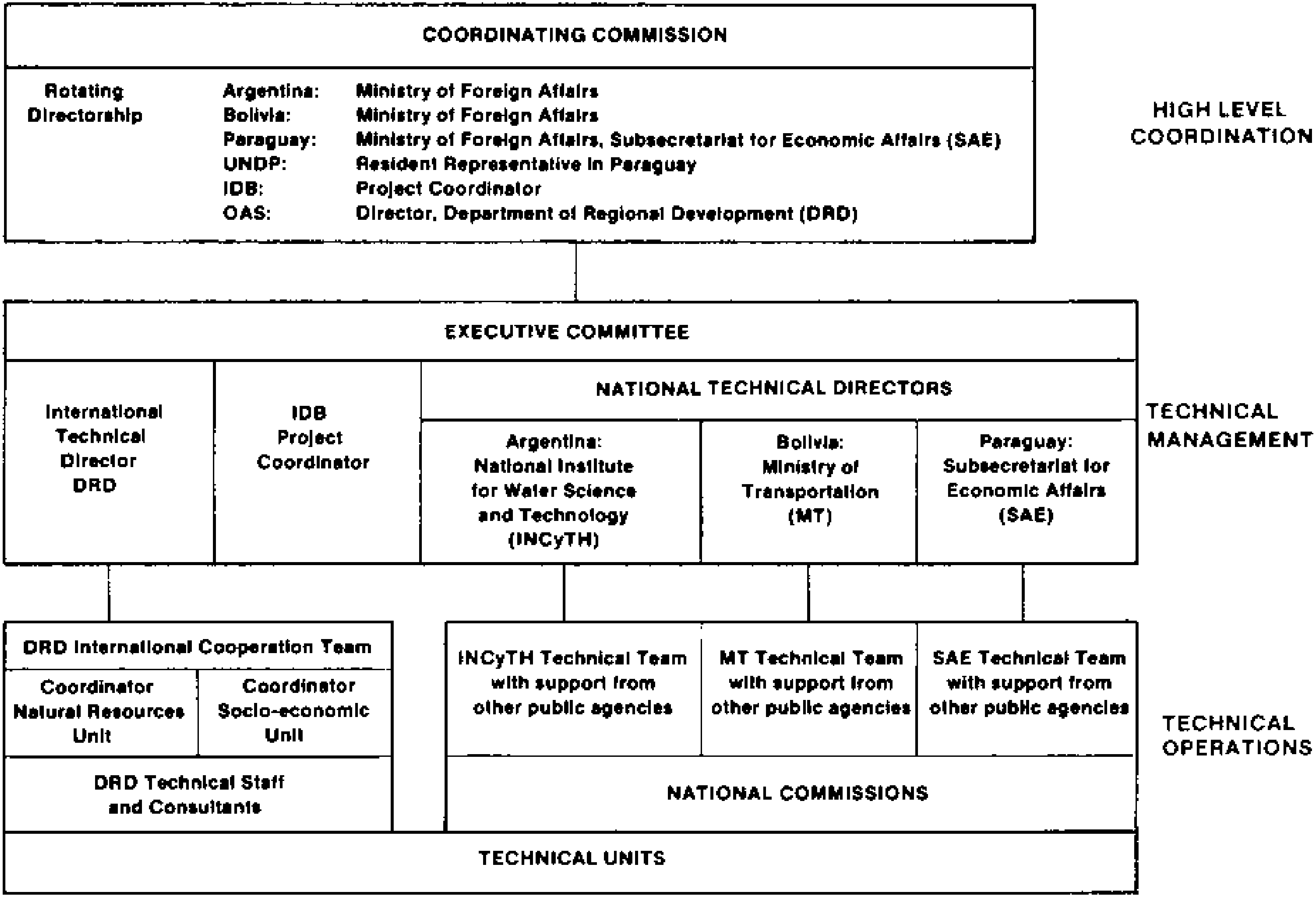


Location of the Pilcomayo River Basin, Argentina, Bolivia and Paraguay

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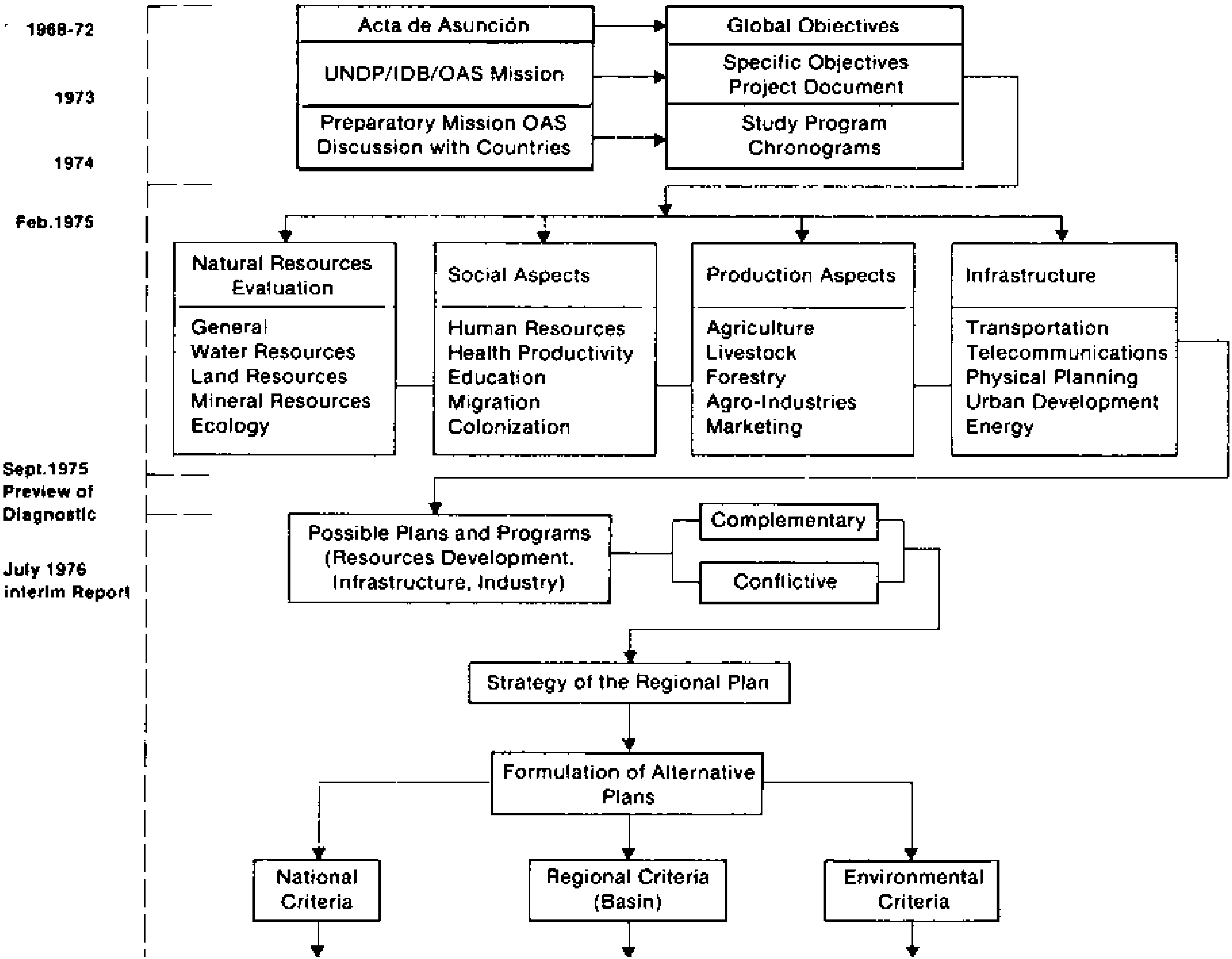
Rotating Directorship
Argentina: Ministry of Foreign Affairs
Bolivia: Ministry of Foreign Affairs
Paraguay: Ministry of Foreign Affairs, Subsecretariat for Economic Affairs (SAE)
UNDP: Resident Representative in Paraguay
IDB: Project Coordinator
OAS: Director, Department of Regional Development (DRD)
HIGH LEVEL COORDINATION
EXECUTIVE COMMITTEE
International Technical Director DRD
IDB Project Coordinator
NATIONAL TECHNICAL DIRECTORS
Argentina: National Institute for Water Science and Technology (INCyTH)
Bolivia: Ministry of Transportation (MT)
Paraguay: Subsecretariat for Economic Affairs (SAE)
TECHNICAL MANAGEMENT
DRD International Cooperation Team
Coordinator Natural Resources Unit
Coordinator Socio-economic Unit
DRD Technical Staff and Consultants
INCyTH Technical Team with support from other public agencies
MT Technical Team with support from other public agencies
SAE Technical Team with support from other public agencies
NATIONAL COMMISSIONS
TECHNICAL OPERATIONS
TECHNICAL UNITS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Preparatory Mission OAS
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Specific Objectives
Project Document
Study Program
Chronograms
Natural Resources Evaluation
General
Water Resources
Land Resources
Mineral Resources
Ecology
Social Aspects
Human Resources
Health Productivity
Education
Migration
Colonization
Production Aspects
Agriculture
Livestock
Forestry
Agro-Industries
Marketing
Infrastructure
Transportation
Telecommunications
Physical Planning
Urban Development
Energy
Possible Plans and Programs
(Resources Development.
Infrastructure. Industry)
Complementary
Conflictive
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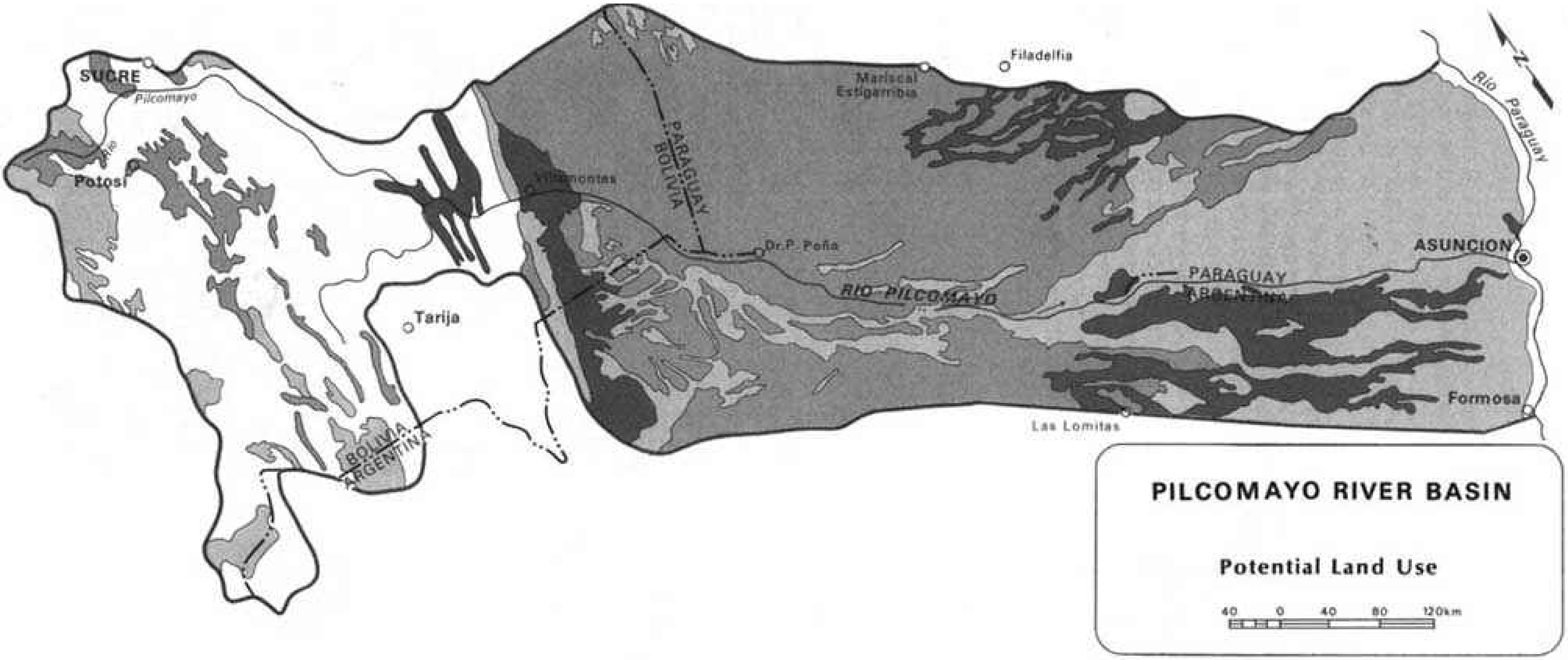
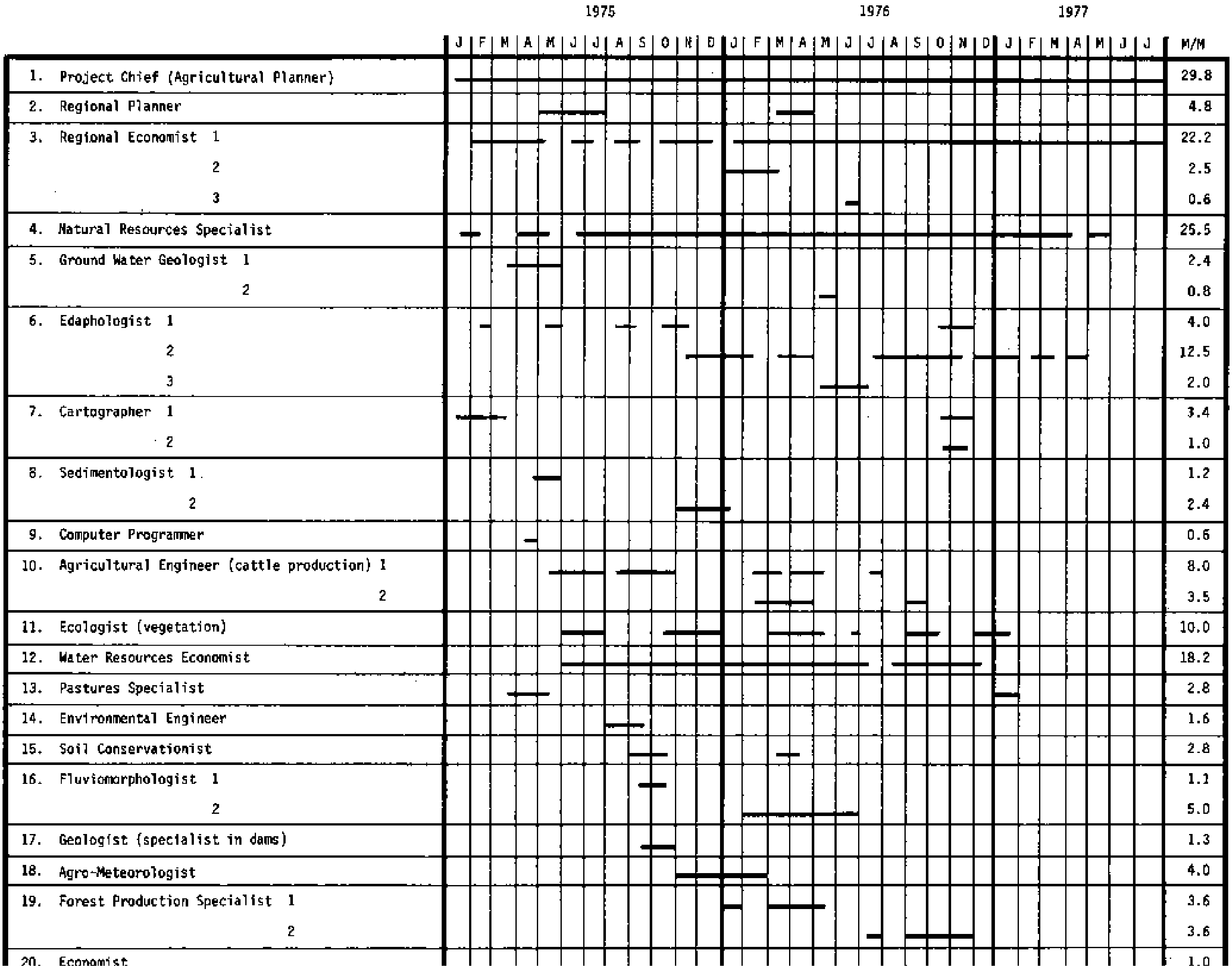
Formulation of Alternative Plans
National Criteria
Regional Criteria (Basin)
Environmental Criteria


October 1977
Final Report
Published
Comparison of Plans
Recommended Regional Plan



POTENTIAL LAND USE	LIMITATIONS	PROBLEMS
Suitable for cultivation of one annual crop in rotation with pasture.	Moderate.	Moderate risk of water deficit. Somewhat excessively drained, medium susceptibility to erosion.
Suitable for improved pasture.	Moderate to somewhat severe.	Slow permeability, occasional water deficit, lightly eroded.
Suitable for grazing and forestry.	Severe.	Frequently flooded, lightly eroded.
Unsuitable for agriculture.	Very severe.	Eroded, hard pan impeded drainage, rocky, steep slopes.


1975
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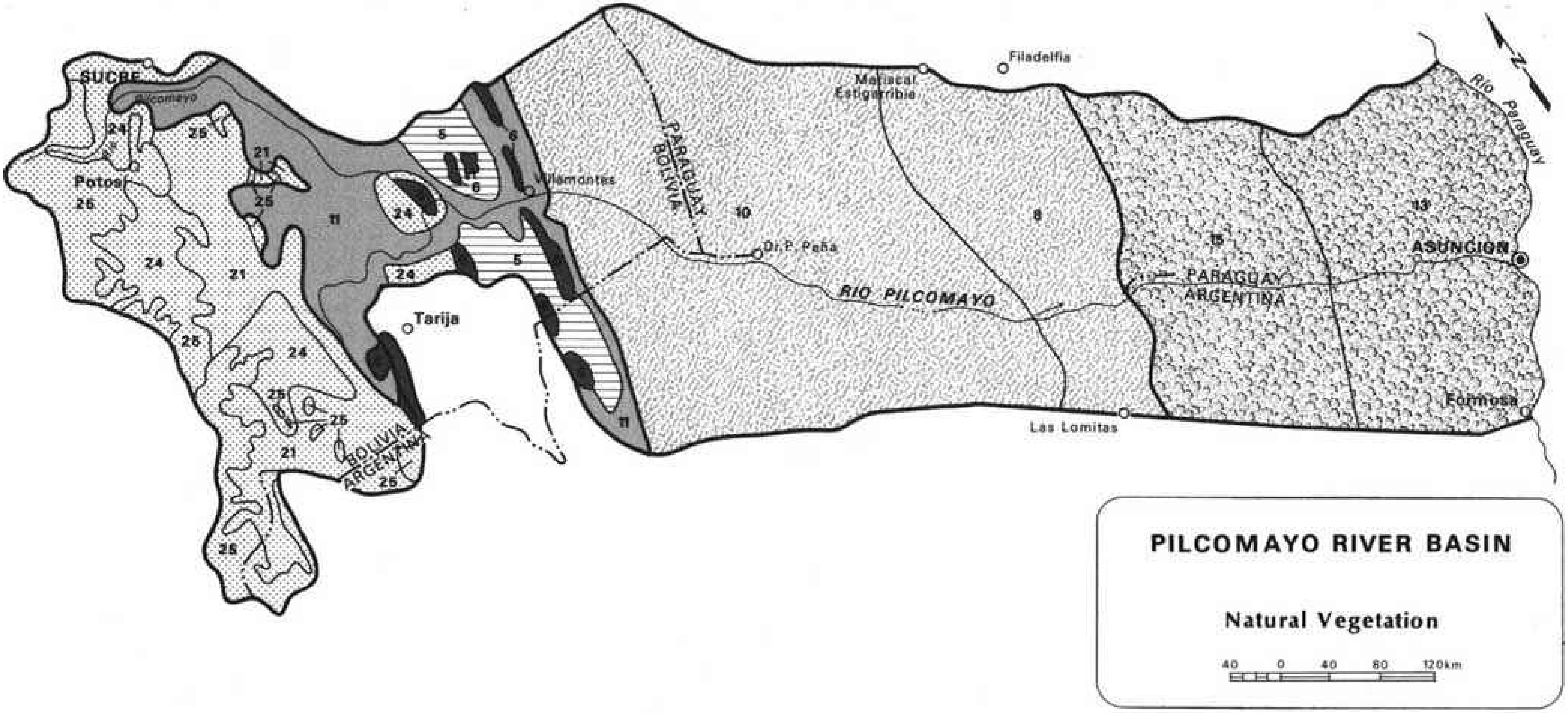
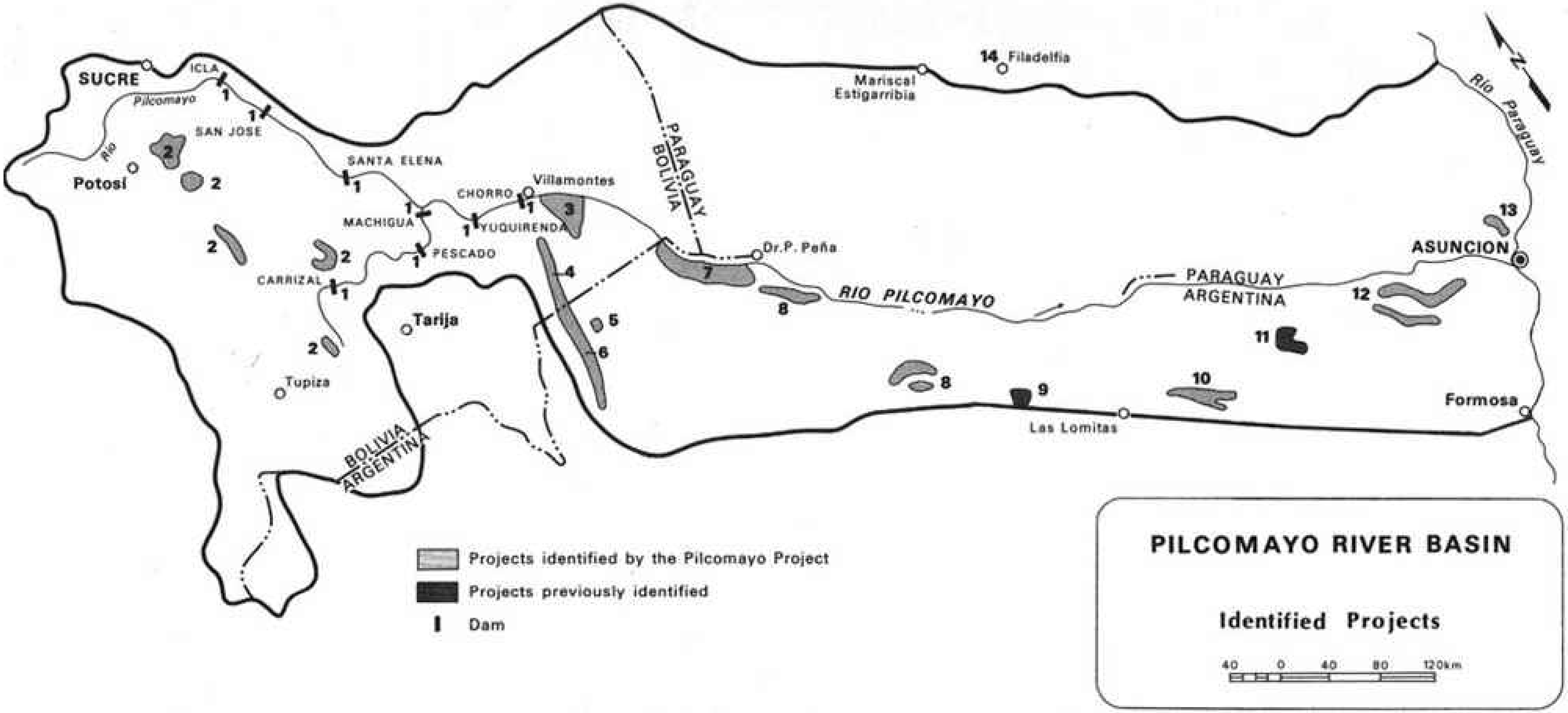
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J
M/M
1. Project Chief (Agricultural Planner) 29.8
2. Regional Planner 4.8
3. Regional Economist 1 22.2
2 2.5
3 0.6
4. Natural Resources Specialist 25.5
5. Ground Water Geologist 1 2.4
2 0.8
6. Edaphologist 1 4.0
2 12.5
3 2.0
7. Cartographer 1 3.4
2 1.0
8. Sedimentologist 1 1.2
2 2.4
9. Computer Programmer 0.6
10. Agricultural Engineer (cattle production) 1 8.0
2 3.5
11. Ecologist (vegetation) 10.0
12. Water Resources Economist 18.2
13. Pastures Specialist 2.8
14. Environmental Engineer 1.6
15. Soil Conservationist 2.8
16. Fluviomorphologist 1 1.1
2 5.0
17. Geologist (specialist in dams) 1.3
18. Agro-Meteorologist 4.0
19. Forest Production Specialist 1 3.6
2 3.6
20. Economist 1.0

20. Economist		[illegible]
21. Agro-Industry Specialist		10.0
22. Agricultural Economist	1	6.0
	2	2.8
23. Sociologist	1	5.8
	2	3.6
24. Economist (industry specialist)		3.5
25. Sanitary Engineer		2.0
26. Irrigation Specialist		2.6
27. Agronomist		4.0
28. Transportation Planner	1	2.0
	2	1.0
29. Water Resources Engineer		0.8
	TOTAL	226.3



PHYTOGEOGRAPHIC UNITS (Based on Cabrera 1971)	NATURAL VEGETATION FORMATION (OAS Plata River Basin 1971)
Savanna of humid Chaco	**13** Wooded savanna with forest in gallery (Modified border in its Southern location) **15** Forest with savannas
Forest of dry Chaco	**8** Dry dense forest **10** Brush pasture
Transition forest	**5** Dense semideciduous forest (mountain)
Mountain forest	**6** Dense humid forest (mountain)
Pastures and shrubs in temperate valleys	**11** Shrub forest of transition
Andean steppe	**21** Arborescent steppe **24** High plain mountain **25** Andean steppe



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SANTA ELENA
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Villamontes
MACHIGUA
YUQUIRENDA
PESCADO
CARRIZAL
Tarija
Tupiza
BOLIVIA
ARGENTINA
PARAGUAY
BOLIVIA
Dr.P. Peña
Mariscal Estigarribia
14 Filadelfia
RIO PILCOMAYO
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Projects identified by the Pilcomayo Project
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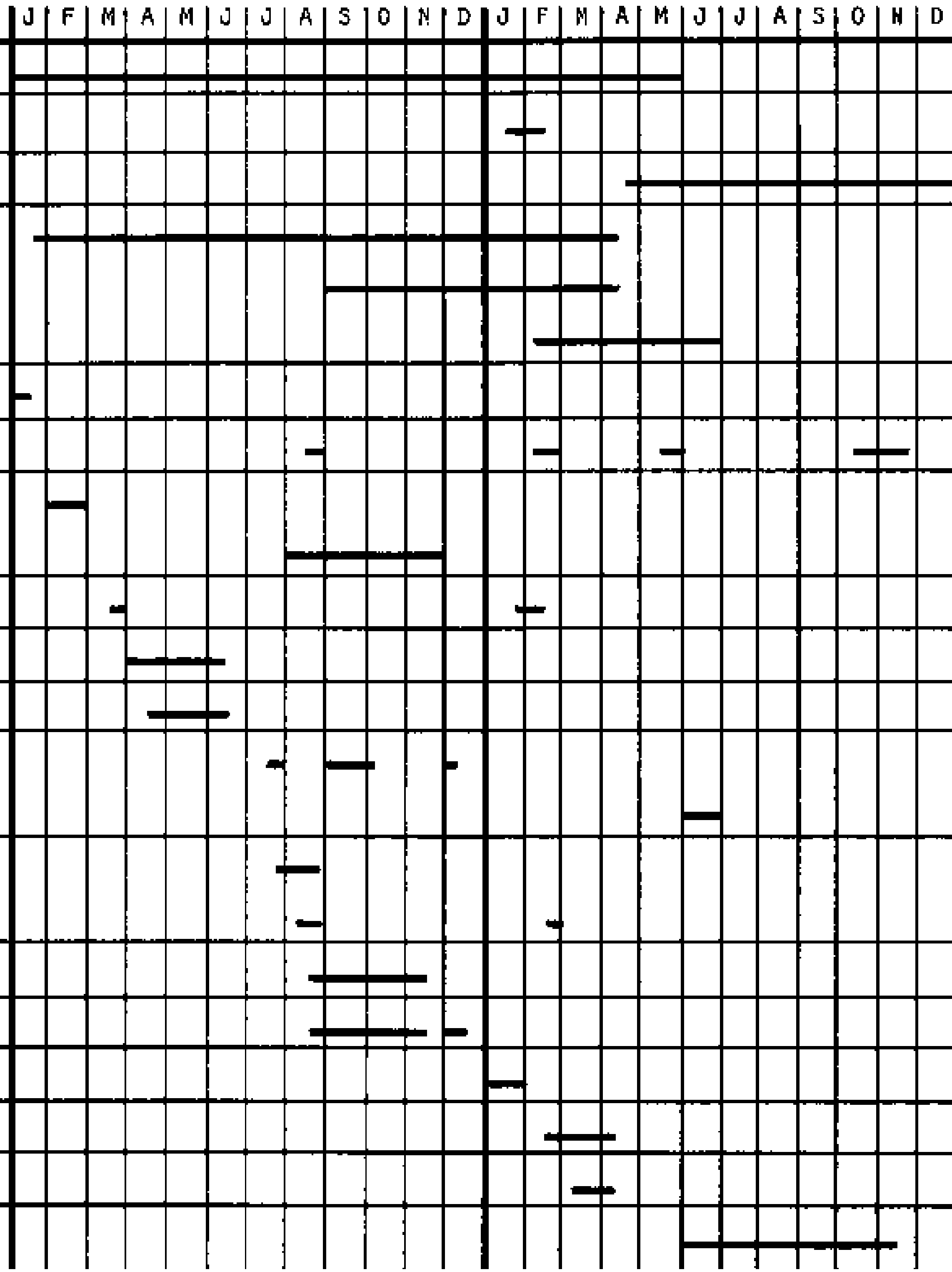

EXPERTS	M/M
1. Project Chief (Regional Planner)	17.0
2. Regional Planner	1.0
3. Agricultural Engineer	8.3
4. Agricultural Economist 1	15.0
2	7.4
3	4.9
5. Ground Water Geologist	0.5
6. Water Resources Specialist	3.2
7. Agro-Industry Specialist 1	1.0
2	4.0
8. Environmental Management Specialist	1.3
9. Cattle Production Specialist	2.3
10. Forest Production Specialist	2.0
11. Edaphologist 1	2.0
2	1.0
12. Project Formulation Specialist 1	1.0
2	1.2
13. Irrigation Specialist	3.0
14. Basic Infrastructure Specialist	3.5
15. Economist	1.0
16. Dry-Land Agriculture Specialist	1.8
17. Transportation Specialist	1.0
18. Sedimentologist-fluviomorphologist (radioactive tracing specialist)	5.5

TOTAL	88.9

Case study 5 - The Chapare region study, Bolivia

PROBLEM SUMMARY

Creating an Economic Base to Support Colonization - Integrated Development Study of the Chapare Region (Bolivia)

The Chapare study (1978-79) was initiated to integrate and rationalize resource development in a 24,500 km^2 area open to colonization. The Bolivian Government (which had launched coca-eradication programs in the area with U.S. AID backing) wanted settlers to have adequate social and transportation services and economically viable alternatives for agricultural production. Because the independent colonists were achieving higher crop yields than the government-sponsored colonists, the government also wanted to capitalize on these successes by directing assistance to the colonists who could make the best use of new technology, credit, and services.

Working with the Ministry of Rural, Agricultural, and Livestock Affairs, the National Institute of Colonization, and the Cochabamba Development Corporation, DRD developed a five-year action plan based on investment projects totalling US$20 million. These included the construction of 224 kilometers of feeder roads and the improvement of 219 kilometers of substandard roads, the extension of agricultural research services to 7,700 families, agro-industry development, programs of agricultural credit and marketing, a reforestation effort, a potable water program for roughly 2,000 families, and a vaccination program for children and pregnant women. DRD also helped develop guidelines for the settlement of new lands. These guidelines - which were based on an evaluation of the area's natural resources - were used to determine the amount of land to be occupied, the physical infrastructure needed to sustain agriculture in the area, and the distribution of the new parcels.

BOLIVIA - THE CHAPARE REGION STUDY - **Fact Sheet**

Project area:	24,500 km^2
Population:	40,000(1978)

Physical characteristics:	
- Holdridge life zones:	
Predominant Humid Tropical Forests with variations to Very Humid in piedmont areas and Subhumid in northern plains	
Subtropical Rain Forest in low mountain area	
Dry Tropical and Dry Subtropical Forests	
- Elevation range: 300 m to 5,000 m	
- Land capability classification:	
Classes I-IV:	39%
Classes V-VIII:	61%
Duration of Project:	
First Preliminary Mission: 1975	
Second Preliminary Mission: 2/1978	
Fieldwork: 4/1978-5/1980	
Publication of Final Report: 1980	
Technical contributions:	
DRD disciplines (19)	Number of DRD/Experts (24)
Agricultural Engineer (Project Chief)	1
Regional Planner	1
Agro-ecologist	1
Agro-industry Specialist	1
Agronomist	1
Animal Health Specialist	1
Cartographer	3
Cattle Production Specialist	1
Forest Development Specialist	2
Institutional Development Specialist	1
Labor and Employment Specialist	2
Potable Water Specialist	1
Project Economist	1
Project Formulation Specialist	1
Regional Economist	2
Road Engineer	1
Rural Electrification Specialist	1
Soils Specialist	1

Water Resource Specialist	1
Total professional person-months: DRD: 74.4 Government of Bolivia: 45.5	
Financial contributions: DRD: US$296,000	
Government of Bolivia: US$147,000	
Total investment in projects proposed: US$20,000,000	

MAP 1

I. Introduction

The development of humid, subtropical forests presents a major challenge since they contain natural resources and space for accommodating population growth and migration. But in most cases, their exploitation has represented the worst of development efforts - spill-over from adjacent developed and densely populated regions and the application of inappropriate models from temperate regions. In the absence of comprehensive rural development planning, ecosystems have deteriorated and destabilized agricultural production. In such frontier areas, the critical task now is not only to develop unoccupied land, but also to restructure the existing economy and social services.

The Chapare area in north-central Bolivia exemplifies this need. Endowed with subtropical forests and abundant water, this sparsely populated region was designated by the Bolivian Government in the 1960s as a priority colonization area. The Chapare's size, underutilized agricultural capacity, limited social services and infrastructure, growing economic dependence on the production of coca leaves, and proximity to potential markets in the densely populated highlands all contributed to the government's decision. Since then the area has received a flow of government-sponsored as well as spontaneous settlers.

From 1978 to 1980, the Department of Regional Development (DRD) of the Organization of American States helped the Bolivian Government formulate a development strategy and identify investment projects for immediate implementation in the Chapare. In the project's first phase, the area's natural resources, infrastructure, and socio-economic and institutional organization were diagnosed. In the second phase, seven integrated investment programs were developed and approved.

Although the Investment proposals are still awaiting action, the Chapare study demonstrates the effectiveness of three methodologies:

- Taking a sectorally integrated approach to rural development so as to support both spontaneous and government-sponsored colonization;

- Determining early in the planning process the geographical, technical, and policy emphases necessary to identify investment projects directly related to local inhabitants' needs; and

- Designing and executing a planning study to take account of nationally and internationally sponsored development activities already under way.

The Chapare settlement area in the department of Cochabamba lies between the fast-developing regions of Santa Cruz and Beni. Geographically, the triangular area of 24,500 km^2 is bounded by a spur of the eastern Andes on the south, the Secure River on the west, and the Ichilo and Mamoré Rivers on the east. Four major rivers flowing northeastward out of the Andes drain the area.

The Chapare can be divided into three major portions. In the upper portion composed of piedmont and low hills (13 percent of the area), dense subtropical forests on steep slopes rise above numerous small valleys and streams. The middle portion, a stabilized alluvial plain of approximately the same size as the upper portion, contains high terraces with good drainage and is a continuation of the piedmont. The major rivers broaden here, and the soils are the best in the Chapare. On the lower floodplain, which covers almost three-fourths of the area, sediment from erosion in the upper portion is deposited continually. The soils are fertile, but annual floods undercut agricultural potential, the lower terraces being continually inundated. The whole area is humid and subtropical, though the climate varies with the elevation. Annual rainfall ranges from 2,800 to 5,500 mm. (These major units are indicated in the map of Agricultural Zones and Subzones - Map 3.)

About 156,000 ha or 6 percent of the region was occupied in 1976. Of that, some 35,000 ha was cultivated: 34 percent, rice; 28 percent, coca; 23 percent, plantain; 11 percent, citrus; and 4 percent, other crops. Although primitive agricultural production technology was used, Chapare grew 39 percent of Bolivia's plantain, 32 percent of its citrus, and 20 percent of its rice. Most of this produce was transported without being classified or processed to consumption centers by a truckers' cooperative that also financed crop production and controlled market prices.

Forests cover 75 percent of the Chapare, varying from 96 percent of the total land area in the mountainous zones to 61 percent in the relatively densely populated alluvial plains. The logging operations that provided the initial impetus for opening the Chapare to settlement have gradually cleared the way for agriculture. But the large companies that obtain government concessions have typically ignored replanting requirements, burned off uncommercial wood, and abandoned parcels after using only about 1 percent of the felled trees. In the mid-1970s, Chapare's annual wood production was low, though it accounted for 9 percent of Bolivia's domestic timber resources.

The 26 sawmills in Chapare can process 30,000 m^3 of wood annually. But in 1977, they operated at only 60 percent of capacity, processing half of the wood harvested and sending the rest as logs to Cochabamba's mills.

Livestock production has just begun in Chapare. Crosses of native breeds are favored, though in very humid areas buffalo are raised.

Agro-production opportunities are limited by the transportation system. Although paved trunk roads connect Cochabamba to Villa Tunari and Puerto Villarroel, the secondary-road network is poorly developed, and 20 percent of the secondary roads are impassable part of each year.

The small settlements connected by these roads are not functionally interconnected, and all lack basic services. The most serious immediate problem is poor health conditions. Mortality, morbidity, and birth rates are higher than the already high national rates. Both infant and adult deaths have been linked to a lack of potable water and to poor sanitation. The shortage of medical personnel is exacerbated by a lack of sewer systems, electrical power, telecommunication facilities, and year-round roads.

Although agricultural patterns and the influence of the truckowners' cooperative are the same in both spontaneously settled and government-sponsored colonies, crop yields and income levels are strikingly different. Because the government program drew the poorest of the landless and many farmers without experience with the local crops, farming in these settlements has been grossly undercapitalized and empirical. In sharp contrast, many household heads among the 62 percent of the agricultural families who entered the Chapare on their own had secure jobs in logging when they came and could thus accumulate savings or leave farming to other family members. Still others, mostly small farmers and entrepreneurs living near Cochabamba, have long used family capital to grow citrus and bananas for an assured market. With more experience and the funds needed to innovate, the spontaneously settled colonies thus produce higher crop yields and enjoy a higher standard of living than the government-sponsored colonies.

The total colonial population in the Chapare is only 40,000. Most are Quechua-speaking Indians who have not fully adapted to the climate. The rest, 600 to 800 nomadic Aymaras and aboriginal families, are being forced into unsettled forest areas.

The intervention of 54 international, national, regional, and private development agencies in the Chapare made addressing the needs of this dispersed and isolated population administratively complicated. Their activities all competed for time, national resources, and supervisory talent, and most were baseline studies - expressions of good intentions rather than concrete proposals or actions grounded in experience. Some also disoriented the colonists and raised false hopes.

Given these administrative problems and the comparative success of the spontaneous entrepreneurial colonists, the goals of this planning study were to build upon these successes while equalizing economic opportunity among the two groups and improving the quality of life for both.

II. Designing the study

A. The Preliminary Mission

In 1975, DRD had carried out a preliminary mission at the request of the Bolivian Government. The report of this reconnaissance mission included: (1) a review of available natural resource and socio-economic data, (2) a geographic definition of the area; (3) a tentative evaluation of its development potential; (4) a quantified assessment of the technical cooperation needed to plan and implement development actions, and (5) a workplan for the study. Between 1975 and 1977, the Bolivian Government reviewed this report, which included a recommendation to carry out an integrated development study of the area. In 1978, it asked DRD to conduct the proposed study.

Upper portion of the Chapare Region. Subtropical forests in steep and narrow valleys.

By 1978, changes in the Chapare had made alterations in the proposed study necessary. Various international development assistance agencies and national counterpart organizations were together carrying out sectoral studies as part of an effort to revitalize the government-sponsored colonization projects. Not even 20 percent of these programmed activities had been executed, but substantial funds had been committed. At the same time, the bilateral technical assistance programs aimed at eradicating coca production were altering the local agricultural economy and social structure.

In early 1978, a second preliminary DRD mission composed of an economist, a natural resource specialist, and an agricultural engineer (the designated project chief) went to Bolivia. With local and national governmental authorities they made three important decisions. First, the Chapare study team should orient integrated development proposals to both the immediate and the intermediate terms. Second, project proposals should be based on the rational use and protection of the area's natural and human resources. Third, projects for the spontaneously settled colonies should receive top priority.

As the national counterpart for the study, the Bolivian Government named the National Colonization Institute (INC), which under the auspices of the Ministry of Small Farmer Affairs and Agriculture (MACA) supports colony-based producer organizations and coordinates land-tenure, housing, potable water, sanitation, commercialization, and credit projects. INC would coordinate the study team's recommendations with the activities of MACA, other sectoral agencies, and the Cochabamba Departmental Development Corporation (CORDECO).

In collaboration with INC, the second preliminary mission set three tasks for the study:

1. Inventory all existing and proposed development projects for the area. (For each project, determine the geographical location, the period of execution, and compatibility with the national goals of redistributing population and fortifying regional markets.)

2. Complete the natural resource, economic, and social analyses and the development strategy for the area.

3. For the spontaneously settled colonies, identify development projects to be implemented immediately to garner the colonists' acceptance and cooperation.

To carry out these activities, the involvement of national and international agencies working in the Chapare was essential. With more than 50 private national and international agencies conducting studies and proposing activities for the area, the colonies were becoming confused and disenchanted. Only if they were consulted and involved during project planning could they be expected to support the new investment projects during implementation,

Since no national Bolivian institute had the experience or power needed to direct a multisectoral study by itself, DRD and the Bolivian Government set up a Coordination Commission (COCOM) comprised of representatives of INC, MACA, CORDECO, and DRD to give technical and administrative direction. The government also named co-directors from INC and DRD to direct the technical unit. (The organizational structure of the study is shown in Figure 1.)

Middle portion of the Chapare Region. A process of heavy streambank erosion and deposition is evident as well as arable land on alluvial terraces.

Spontaneous colonization along a newly paved road in the Chapare Region.

B. The Workplan

The workplan formulated in April of 1978 specified five activities for Phase I (May through December):

1. Review the study's objectives and align them with the national and regional objectives.

2. Develop a five-year development strategy for the area.

3. Collect basic data on natural resources, socio-economic characteristics, and infrastructural

elements to help the team identify priority geographic and technical subject areas, and set time frames for subsequent activities.

4. Identify sectoral development projects.

5. Prepare a first-phase report summarizing these four activities.

During Phase II, (14 months), the technical unit would:

1. Select sectoral programs and projects for formulation and evaluation.
2. Develop projects and programs to the pre-feasibility level. (See Glossary.)
3. Prepare an action plan for the short- to mid-term.
4. Issue a final report.

Between 1975 and 1978, the study design was modified to better reflect institutional planning constraints and the colonists' economic needs. The open-ended diagnosis originally planned was dropped in favor of a closely focussed study of one portion of the region, and the technical unit began taking the initiative in working with international organizations, national sectoral agencies, and local inhabitants. Indeed, although DRD was the last international agency to get involved in the Chapare, it was the first to help the Bolivian Government coordinate the wide-ranging development activities under way. Another change was placing greater emphasis on meeting the spontaneous colonists' needs for greater access to credit and markets, better communication and health services, electrification and road networks, agricultural productivity increases, and technology transfer. (Figure 2 is a synthesis of the methodology used for the study and shows the time sequence of activities. Figure 3 shows the distribution of person-months in Phases I and II.)

III. Executing the study

A. Phase I - Data Collection and Analysis

In May of 1978, the technical unit's headquarters was established in Cochabamba. The natural resource evaluation began with the preparation of thematic maps based on existing information on the local river system, the road system, and the colonies. As expected, most available data covered the two upper portions of the area, where previous studies of the government-directed colonies had been conducted and where socio-economic data had been collected in conjunction with the coca-eradication projects. Additional information was needed on vegetation, soil classification, agro-climatic units, and infrastructure.

The technical unit decided to collect only the information needed to identify and formulate new projects and evaluate existing ones. To keep the data collection effort manageable and affordable, it would confine its study primarily to populated areas and use small-scale maps (1:250,000). It would also pare down the resource evaluation, mapping only vegetation, soil classes, agro-climatic units, and basic infrastructure.

For the natural resource inventory, the study team used satellite images since cloud cover ruled out the use of conventional aerial photography. The team used these images to prepare maps of soils, and natural vegetation. (See Map 2.) This data was then correlated with a life zone map of Bolivia that DRD helped prepare in 1975 to produce a map of agricultural zones and subzones. (See Map 3.) To obtain information of property boundaries and population in the Chapare, the technical unit worked with INC. This information was vital because access to new credit programs - the basis of agricultural development - would depend on getting clear title to the land.

Figure 1 - ORGANIZATIONAL STRUCTURE

Figure 2 - METHODOLOGY AND TIME SEQUENCE

Figure 3 - CHRONOGRAM OF INTERNATIONAL TECHNICIAN ACTIVITIES

Transportation data obtained from the national agencies and CORDECO revealed that although the paved road provided excellent access to Cochabamba and north-central Bolivia, Chapare was nonetheless isolated from the northernmost and southernmost regions of the country. These potential markets could be reached only by river, as 80 percent of Chapare's local roads were impassable in rainy weather. Better roads, the study team concluded, would create new markets for the additional produce but also open more forest land to destructive timber extraction and to further spontaneous colonization by slash-and-burn farmers.

Since coca production would also increase if new lands were opened, the study team worked with MACA and the international technical assistance agencies to map coca-production areas, determining how many years coca had been produced in each sub-area and how important coca was relative to other crops. (While the Bolivian Government had set limits on the production and commercialization of the leaves for consumption in Bolivia, most of the crop was grown illegally for the international drug trade.) Ultimately, the technical unit concluded that a strategy focussed solely on coca-eradication would fail since at least one third of the colonists' income was generated from coca production. Responding rationally to market forces, the colonists would not stop growing coca until other lucrative and easy-to-grow crops were identified.

MAP 2

MAP 3

Although contacts with the Bolivian national agencies had been established while the study was being designed, the need for formalizing communications between the agencies and the technical unit became apparent once the study was under way. To meet this need, a two-level Inter-Institutional Coordination Committee (INTERCOCOM) was created: the upper level consisted of representatives of the national agencies in Cochabamba, and the lower level of representatives of the same agencies in the Chapare. (See Figure 1.)

INTERCOCOM initiated a dialog among the national and regional agencies, farmers' organizations, the truckers' cooperative, and the local colonists' cooperatives. However, INTERCOCOM functioned only at the prodding of the technical unit, and Chapare-based delegates had to consult with their superiors in Cochabamba or the national capital to make any decision. Local discussions simply did not compensate for the lack of a sectorally integrated planning process at the regional and national level.

When the technical information was mapped, it became clear that special permission from high-ranking authorities in La Paz would be needed to obtain any information on existing and proposed development activities. Thus, once or twice a month the team had to travel to the capital. Since team members were already making three or four trips per month to Chapare to talk with area INTERCOCOM representatives and colonists' organizations, their time at headquarters in Cochabamba was severely limited. But even though the great distance between the field-study site and information sources - typical of Latin American regional development studies - did add to the administrative burden, Cochabamba was probably the most appropriate location for the study's headquarters. Technical counterpart personnel and support facilities were there, and the field area was only a 90-minute drive away.

Another limitation was INC's inability to execute development projects. INC lacked budget and implementation authority for sectoral public works projects and did not directly provide agricultural, health, or education extension services. The sectoral agencies and CORDECO would have to collaborate to get investment projects implemented.

To compensate for institutional deficiencies, several changes were proposed. First, to engender the colonists' support while the development strategy was being formulated, the technical unit laid plans for using local teachers and representatives of agricultural cooperatives as change agents and for holding dialogs with the colonists in schools and other communal buildings. Second, COCOM was put in charge of managing technical assistance, providing institutional support, and seeking financing. Third, it was decided to expand the technical unit during project implementation to include representatives of all national agencies active in the Chapare and to make the unit a permanent body directed by CORDECO and supported by INTERCOCOM. Finally, the creation of a development organization focussed specifically on the Chapare was proposed. Key to this revised plan was CORDECO's control of project implementation and internal financing.

To bolster inter-sectoral coordination, the technical unit also presented a two-month course on water resource management in mid-1979. While water use per se was not the study team's primary concern, instructors from the Inter-American Center for Integrated Development of Land and Water Resources (CIDIAT) in Venezuela linked surface-water management to agricultural production, soil conservation, timber management, potable water for settlements, and farm-to-market road systems - which were key issues. Moreover, to capture national agencies' interest, the instructors used Chapare as a case study from which more general principles could be inferred,

B. Phase I - Preparing the Interim Report

In August of 1979, the study team issued a report summarizing the diagnosis of the area, the principal guidelines for a five-year development strategy, and the sectoral program proposals. Five principal guidelines were spelled out in the interim report: (1) integrate the area socially, economically, politically, and geographically into the national context; (2) set self-sustaining economic and population growth in motion; (3) equalize the distribution of income from the area's economic activities; (4) increase public services; and (5) reduce coca production while protecting the traditional national consumption patterns.

The seven development programs proposed for the Chapare in the report - technology transfer, agricultural credit, agro-industry, zonal market development, electrification, secondary-road construction, and potable water - were carefully integrated. They were developed concurrently and were coordinated for each target population and agricultural zone. The technology transfer and agricultural credit programs were tied directly to agro-industry and zonal market programs. The electrification and potable water programs, along with the zonal market program, had two aims: improving health conditions and establishing a settlement hierarchy in which each center and sub-center would offer specified public services. The secondary-road program would provide access to proposed agro-industries, settlement services, and new regional markets along the La Paz-Cochabamba-Santa Cruz corridor, a major national artery.

Key here is the agricultural credit program, which was aimed at financing the area's traditional crops. For such crops as citrus, rice, cassava, and bananas, Chapare's productivity was the highest in Bolivia. Since the 1950s, Santa Cruz and the highland regions had depended on the Chapare for fruit, and continued demand was assured, By concentrating on these traditional crops, the technical unit boosted the probability that the credit program would yield results within the five-year time frame adopted.

For each program and for each settlement, the technical unit designated the national sectoral agencies that would help formulate the program. The electrification program, for instance, complemented and conformed to the specifications of the National Electric Corporation, while the secondary-road program was to be carried out under the auspices of the National Road Service. The technical unit also determined the surface area and number of families affected by each proposed program.

In August of 1979, COCOM approved readily these recommendations - in part because the study team's brief report (22 pages) was constructed to highlight the proposal policies and the projects that each agency was to carry out. COCOM then instructed the technical unit to proceed with second phase activities.

C. Phase II - Developing the Action Plan

Once the first phase report was approved, the technical unit began elaborating a proposal for a five-year action plan based on the seven programs (46 projects in all). On INTERCOCOM's recommendation, it also prepared general guidelines for occupying uninhabited but potentially productive lands in the Chapare, In addition, the unit began work on the study's final report.

To prepare the action plan, a DRD specialist in formulating development projects in accord with international funding agency requirements joined the study team. This individual worked closely with experts in agricultural and agro-industrial development and forestry, physical planners and engineers, specialists in water resource and transport projects, ecologists, economists, and social scientists.

Since many of these experts had helped formulate the development strategy, renewing contact with their national counterparts in local agencies was relatively simple. The technical unit kept up this dialog while the action plan was being prepared and visited the Chapare weekly to meet with local colonists' groups and the truckers' cooperative.

During these meetings in Chapare, the technical unit wrestled with conflicts of interest between the colonists (who wished to lessen their dependence on the truck-owners) and the truckowners (whose livelihood would be affected by development activities in the area). Gradually, the truckowners became convinced that increased economic activity in Chapare would boost overall demand for transportation enough to outweigh the cooperative's loss of control over agricultural financing. The colonists, on the other hand, supported the government-administered credit programs built into the proposed agricultural projects since credit afforded them some independence from the truckowners. Overall, the proposed projects met with the colonists' approval and the truckowners' qualified support.

Meeting of truck owners, colonists and the study team in the transportation cooperative headquarters in Villa Tunari.

MAP 4

Few conflicts between natural resource management and economic development emerged from the technical unit's analysis of the proposed activities. In informal meetings, the colonists, local agency technicians, and the technical unit all agreed that current soil conservation, logging, and cropping practices contributed to dependence on the truckers' cooperative and subsistence single-crop production. The colonists understood the roots of soil erosion, deforestation, and surface water pollution, as well as the need for crop rotation and better farming practices. There was also agreement that the area could enjoy sustained growth if agricultural credit programs, additional jobs in agro-industry, and stable markets were created in conjunction with improved health and educational services.

While the colonists were considering the technical unit's proposals, however, the coca-eradication projects already under way were jeopardizing their livelihood. Taking a broader and more positive approach than MACA and the international development agencies that sponsored these projects, the study team met several times with the colonists to find out which alternatives offered the most economic security and subsequently decided to focus on agricultural credit and a few other programs.

To explain its integrated approach to the Chapare area's development, the technical unit used maps in draft form. These showed the main coca-growing areas; the action plan with programs and projects for the spontaneously settled, government-directed, and uninhabited areas; and the hierarchy of settlements proposed to support the plan. This information helped the colonists and Bolivian agency personnel visualize the technical unit's proposals in precise geographic terms and to fit these actions into the Chapare area's larger concerns.

Drawing on these discussions and its earlier activities, the technical unit divided the Chapare region into three major areas, according to their role in the short- to medium-term development. (See Map 4.) Most proposals were for the spontaneously colonized area already settled, the "project concentration area." In the area containing the government-directed colonization projects - the "consolidation area" - sectoral projects identified by national agencies and selected on the basis of their compatibility with the overall strategy would be implemented. In a third zone designated the "expansion area," public sector activities based on the area's economic development strategy and the technical unit's resource-related recommendations would be carried out. For the remainder of the Chapare area, no development activities were specified because the investment resources needed to develop a major road were not available, but guidelines for project preparation were drawn up.

Within each zone, a hierarchy of settlements was defined. The regional subcenter, Villa Tunari, was linked through communication and institutional networks to Cochabamba, the regional center. The concentration zone and the consolidation zone were divided into subzones, each with a designated center. The remaining established settlements were designated as local centers.

This hierarchy reflected such factors as population distribution, the location of commercial centers and the local offices of national sectoral agencies, and the construction of the proposed Cochabamba-Villa Tunari-Santa Cruz highway, which would span the consolidation zone. The role the small river-port settlements would play as points of exit for additional agricultural products was also considered.

On the basis of this hierarchy and the characteristics of each zone, packages of investment projects and programs for the colonies were prepared. (See Map 5.) These included projects in agricultural credit and industries, zonal markets and technology transfer, and road building, health, and electrification. Only projects that would have a positive internal rate of return without subsidies were included in the packages.

Road, health, electrification, zonal markets, and agro-industry projects were selected on the basis of varying community needs and scaled to each colony's size. Not every settlement was to get every type of facility or service, but the same design criteria would be used for all the installations of each type built.

The type and number of agro-industries proposed did not reflect the area's theoretical potential, since dependence on farm-to-market roads and the primary road to Santa Cruz limited agro-industrial development. Moreover, since the road program would cost more to implement than the other programs, its implementation would not keep pace with expanded agricultural production. Accordingly, the study team concentrated initially on industries that selected and packaged local agricultural products. Food-processing industries were to be added only when the road system could handle the extra traffic they would generate. As specified in the initial project agreement, only activities that could be fully implemented within five to seven years were planned in detail.

The technology transfer and agricultural credit programs, which were more or less the same in all the colonies, were tied to existing institutions and the new settlement hierarchy. Farmers would have access to credit for the production of traditional crops (except coca) on small parcels and for cattle-fattening activities at one slaughterhouse in Villa-Tunari, With the agricultural inputs purchased on credit, they would be able to keep at least 50 percent more land (an additional of 6 to 7 hectares per family parcel) in continual production, and local agro-industries and increased access to the regional market would stabilize demand for this increased production. Credit-eligible projects were determined on the basis of the data used to prepare the map of agricultural zones and subzones (map 3), which included rainfall, soil depth, flooding potential, and slope restrictions.

MAP 5

Agricultural colonists selling products a Villa Tunari, at zonal market center in the Chapare Region. Similar marketing centers were recommended along the proposed Cochabamba-Villa Tunari-Santa Cruz highway.

The forestry components of the proposed programs were limited to conservation measures, pending further study of the forest resources. In its final report, the technical unit recommended limiting timber concessions, introducing selective cutting practices, and abandoning the practice of burning the unsalable parts of trees. Reforestation was integrated into the agricultural production models proposed and the technical unit recommended that the Forest Development Center ban further colonization in the Isiboro Secure Reserve and National Park where the aboriginal population lived. (Even though the Bolivian Government had officially designated the area as a reserve, migration and conflicts of interest are likely to intensify since the reserve will be crossed by the Chapare-Beni road now under construction.)

The guidelines for occupying new lands were based on experience in inhabited areas. The emphases were on (1) evaluating the natural resources of the area to be occupied, (2) making sure that colonists have clear title to the land, and (3) identifying the infrastructure necessary to sustain sedentary agriculture on the occupied lands. These guidelines were used to determine the amount of land to be occupied, the design of the physical infrastructure, and the distribution of the parcels.

D. Phase II - Preparing the Final Report

The technical unit's final report was presented to COCOM in April of 1980. Building on the approved material in the interim report, it described the national concerns bearing on the Chapare's development, the foundation for a development strategy for the Chapare, and integrated development programs and projects for the area. (See Table 1.) It also featured revised versions of settlement, coca-production, and thematic maps.

Reviewing the final report, COCOM readily endorsed three features in the Chapare project:

1. The proposed projects responded directly to the objectives the technical unit originally set forth and to the general development strategy designed for the area.

2. The study team's assessment of the area's natural resources, institutional network, access to production technology, population density, land-tenure situation, market conditions, and demographic factors was concise and pragmatic.

3. The projects were institutionally and spatially integrated. They reflected a thorough understanding of the area's needs, constraints, and potential.

COCOM approved the final report within weeks. By this point, counterpart agencies had demonstrated support for the study's recommendations and CORDECO had integrated them into its action plan for Chapare. The colonists in the region had also publicly expressed support for the plan.

IV. Implementing the recommendations

Three months after the report was presented, Bolivia's national government changed, and technical and administrative personnel turned over at the regional and local levels, With the departure of the counterpart personnel who helped formulate the development strategy and action plan and INC's loss of control over coordination activities, the study's recommendations were ignored. When CORDECO withdrew its support, the implementation program was abandoned.

With no support for an integrated regional development program, and coca production flourishing despite government efforts to curtail it, - the area planted to coca increased eight-fold between 1978 and 1982, and production of traditional food crops fell to below subsistence levels. Under these circumstances, the coca-eradication project came to the fore while the other sectoral projects were re-evaluated. The development of health, education, and potable water programs came to a standstill. Land-ownership problems in the Chapare were ignored, and no agricultural and agro-industry projects were implemented.

With another change of government in 1982, CORDECO again reviewed the recommendations of the Chapare report. They were also reviewed by Cochabamba Agricultural Planning and Coordination Committee - a new planning coordination agency formed in response to the study team's recommendation to expand the technical unit and make it a permanent part of CORDECO.

Since the latest review, the study team's recommendations have formed the basis for action by agencies of the Department of Cochabamba in the Chapare and for soliciting technical assistance from international agencies. In mid-1983, the Government of Bolivia asked DRD to review recent studies of the Chapare - including DRD's own study - and to identify proposals for immediate external funding.

V. Lessons learned

The **DESIGN STAGE** of the Chapare study showed the importance of:

1. Involving the project's intended beneficiaries throughout the study. Because local people helped identify local needs and review proposed actions, the technical unit's recommendations fit into the Chapare farmers' way of life and addressed local needs for better social and health services, income-generating substitutes for coca-production, and new agricultural credit programs - none of which were addressed by the coca-eradication programs.

2. Restricting information collection to save time and keep project momentum. The technical unit collected only that data needed to design geographical and technical policies for the development strategy and to formulate projects. As a result, the project stayed on schedule and project resources lasted until the study was completed.

Table 1 - SUMMARY OF FINAL REPORT

Component	Presentation
Presentation	Summary of the report's recommendations and list of the study's participants
Introduction	- Background:
	(a) Objectives and socio-economic development policy of Bolivia
	(b) The Chapare area in the regional development policy framework
	(c) The national program of technical cooperation
	- Execution of the technical cooperation agreement:
	(a) Operations
	(b) Results
	(c) Contents
	- Contents of the report
The National Context	- The national ambience and the Bolivian population - Economic activities - Geography and natural resources - Production sectors - Regional development and its interrelation to national development
Bases for the Formulation of a Proposal for Chapare's Development	- Objectives
	- The diagnostic:
	(a) Chapare as a resource - the context
	(b) Physical aspects

	(c) Economic aspects
	(d) Social aspects
	(e) Population aspects
	(f) Institutional aspects
An Integrated Program for the Development of Chapare	- Background and criteria
	- The strategy for development:
	(a) The relation between the objectives and the diagnostic
	(b) The proposed strategy
	- Programs and Projects - a detailed discussion of specific sectoral actions and project components:
	(a) Agro-industrial program
	(b) Population centers electrification program
	(c) Secondary-roads program
	(d) Zonal market program
	(e) Preventive health care program
	(f) Agricultural credit program
	(g) Agricultural technology transfer program
	(h) General guidelines for the occupation of new lands
	- Conclusions and Recommendations for the short and mid-term:
	(a) The investment program by sectors
	(b) Global evaluation
	(c) Proposal for the institutional structure for the area
	(d) Principal recommendations for the short and mid-term

Annexes	Sector specific preliminary reports: - Soils: exploratory survey - Forest resources: exploratory survey - Formulation and application of criteria for selection of investment projects and programs - Socio-economic aspects - Diagnosis of the institutional structure - Preventive health care program - Secondary-roads program - Population centers electrification program - Cattle production program - Agro-industry program - Zonal market program - Agricultural credit program

Key Mapped Information	***Scale***	***Thematic***	***Synthesis***	***Projects***
	1:250,000	Soils: exploratory survey	Agricultural Zones and Subzones	Location of proposed projects and programs*
		Soils: index of available information	Spatial strategy for the short- to mid-term*	
		Forest cover: exploratory survey		
		exploratory survey*		
		Present land use:		
		Areas in coca cultivation*		
		Road system		

1. Gobierno de Bolivia (MACA-INC-CORDECO) y Secretaría General de la OEA/DDR, *Proyecto Chapare: Estudio para el Desarrollo Integrado, Provincias de Chapare, Carrasco, Moxos, y Arani, Informe Final;* Gobierno de Bolivia: Cochabamba, 1980.

* Covers the presently colonized (southern) portion of the study area.

The **EXECUTION STAGE** illustrated the advantage of:

1. Working with existing institutions in the Chapare, Cochabamba, and La Paz. This solved several problems and reinforced links among the national agencies. First, because the study team was aware of national agency proposals and the agencies were kept informed about the guidelines being devised for integrated development in the Chapare, some of INTERCOCOM's limitations could be surmounted. Second, through close contact with the local agencies, the technical team became familiar with the pre-feasibility project-preparation requirements these agencies had to follow to comply with international

lenders, which made defining team members' tasks in the project-formulation stage easier. From the beginning, projects were formulated in terms lenders would accept.

2. Delivering a high-quality first-phase report which engendered considerable institutional support for the Chapare project. The document was so brief that it did not overwhelm COCOM or the other national agency reviewers. Describing the proposed programs first and summarizing the study's objectives in a two-page addendum, the report got straight to the point. With the responsibilities each agency would have for each project spelled out, as well as the precise areas and population groups each would affect, agency decision-makers could accurately assess the practicality of each proposal.

3. Focussing project proposals on the use of technologies and practices already in use in the project area. This greatly increased the likelihood that the action plan would yield palpable results within two to five years. Since traditional crops were productive and in high demand, the team saved the time and expense of field-testing new crops and conducting training sessions for the farmers.

4. Accepting the inevitability of coca production and incorporating coca-growing into an integrated development approach - a more effective approach than the more narrowly focussed rural development perspective of the other sectoral agencies working in the area simply because the colonists accepted it. In the Chapare study, colonization was considered as a unit of integrated rural development and the network of colonies was considered in the regional and national contexts.

The **IMPLEMENTATION STAGE** was improved by:

1. Building implementation considerations in from the beginning, as indicated by the lessons above.

2. Using teachers and other local respected personnel as "change agents" to mobilize support for proposed actions.

3. Identifying the conflict between principal actors and helping them arrive at a mutually satisfactory resolution that could then be built into the study recommendations. Together, the farmers and the trucking cooperative reached an agreement whereby the truckers reduced unit charges but increased their profit because the increased net returns to the farmers were an incentive to produce and sell more crops.

4. Presenting the regional study as a model. Although the proposed projects were intended for only a small portion of the total Chapare area, the integrated packages and the guidelines for developing uninhabited lands were of great interest to CORDECO (which was assuming increasing responsibility for guiding regional development) and to sectoral institutions becoming involved in regional development planning. (Using the Chapare study as a case study during training sessions contributed to this interest.)

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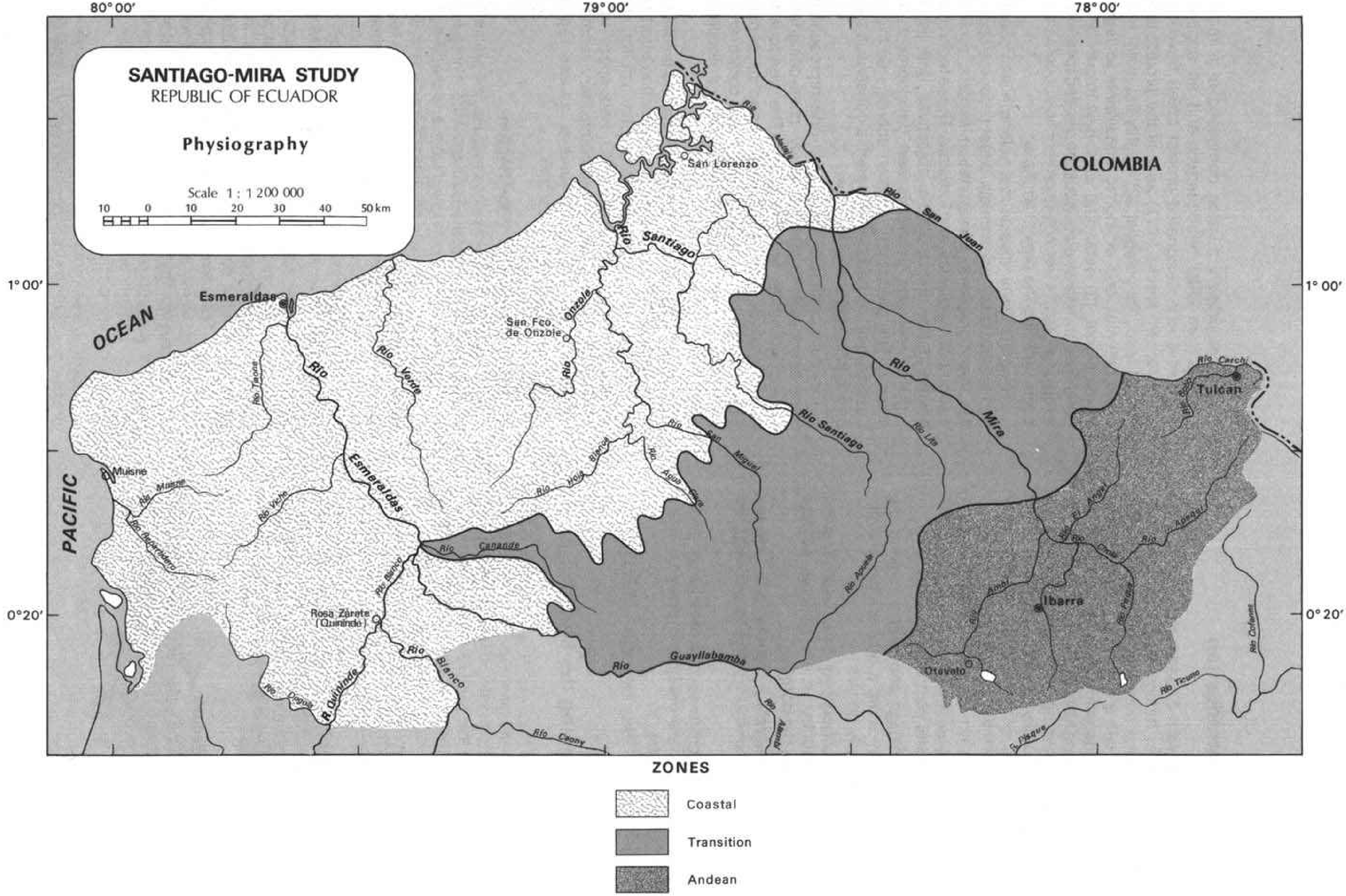
SANTIAGO-MIRA STUDY
REPUBLIC OF ECUADOR
Physiography
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80° 00'
79° 00'
78° 00'
1° 00'
0°20'
COLOMBIA
PACIFIC
OCEAN
Esmeraldas
San Lorenzo
San Fco. de Onzole
Muisne
Rosa Zárate (Quinindé)
Tulcan
Ibarra
Otavalo
Río Santiago
Río San Juan
Río Mira
Río Esmeraldas
Río Verde
Río Onzole
Río Canande
Río Guayllabamba
Río Blanco
R. Quinindé
Río Santiago
Río San Miguel
Río Carchi
Río Caony
Río Muisne
Río Viche
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Río Lita
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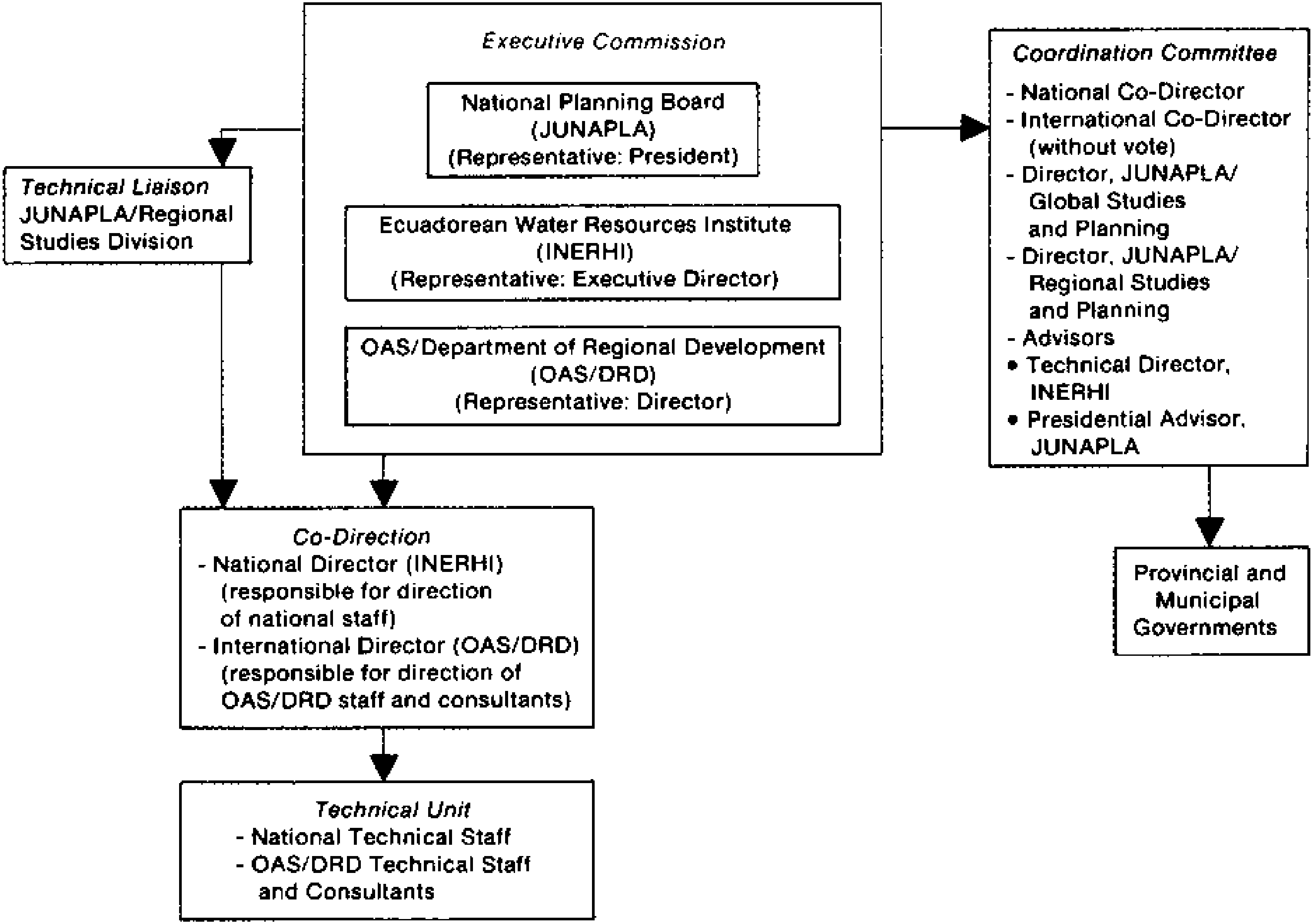
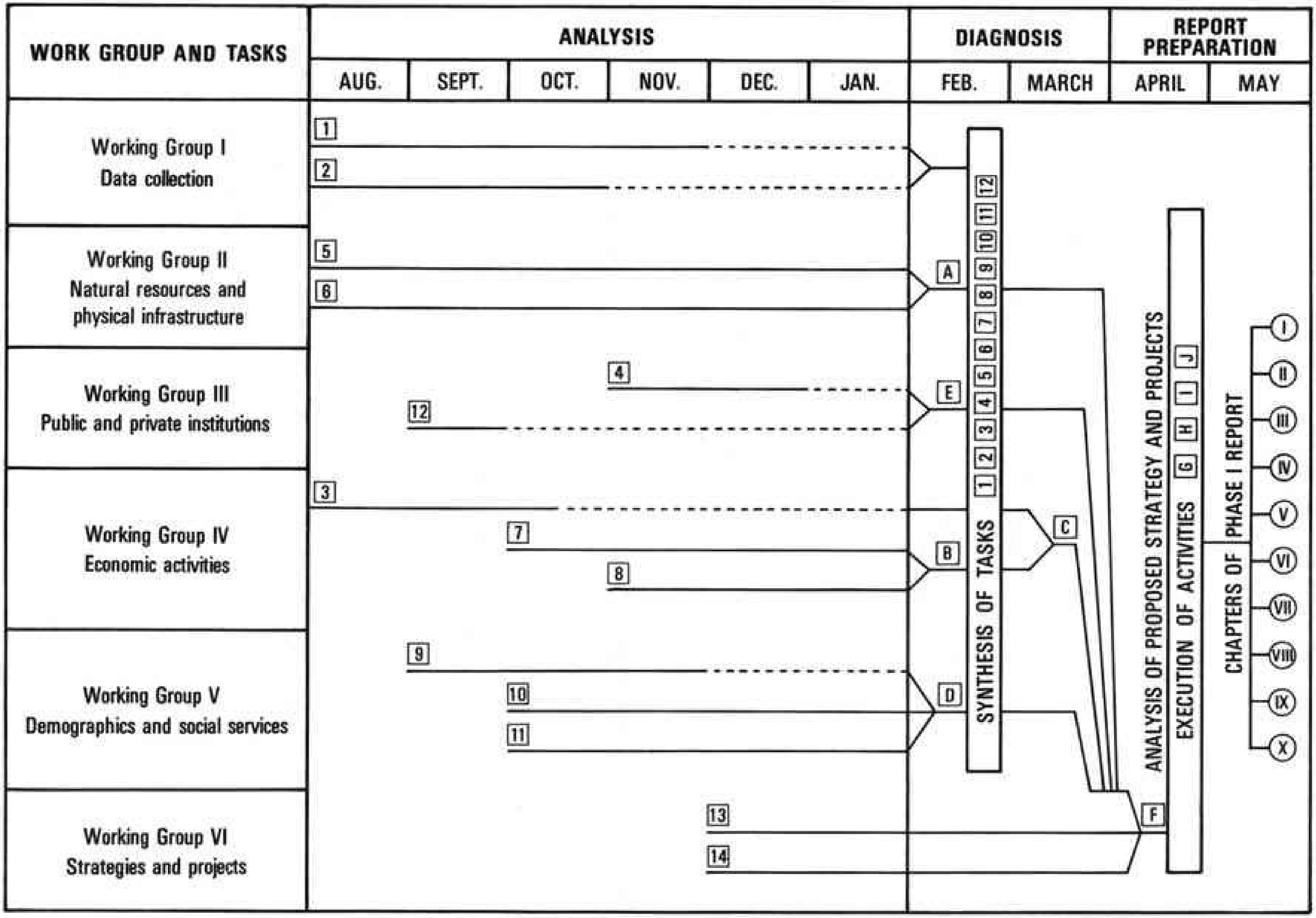
Río Ambi
ZONES
Coastal
Transition
Andean

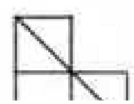

Executive Commission
National Planning Board
(JUNAPLA)
(Representative: President)
Ecuadorean Water Resources Institute
(INERHI)
(Representative: Executive Director)
OAS/Department of Regional Development
(OAS/DRD)
(Representative: Director)
Technical Liaison
JUNAPLA/Regional
Studies Division
Coordination Committee
- National Co-Director
- International Co-Director
(without vote)
- Director, JUNAPLA/
Global Studies
and Planning
- Director, JUNAPLA/
Regional Studies
and Planning
- Advisors
• Technical Director,
INERHI
• Presidential Advisor,
JUNAPLA
Co-Direction
- National Director (INERHI)
(responsible for direction
of national staff)
- International Director (OAS/DRD)
(responsible for direction of
OAS/DRD staff and consultants)
Provincial and
Municipal
Governments
Technical Unit
- National Technical Staff
- OAS/DRD Technical Staff
and Consultants



1 - 14 **STUDY TASKS**

PRINCIPAL RELATIONSHIPS AMONG TASKS

1 Collect basic data on natural resources



2 Collect social and economic data on key regional variables

3 Prepare draft economic policy statement on the region's relationship to nation

4 Clarify relationships among national institutions working in the study region

5 Map region's natural resource system

6 Study region's human settlement system

7 Study region's rural production systems

8 Study region's agro-marketing system

9 Study region's economic conditions and trends

10 Analyse region's employment structure, and extension services

11 Study Indian communities' organization and technologies

12 Study region's public and private institutions

13 Identify ongoing and potential projects to implement the regional strategy

14 Define preliminary regional strategies

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2														
3		X												
4			X											
5	X													
6	X	X	X	X	X									
7	X	X	X	X	X	X								
8		X	X	X		X	X							
9		X				X	X	X						
10		X	X			X	X	X	X					
11		X	X	X		X	X	X	X	X				
12			X	X		X	X	X		X	X			
13	X	X			X	X	X	X			X	X		
14	X	X	X	X	X	X	X	X	X	X	X	X	X	

A - J INTEGRATING ACTIVITIES

A Define spatial options and outline water-resources strategy

B Develop forest and agricultural strategy

C Define overall economic and agricultural policy

D Define social strategy and social guidelines for agricultural policy

E Develop institutional strategy for Phase II

F Identify projects and regional development strategy

G Develop natural resource policy and assess resource constraints on the regional strategy

H Review projects to determine economic viability of regional strategy

I Assess social viability of regional strategy

I - X CHAPTERS OF PROPOSED PHASE I REPORT

I Regional Model: Problems, Objectives, Opportunities

II Regional Strategy
1. Integration of Regional Strategy
2. Projects for Regional Strategy

III Water Resource Strategy

IV Infrastructure Strategy

V Human Settlements Strategy

VI Agriculture and Agroindustry Strategy

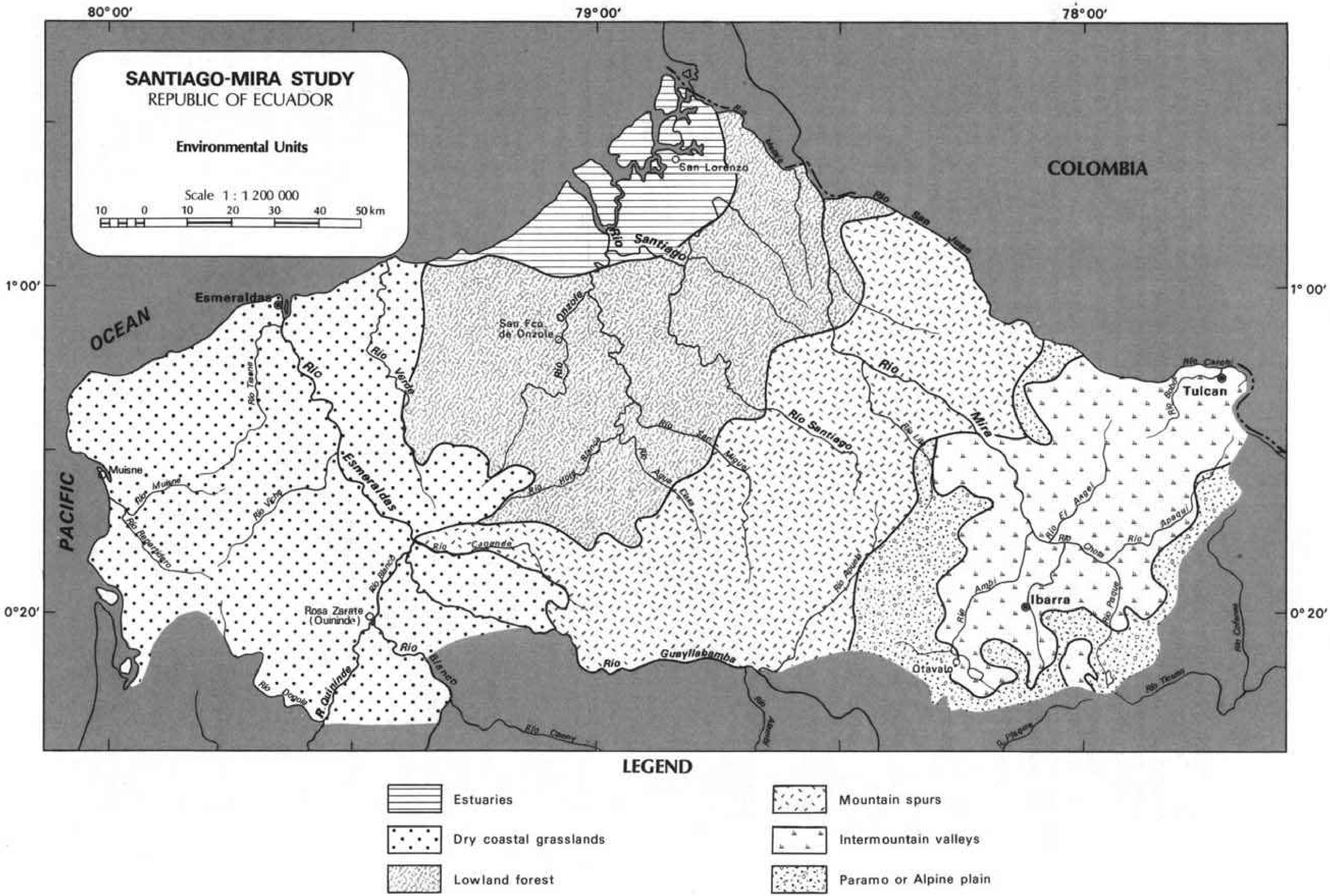
VII Social and Demographic Strategy

VIII Institutional Strategy

IX Description of Priority Projects

X Workplan for Phase II

J Assess institutional viability and organizational needs for implementing regional strategy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REPUBLIC OF ECUADOR
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San Lorenzo
San Fco. de Onzole
Rosa Zarate (Quininde)
Tulcan
Ibarra
Otavalo
Rio Santiago
Rio Esmeraldas
Rio Mira
Rio San Juan
Rio Guayllabamba
Rio Blanco
Rio Santiago
Rio San Miguel
Rio Onzole
Rio Verde
Rio Muisne
Rio Canande
R. Quininde
Rio Ambi
Rio El Angel
Rio Chota
LEGEND
Estuaries
Dry coastal grasslands
Lowland forest
Mountain spurs
Intermountain valleys
Paramo or Alpine plain

EXPERTS		M/M
1. Project Chief (Engineer/Economist)		34.0
2. Deputy Project Chief (Agricultural Economist)	1	6.5
	2	14.0
3. Project Coordinator- preliminary operations (engineer)		7.0
4. Demographer	1	1.8
	2	2.0
5. Water Resource Specialist	1	3.0
	2	3.5
	3	4.5
6. Soils Specialist	1	3.0
	2	1.5
7. Transportation Specialist		5.0
8. Physical Planner	1	2.0
	2	2.0
9. Cartographer	1	0.3
	2	0.3
10. Statistics Advisor		0.3
11. Employment Specialist		1.5
12. Telecommunications Specialist		1.5
13. Environmental Specialist		1.4
14. Forest Development Specialist	1	1.0
	2	3.5
15. Editor		5.0
16. Regional Economist		6.0
17. Industrial Planner		1.0
18. Housing Specialist		2.5
19. Institutional Development Specialist		1.5
20. Agro-industry Specialist	1	1.3
	2	0.5
21. Irrigation Specialist	1	3.0
	2	2.0
22. Agricultural Economist		5.0
23. Project Formulation Specialist		1.3
	TOTAL	128.7

Case study 6 - The San Lorenzo Canyon study, Mexico

PROBLEM SUMMARY

Formulating an Integrated Management Plan for a Natural Reserve - The San Lorenzo Canyon Study (Mexico)

The San Lorenzo Canyon study (1979-1981) was launched to assess the resource potential of various ecosystems within a single valley, to determine the geographical boundaries of a proposed research reserve, and to help design a cooperative local management authority for the valley. Once the study was initiated, the planning team was forced to re-evaluate the original study objectives and to expand a single-sector project into an integrated development project.

Working with members of the Natural Resources Department of the Autonomous Agrarian University "Antonio Narro," (UAAAN), a DRD natural resources specialist helped refocus what began as an academic research project into a multiple-use development plan based largely on watershed management. During this re-evaluation, the project beneficiaries expanded from two groups (university researchers and the tourists who were to be allowed into the study area on a limited basis) to several (the original two and local farmers, politicians, businessmen, and developers).

The planning team zoned the 91.5 km^2 area and proposed uses for each zone based on native potential and the project's objectives. It made various integrated resource-management proposals to be executed in three phases.

MEXICO - THE SAN LORENZO RESERVE STUDY - **Fact Sheet**

Project area:		91.5 km^2
Population:		1,000 (approximately)
Physical characteristics:		
	- Warner and Riskind life zones:	

		Pine juniper forest	
		Chaparral	
		Oak forest	
		Dense thornless brush	
		Thorny desert and cactus with underlying grasses	
	- Elevation range: 1,700 to 3,100 m		
	- Land capability classification:		
	Classes I-III:		20%
	Classes IV-VIII:		80%
Duration of Project:			
	Preliminary Mission: 5/1979		
	Fieldwork: 9/1979-12/1981		
	Publication of Final Report: 1981		
Technical contributions:			
DRD discipline areas (3)			Number of DRD Experts (3)
Natural Resource Specialist (International Director)			1
Environmental Management Advisor			1
Regional Planner			1
Total professional person-months: DRD: 29.6 Government of Mexico: 41.3			
Financial contributions: DRD: US$133,000 Government of Mexico: US$233,000			
Total investment in projects proposed: N/A			

MAP 1

I. Introduction

The need for national parks and protected areas in developing countries is growing, especially in rapidly urbanizing areas where demands for recreational, educational, and scientific uses can conflict with agricultural and urbanization demands. As land values rise and competition between alternative uses increases, the need for a planning approach that considers all users and both present and future demands becomes more pressing. But formulating a plan is far simpler than finding a politically acceptable way to implement it.

This account of the San Lorenzo Canyon study addresses these issues. While planning a reserve at first appears to be a limited affair, it actually brings all the principles of regional planning into play. This study involved:

- Integrating a local sector-specific plan with regional and national development plans;
- Cultivating inter-agency cooperation in preparing and implementing a development plan;

- Acclimating host-country scientists and social scientists to participating in regional planning;
- Designing a management authority to represent all the users and keep the program going;
- Re-evaluating initial study objectives; and
- Expanding a single-sector project into an integrated development project.

By the year 2000, Mexico City is expected to have 31 million inhabitants, making it the world's largest metropolis. As part of a national strategy to control and manage population growth, industrial centers are being expanded in other Mexican cities, particularly in the sparsely populated north. One urban center selected for development is Saltillo, a city of 300,000 situated in a desert basin of the Sierra Madre Oriental. (See Map 1.) Automobile and steel plants have recently been built in Saltillo, partly because of government incentives. As a result of this stimulus and other factors, Saltillo's population is expected to double before the decade's end, and demands for all basic resources have increased greatly already. Clearly, with development of this scale and pace, only an integrated regional approach to planning can direct growth and avert negative impacts and irreversible problems.

Despite these large problems, the San Lorenzo study initially had a narrow purpose. When the Autonomous Agrarian University "Antonio Narro" (UAAAN) approached the Mexican Government in 1978 about establishing a protected area in the San Lorenzo Canyon area, the impetus was simply to conduct research to improve natural resource management, though limited public access for recreation and education was to be permitted. When the Mexican Government subsequently asked the OAS Department of Regional Development (DRD) for technical assistance in preparing a plan for the San Lorenzo Canyon, the hope was that the plan would also serve as a model in areas with similar ecosystems, but nothing approaching an integrated plan was envisioned. Only after fieldwork commenced did it become clear that the management of the Canyon could benefit the two local *ejidos*[1] and Saltillo.

1. Peculiar to Mexico, *ejidos* are former private estates acquired by the state and redistributed to a group of country dwellers. They function as government-subsidized rural villages oriented toward agricultural production. Pasture, woodland, and cropland are held by the community. Small plots of arable land are also allocated by elected managers on a semi-permanent basis to families for personal gardens. The two *ejidos* included on the study area are Cuauhtemoc and Sierra Hermosa.

Water became the focal point of the planning process and the measure of all development alternatives. Since 40 percent of Saltillo's water supply (some 5,000,000 gallons per day) comes from three wells in the San Lorenzo Canyon seven kilometers south of the city, the importance of carefully husbanding this resource was clear to politicians, farmers, businessmen, and developers.

This case study summarizes DRD participation with UAAAN, the counterpart agency, mainly between September of 1979 and December of 1981. It focusses on the adjustment of project objectives and scope, institutional arrangements, the preparation of a multiple-phase management plan, the involvement of interested parties, and implementation techniques.

II. Designing the study

UAAAN owned part of the San Lorenzo area and had for some time been conducting ecological research both there and on adjacent *ejido* lands. On the basis of this research, several professors in the Department of Renewable Natural Resources came to believe that only by establishing a UAAAN-controlled reserve would the Department be able to carry out reliable studies. Plans for establishing such a reserve began taking shape in May of 1979, when the Mexican Government signed a contract with OAS.

On a preliminary mission at that time, a DRD advisor met with university representatives in Saltillo. They agreed that a Project Executive Committee consisting of UAAAN's rector and the DRD's director should be established. They also set the following four objectives, which were broader than UAAAN's original objectives but narrower than those finally adopted:

1. Create a planning methodology applicable to geographically similar areas in northern Mexico;

2. Implement the methodology and establish the reserve;

3. Establish planning classes in the UAAAN's Departments of Forestry and Renewable Natural Resource Management; and

4. Design and develop an environmental education framework for visitors to the reserve.

The San Lorenzo Reserve in the background with land of the Ejidos in the foreground.

With the arrival of the International Director in late 1979, UAAAN named a multidisciplinary planning team, thus completing the organizational structure of the study. (See Figure 1.)

This team reviewed previous and ongoing research in the San Lorenzo area relative to the preliminary study objectives, which enabled it to identify gaps in information about the area's natural resources, land use, tenure patterns, and the economy of the *ejidos.*

A. Preliminary Fieldwork

Between October of 1979 and August of 1980, the study team conducted extensive field visits and aerial surveys in the canyon. To document land-use trends and their impact on the natural resource base, it compared its findings with benchmark data from previous UAAAN and government studies.

One important conclusion was that once-acceptable land-use practices had over the years notably altered the canyon's resource base. Virtually all forest cover had, over the years, been cut over or burned since 1920 without compensatory reforestation; primary-growth stands of pine, juniper, and fir were confined to the most inaccessible crests and canyons. Pine forests had regenerated naturally in some areas, covering 20 percent of the 9,150 ha proposed for the reserve, but the remaining 80 percent had regressed to chaparral and woody shrubs.

Timber removal continues today in San Lorenzo Canyon, even though Mexico's Agrarian Reform Act prohibits harvesting anything but dead or downed trees. Tree poachers circumvent the law by girdling trees so they dry out and can be cut "legally" for use as firewood, construction lumber, and posts.

Water supply has also fallen as a result of continued overgrazing, erosion, and a reduction in the ground-water-recharge. By most estimates, only 5 percent of the precipitation the area receives reaches the aquifer. Moreover, according to the study's hydrogeologist, much of the water Saltillo obtains from the San Lorenzo Canyon is fossil in nature, and an irreversible water-recharge deficit has been building for several years as demands upon the supply have increased. In short, Saltillo has been "mining" water instead of managing it. Indeed, the region's groundwater levels have fallen more than 300 meters during the last ten years, and to get ever-increasing quantities of high-quality water to meet domestic, agricultural, and industrial needs, Saltillo must now drill to depths greater than 1,200 meters.

Figure 1 - ORGANIZATIONAL STRUCTURE

The study team also discovered that human intervention has seriously harmed wildlife populations in the San Lorenzo Canyon. Habitat destruction through deforestation and other activities is so advanced in some places that certain populations cannot recuperate naturally. One of the few large mammals remaining in the reserve is the white-tailed deer (*Odocoileus virginianus*), and even its numbers are in decline. Unregulated hunting and trapping have also taken their toll on bird populations. For example, the maroon-fronted parrot (*Rhynchopsitta terrisi*), the only parrot known to nest in this high-desert zone, is now considered endangered.

While no statistics on current recreation use were available before this study began, historical records verify that the San Lorenzo's wildlife and running water drew considerable numbers of hikers, campers, photographers, and hunters to the area early in this century. Even as recently as 1980, more than 5,000 people - most of them in groups that come for one day only - visited San Lorenzo Canyon. Demand for outdoor recreation and education will no doubt continue to increase, even though in recent years litter, human waste, man-caused fires, graffiti, and tree blazing have dampened the appeal of many popular campsites.

The study team also discovered that great quantities of organic soil and river gravel had been removed from the canyon for landscaping and construction. Most of San Lorenzo's highly compactible clay soils have limited agricultural potential. Until recently, individuals who removed soil used primitive methods on a small scale, but they now use heavy equipment, so the impact on groundwater-recharge areas and river courses has multiplied. While soil removal is illegal, none of the government agencies working in the area has had the authority or manpower needed to control it.

Goats belonging to the farmers of the Ejidos are grazed on the lower portions of the San Lorenzo Canyon

A burro loaded with bags of topsoil removed from the San Lorenzo Canyon. High prices are paid by city dwellers for organic potting soil.

One of the most urgent problems the study team confronted was that of determining who owned the land proposed for the reserve and how best to acquire it. (See Map 2.) Although the San Lorenzo Canyon was un-inhabitated, cadastral records indicated that 64 percent (5,832 hectares) of the study area was owned and utilized by two *ejidos*, while 23 percent (3,318 hectares) was privately held in two large parcels. Since UAAAN assumed that effective long-term management would require control of all the reserved lands and the University owned only 13 percent of the proposed reserve, the study team had to consider recommending use restrictions on those *ejido* and privately owned lands that could not be acquired.

Although neither of the two private parcels was generating any income for the owners at the time of the investigation, the *ejido* lands proposed for the reserve were supporting some livestock and supplying timber, nuts, bark, and moss. While both *ejidos* derived most of their income from annual crop production in the low, fertile valleys near their communities, they supplemented their income by exploiting nearby forests. Sierra Hermosa stood to lose direct control over nearly 45 percent of its land if the reserve was established.

The study team's review of regional and national plans revealed that both the State Ecological Development Plan (ECOPLAN) and the Coahuila Development Plan had made the creation of an ecological reserve a regional development priority, In addition, the President of Mexico, Lic. José López Portillo, declared in 1980 that managing lands for multiple uses (including preservation) was essential for Mexico's economic and social stability, particularly in arid regions. At the time, the International Union for the Conservation of Nature and Natural Resources (IUCN) and the OAS had also recently declared the importance of establishing reserves in this biogeographic province.

B. Analysis of Preliminary Fieldwork

Once the preliminary fieldwork had been completed and the area's conditions and problems cataloged, the planning team reviewed the results and exchanged ideas on the study's future. A DRD natural resources specialist from Washington, D.C., participated in this exercise, which took place in August of 1980 in Saltillo. This review proved critically important for the university professors on the planning team, few of whom had worked on an interdisciplinary team with practical rather than academic objectives. Accustomed to working on highly specific problems, the university team members feared that their work would be diluted by another investigator's in the final management plan. Many guarded their own field data, apparently to avoid review by peers and government agencies and to protect publishable information, and some were reluctant to collect field data since this task is usually assigned to students.

As it turned out, these conflicts were minimized by making the participants themselves responsible for resolving their differences. This method of mediation enhanced communication, improved the team's understanding of the concepts underlying multiple-use resource management, and forced appreciation of an interdisciplinary approach to problem resolution. Nevertheless, some adjustments were painful and some problems were never resolved. For example, some senior faculty members would not allow the national field counterpart, a junior staff member, to evaluate their field reports. Additionally, several UAAAN team members did not want to participate in field visits, but chose to send a student proxy. Last, since most team members were "nominated" by UAAAN's rector without being granted any compensation or release time for the study, the study was not their highest priority.

MAP 2

The study's scope was broadened after the Saltillo meeting from that of reserve management for research purposes to that of multiple-use resource management for the whole community's benefit. Because the multiple-use plan was compatible with integrated programs at both national and regional levels, Mexican agencies became more receptive and cooperative, and there was a check against the tendency to diffuse or duplicate efforts - a common pitfall of projects conceived in isolation and sectorally implemented. Moreover, the study probably received more political support than it would have if it had not been restructured.

C. Revised Study Objectives

Partly as a result of the review, the study's objectives were reorganized into three major categories: natural resources, rural development, and public use. (See Table 1,) The workplan based on the revised objectives allocated tasks implicit in the objectives to members of the planning team, indicated the interrelationships of the tasks, and scheduled each.

While the research on natural resources remained UAAAN's main interest, the study team became more committed to both the rural development and public use objectives. In September of 1980, the team held a public seminar to explore the evolution of the concept of the reserve from that of a university research area to that of a community resource. This seminar drew 300 students and citizens, as well as favorable articles in the local press. It also prompted three university classes to examine the canyon planning process, Despite this warm reception, however, UAAAN held fast to its policy of excluding the general public from decisions about the study. It also excluded property owners on the assumption that they could use the information for private gain and thus thwart the study's goals.

Too general to act upon or measure, the original objectives for the study also ignored the considerable difficulty of getting study team members from different disciplines to adopt common management objectives. This problem was intensified when, shortly after DRD got involved, the prime mover behind the reserve project left UAAAN for reasons unrelated to the study. An orientation session helped mitigate such problems, but an even better approach would have been to involve all team members in objective-setting and the other early study phases.

D. Local and State Cooperation

At the study's outset, UAAAN decided against inviting *ejido* representatives to participate in project planning. But review of the cadastral data and the economic structure of the *ejidos* made the importance of their cooperation clear. Formal contracts with the Secretariat of Agrarian Reform would have to be drawn up to compensate the *ejidatarios* and other property owners for their land and for the opportunity costs of resource exploitation.

When projects involve rural populations who have limited opportunities to express their needs, the national agency sponsoring the project should actively and regularly fulfill this communicator role in the field. In the San Lorenzo study, this ideal was never fully attained. Even though the national and international co-directors visited the communities several times, the *ejidatarios* never became actively involved. They remained skeptical of the study goals since past promises of assistance had not been kept. To them, designating the San Lorenzo Canyon as a reserve meant only that their freedom to exploit the forests and pastures would be proscribed. They had little hope that government agencies could be convinced of the need for such practical rural development projects as wells, irrigation systems, and agricultural credit for crop cold-storage units - all of which they viewed as more fundamental to their long-term progress than a reserve.

As a result of the review meetings, the study team also asked the state delegations of the Secretariat of Agriculture and Water Resources (SARH), the Secretariat of Human Settlements and Public Works (SAHOP), and the Secretariat of Agrarian Reform (SRA) to comment on the study team's reports and management recommendations in the latter phases of the project. Like the *ejidatarios*, agency representatives participated only informally and sporadically, but their help did prove valuable later.

The political importance of the San Lorenzo Canyon management's impact on Saltillo's water supply prompted the team to reorder the study priorities. While they considered research and recreation development laudable social goals, local decision-makers were much more interested in the municipal water supply. In turn, they ultimately motivated the Governor, who helped by proposing solutions to the land-tenure problem and developing a scheme for financing rural development projects. (A new Governor was installed in Coahuila in late 1981, and contacts were made with appropriate state agencies just before DRD involvement ended.)

Table 1 - MANAGEMENT OBJECTIVES FOR THE SAN LORENZO RESERVE

Output Group	Product Output	Management Objective Statement	Management Actions
I. NATURAL RESOURCE	Water production	To propose a specific management plan to insure long-term water production for Saltillo	- Regulate tree harvesting and grazing - Initiate reforestation program - Implement specific use regulations for essential water-recharge zones - Implement erosion/sedimentation control programs - Protect the upper portions of watersheds
	Endangered species maintenance	To conserve and protect representative ecosystems (where possible, in a natural state)	- Establish protected habitat zones - Establish scientific zones - Temporarily prohibit hunting and trapping; regulate both over long term
	Ecosystem regulation	To conserve ecosystems and genetic diversity	- Preserve and protect representative ecosystems in the reserve
	Wildlife production	To implement regulations to insure repopulation or reintroduction of depleted native species	- Complete field research - Institute patrols to control hunting and trapping - Construct fences and signs; post signs; Launch public education program

II INTEGRATED RURAL DEVELOPMENT	Economic stability for local rural inhabitants	To promote the rational use of the area's natural resources as part of an integrated rural development program	- Make contracts with *ejidos* and reserve administration outlining natural resource utilization - Offer short course to familiarize local rural residents with reserve objectives - Give technical and financial assistance through state and federal programs for diversification of economy - Drill wells for domestic and agriculture uses in both *ejidos* - Extend program for site preparation, installation, maintenance and marketing of fruit, and Christmas tree plantations - Create jobs in reserve for concessionaires
	Production of animal protein	To produce animal protein for human consumption through a wildlife management program	- Complete basic field research concerning carrying capacity and optimum wildlife population levels with specific reference to game levels - Initiate habitat recuperation program - Implement controlled harvesting program
	Wood and forage production	To manage designated areas to increase the production of both wood and forage on a sustained-yield basis	- Implement of multiple-use management zones near Sierra Hermosa and Cuauhtémoc *ejidos*

	Consolidation of reserve lands under administration of SARH or SAHOP*	To resolve potential conflicts with private land-owners and *ejidatarios*	- Purchase, exchange, or expropriate life-term agreements - Make land-use restrictions on *ejido* lands within reserve
	Future development/management options	To maintain flexibility of future management for multiple uses	- Implement management and rural development plans
III. PUBLIC USE	Data base for management	To implement a coordinated research effort to gather both natural resource and user data	- Make contracts with research institutions and managing agency - Start research extension program
	Recreation use	To provide facilities for outdoor recreation in accordance with the management objectives	- Designate intensive, extensive, and primitive use zones
	Informed public (on site)	To facilitate opportunities for visitor understanding of the natural phenomenon and the relationship of the reserve to the community	- Complete and implement interpretative plan
	Informed public (off site)	To maintain sites for field trips of students from Saltillo and surrounding communities	- Contact schools - Develop teacher packets and audio visual materials - Implement environmental education-extension program

* SARH: Secretariat of Agriculture and Water Resources. SAHOP: Secretariat of Human Settlements and Public Works.

Figure 2 - CRITICAL PATH FOR THE PLANNING OF THE SAN LORENZO RESERVE

MAP 3

In retrospect, it appears that a government agency may have been a more appropriate counterpart institution than a university. Primarily a research and teaching institution, UAAAN has no mandate to manage a regional development project or even a reserve area. Naming SARH as the counterpart agency, for example, would have reduced the chance of conflicts over jurisdiction and responsibilities associated with the area's long-term management. Unlike UAAAN, SARH has park-management experience, funds, and manpower.

III. Executing the study

Once the revised workplan was completed, the planning team was prepared to set the reserve boundaries, determine potential uses, establish land-use zones, identify potential uses within the zones, rank and synchronize the potential uses in accordance with the development objectives, and prepare a management plan. (Figure 2 shows the sequence of activities of the study and follow-up activities.)

The study team met monthly to discuss progress and resolve problems. By April 1981, the work was completed and the team's report, "Multiple Use Management Plan for the San Lorenzo Canyon," was published.

A. Development Alternatives

The boundaries of the reserve were determined primarily by natural geographic features. Arable land on *ejido* property was excluded, but all marginal and unproductive land was included. Once the total area was determined, all potential uses and activities were listed. The zoning scheme developed for the 9,150 ha was compatible with the range of objectives identified earlier. (See Table 2 and Map 3.)

Generally, areas in Categories A and B protect important water recharge and upstream-catchment zones, threatened flora, and habitats for important wildlife. They also provide for scientific research in natural areas and in disturbed areas under natural recovery. A limited number of visitor access trails will also be allowed to cross these areas. Extensive use zones (Category C), in contrast, are dedicated to primitive outdoor recreation. In some cases, they are also used to maintain disclimax vegetation (see Glossary) for recreational or aesthetic purposes. Lands in Category D are intensively developed and situated near major access points. While the natural appearance of Category D lands should be maintained, parking lots, restrooms, camping areas, interpretative trails, visitor facilities, and tourist services will be allowed. Additionally, three areas have been zoned for natural recovery (Category E) until the resources can be rezoned to permanent categories. (In two such natural recovery areas, the *ejidos* will manage sustained timber production and grazing.)

Once the zoning scheme was developed and approved, a compatibility matrix was prepared. This matrix took account of the objectives the reserve was designed to serve, the amount of land in each zone, and all resource-development opportunities and activities. This information formed the basis for the reserve management recommendations, and it helped the team rank project priorities and stagger the development tasks so as not to exceed the land's carrying capacity.

Table 2 - PROPOSED ZONING SCHEME

Category Zone/Specific Areas	Hectares	% of Reserve
A *Scientific* (research/watershed protection)	4,092	45
B *Primitive* (watershed protection/recreation)	1,302	14
C *Extensive Use* (recreation/watershed protection)	460	5
D *Intensive Use* (recreation/education)	847	9
E *Natural Recovery* (eventually scientific, and, in the *ejidos*, agricultural and commercial)	2,449	27
Totals	9,150	100.0

Finally, a review of all existing Mexican conservation categories - national park, national forest, watershed district, wildlife reserve, and nature reserve - revealed that none was appropriate for San Lorenzo Canyon. While the study team director proposed adopting one of the internationally accepted IUCN management designations, the team chose to create a new broad management category within the Mexican system - an "ecological reserve" in which multiple and maximal use of the site's natural resources would be permitted. (See Glossary.)

B. Management Recommendations

To meet the project objectives and to retard resource degradation, the team recommended eight actions. (1) Designate a management agency to resolve the land-tenure issue. (2) Through this agency, enforce interim management measures, including a phased reduction of forestry and grazing and an immediate cessation of hunting, trapping, and soil collection. Once the economies of the *ejidos* are stabilized, proscribe timber and grazing activities except in designated zones. (3) Consider acquiring resource-development rights on private lands through purchase at market value, property exchange, life-lease agreements, or other arrangements. (4) Help SARH and the Secretariat of Agrarian Reform (SRA) prepare contracts defining future use of *ejido* lands. (5) Request national and international funds to help local rural inhabitants improve crop production and start new fruit-growing and Christmas-tree operations modelled after successful apple and pine-tree production in the area. Include the construction of wells, reservoirs, and irrigation systems for both *ejidos* in this effort. (6) Reforest approximately 5,000 ha in the *ejidos* (3,400 ha) and the private parcels (1,000 ha) with native pine and juniper to determine how quickly these forests can reproduce. (7) Take soil-conservation and fire-management measures, eliminate undesirable vegetation, improve specific habitats, and (eventually) reintroduce certain wildlife species. (8) Implement an outdoor recreation and education development scheme.

Obviously, not all these actions could be undertaken at once. The planning team therefore recommended that development be phased in three stages of approximately one year each as finances became available. (See Table 3.)

Table 3 - PROPOSED DEVELOPMENT AND MANAGEMENT SEQUENCE

Activity	Phase		
	I	II	III
LEGAL AND ADMINISTRATIVE			
- Secure endorsement from Government of Coahuila	X		

- Designate managing agency	X		
- Officially establish the San Lorenzo Canyon			
Ecological Reserve and set reserve boundaries	X		
- Begin purchase negotiations with *ejido* and private property owners, and find funds for the purchases	X		
- Establish a task force (citizens and professionals) to assist the management agency In public relations		X	
- Review and approve management plan		X	
- Establish contracts with the *ejidos* outlining natural resource use within the reserve		X	
- Initiate extension-education program with *ejidos*			X
- Sign contracts with *ejidos*			X
RESOURCE CONSERVATION			
- Gradually suspend all grazing and forestry activities until *ejidos* sign contracts	X		
- Suspend all hunting, soil, and plant extraction	X		
- Close areas for Natural Recuperation Zones	X		
- Initiate ranger patrols		X	
- Initiate reforestation and erosion- control programs		X	
- Eliminate introduced plant species In land categories A-C			X
- Reintroduce selected animal species			X
- Assess potential for expanding reserve			X
- Implement comprehensive resource- management programs			X
RURAL DEVELOPMENT			
- Drill wells for domestic water in *ejidos*	X		
- Construct irrigation infrastructure		X	
- Plant fruit and pine trees		X	
- Launch extension program			X
PUBLIC USE			
- Develop and distribute reserve orientation brochure	X		
- Initiate interpretation and environmental			
education management plans	X		
- Contact local schools and complete teacher packets		X	X
- Prepare orientation slide-tape or film		X	
- Begin posting signs		X	
- Construct visitors center and interpretation trails		X	
- Implement Interpretation and environmental-education programs			X

FACILITIES AND CONSTRUCTION			
- Contract construction firms to design and construct buildings, parking facilities, camping and picnicking areas, trails, etc.	X		
- Drill wells		X	
RESEARCH			
- Establish administrative guidelines for research program	X		
- Begin gathering baseline data and initiate monitoring program	X		
- Establish research extension program			X
PERSONNEL			
- Designate superintendent	X		
- Hire division chiefs, establish Interim regulations, and prepare Initial budget	X		
- Design orientation course for reserve employees and concessionaires		X	
- Hire and train rangers and interpreters		X	
- Implement comprehensive personnel program			X

IV. Implementing the recommendations

The final project document was presented to the Mexican Government in April of 1981. Once approved by the counterpart institution, it was distributed throughout Mexico, Until December of 1981, the study team focussed on increasing public and agency support for the plan, particularly with state and federal institutions in Coahuila. With less than six months remaining in his term of office, the Governor of Coahuila was reluctant to endorse the San Lorenzo Management Plan, but UAAAN invited the new gubernatorial candidate to a presentation of the plan and garnered his aides' support. At the same time, the public at large was invited to a slide-tape program outlining the planning process and recommendations. This program was presented at 19 public offices, schools, and private civic clubs between June and November of 1981.

A. A Strategy Seminar

At the project's outset, DRD team members assumed that UAAAN would take long-term responsibility for managing the reserve, that land-ownership would be transferred to the university, and that administration would be oriented toward research and field laboratory exercises. However, when the complexity of the management of the restructured study became clear, the study team recommended transferring authority for the reserve to either SAHOP or SARH since both had helped plan the study and both would have to help implement the recommendations regardless of which assumed final responsibility. Under the revised framework, UAAAN would assume administrative responsibility for the research program only.

To promote the revised project, DRD, UAAAN, the Autonomous University of Nuevo Leon (UANL), UNESCO, and the Latin American Social Science Faculty (FLACSO) offered a seminar for public agency administrators in October of 1981, The objective was to design a realistic strategy for implementing the recommendations of the San Lorenzo Canyon plan. Because the State wanted to apply the San Lorenzo model to the Cumbres de Monterrey area, the course was offered at the School for Advanced Architectural Studies of the UANL in Monterrey, Nuevo Leon. The seminar also helped local institutions acquire international support for the project via televised interviews, newspaper articles, and the publication of the seminar proceedings - a clear benefit of working with such major institutions as SAHOP and SARH. The 20 participants represented a variety of disciplines and agencies.

The seminar participants used FLACSO's methodology which helped to:

1. Review the region's economic conditions, prospects, and resource trends, evaluating major problems encountered and analyzing proposals for implementing the plan;

2. Examine selected recommendations and development alternatives in view of political and institutional realities;

3. Identify the actors involved and their interrelationships; and

4. Redesign the scheme for implementing the development plan.

This review yielded two important conclusions. First, resource degradation was primarily a political and economic issue: *ejidos* in remote arid areas tended to receive fewer benefits from extension agencies or Rural Bank credit programs than those nearer to the capital. Second, Mexico's institutional framework makes it difficult to address the chain reaction of problems caused by overusing a natural resource. Most integrated development programs involve several agencies, and cooperative efforts are too often hampered by conflicting legislative mandates. Consequently, efforts are duplicated, gaps are left in development programs, budget cycles are uncoordinated in multi-agency projects, and inter-agency rivalries occur.

These cliffs of the San Lorenzo Canyon offer beautiful vistas for hikers and campers and also provide resting sites for the maroon fronted parrot - an endangered species.

Aware of these institutional failings, the seminar members first called for a new autonomous regional development and management authority. But, since similar bodies had not functioned well in Mexico, this option was disregarded. The group subsequently proposed that either SAHOP or SARH draft legislation that would address the need for inter-agency coordinating powers to insure that Mexican development projects are truly regional and integrated. It also recommended that such legislation authorize credit arrangements to guarantee development funds for the *ejidos.*

The seminar participants also identified all the "actors" in the region - many of whom had escaped notice during the planning process. This exercise brought to light the key roles that the National Federation of Small Farmers (CNC) and the Rural Development Bank play in implementing rural development projects in the *ejidos.*

After the seminar proceedings were distributed in December of 1981, DRD's direct involvement terminated. However, UAAAN promoted several recommendations made by the study team and the seminar participants, so the plan stands a good chance of being implemented.

B. A New Decree

In early 1982, at UAAAN's suggestion, the state delegation of SAHOP drafted a decree establishing San Lorenzo as an Ecological Reserve. (A recent law granted explicit powers for such designations on the

President's recommendation.) A revised document endorsed by the City of Saltillo and the State of Coahuila was then forwarded to SAHOP's national office, The proposed law establishes guidelines for acquiring private lands and those *ejido* lands that will not be managed for timber and grazing in the future. If approved, it will allow a number of federal agencies to implement an integrated rural development plan for both Sierra Hermosa and Cuauhtemoc - avoiding the need to create a specialized management authority.

Some changes will naturally be required, but the plan as recommended by DRD and UAAAN will probably be adopted largely as it stands. When it is, a practical framework for integrated development in a small region in the Sierra Zapaliname of Mexico's Chihuahuan Desert will have met with real-world success.

V. Lessons learned

The **DESIGN STAGE** of the San Lorenzo Canyon study demonstrated the importance of:

1. Defining a study's objectives to reflect the study area's problems and potentials. The initial emphasis on academic research in the San Lorenzo Canyon study was narrow and unrelated to the immediate needs of the *ejidatarios* or the nearby residents of Saltillo. Research goals were not sacrificed when the study was expanded, but redirecting the study to serve regional and national development objectives made it politically desirable. While a research project may well have perished with the election of a new governor, a project with water-supply and land-management components did not. Periodic revision in view of local needs also gave the team members a sense of urgency often missing from studies with an academic focus.

2. Realistically assessing the institutional drawbacks and advantages of working with the designated counterpart agency. Basing a regional planning project in a university means doing without the budgetary and human resources available to a government agency. Provincial universities have little sway over the government agencies that will ultimately implement the study team's recommendations, and university personnel have professional goals and working habits quite different from those required by interdisciplinary "seat of the pants" planning.

3. Involving local people wherever possible in the planning process. The initial decision to exclude the *ejidatarios* from planning meetings was a mistake. Their cooperation was critical to resolving the all-important land-ownership issue. Moreover, understanding the roots of their disaffection ultimately helped the study team understand the region's development dynamics and become more committed to directing research toward local development problems. By the same token the team's work on Saltillo's water-supply problems got local decision-makers interested in the study, and they in turn got the Governor interested.

4. Taking a neutral view of natural resource conflicts. Instead of viewing this study as part of a rear-guard action to forestall development in the San Lorenzo Canyon, the study director posed the potential conflict in terms of the development of one economic sector (tourism) impinging upon the development of another (agriculture) - in other words, two

"goods" were in competition. Framing the choice in this way made negotiating a compromise easier than it would have been if "environment" had been pitted against "development."

The **EXECUTION STAGE** showed the importance of:

1. Viewing the project director's main task as maximizing the use of indigenous personnel and political support. While no integrated planning project is a "one man show," this one debunked the myth that a large full-time team is needed to effectively carry out development goals. The project director was the only full-time study team member and the only non-Mexican team member. His systematic efforts to bring local decision-makers and local people affected by the study into the planning process got media attention for the study, and cultivated the support of national and international agencies which maximized the productivity of the university-based research and paved the way for project implementation.

2. Making allowances for part-time and unpaid workers. Since only one Mexican team member was given release time to work on the project and none of the other researchers was compensated for the work done on top of the normal academic load, allegiance to the project faltered at times and some mid-project deadlines were missed, The price of economy was some natural resentment toward a policy of "forced participation." While the team members' commitment to the project actually increased during the study and the research was completed on time, the "costs" of labor economy cannot be ignored.

The IMPLEMENTATION STAGE illustrated the importance of:

1. Generating publicity and support for the project. In the San Lorenzo Canyon study, this was an "all fronts" effort. The study team director found out which agencies were equipped and willing to support the project and then systematically cultivated that support, Agency personnel were persuaded to allot funds for the project, and provincial government support for the law establishing the canyon as an ecological reserve was mobilized. At the same time, public support for the project was generated through local seminars, slide-tape presentations to civic groups, and field trips for officials. Local newspapers published four articles on the study, and one radio station aired an interview. Combined, these efforts created a political future for the study team's recommendations.

2. Paying attention to politics without taking political stands. The Governor of Coahuila's natural reluctance to endorse the San Lorenzo management plan as his term of office was expiring could have dissipated political support for implementing the recommendations. But it didn't. By inviting the Governor's likely successor to an unveiling of the plan, UAAAN staff captured his interest without taking any political risks. This strategy paid off in post-election support for the project.

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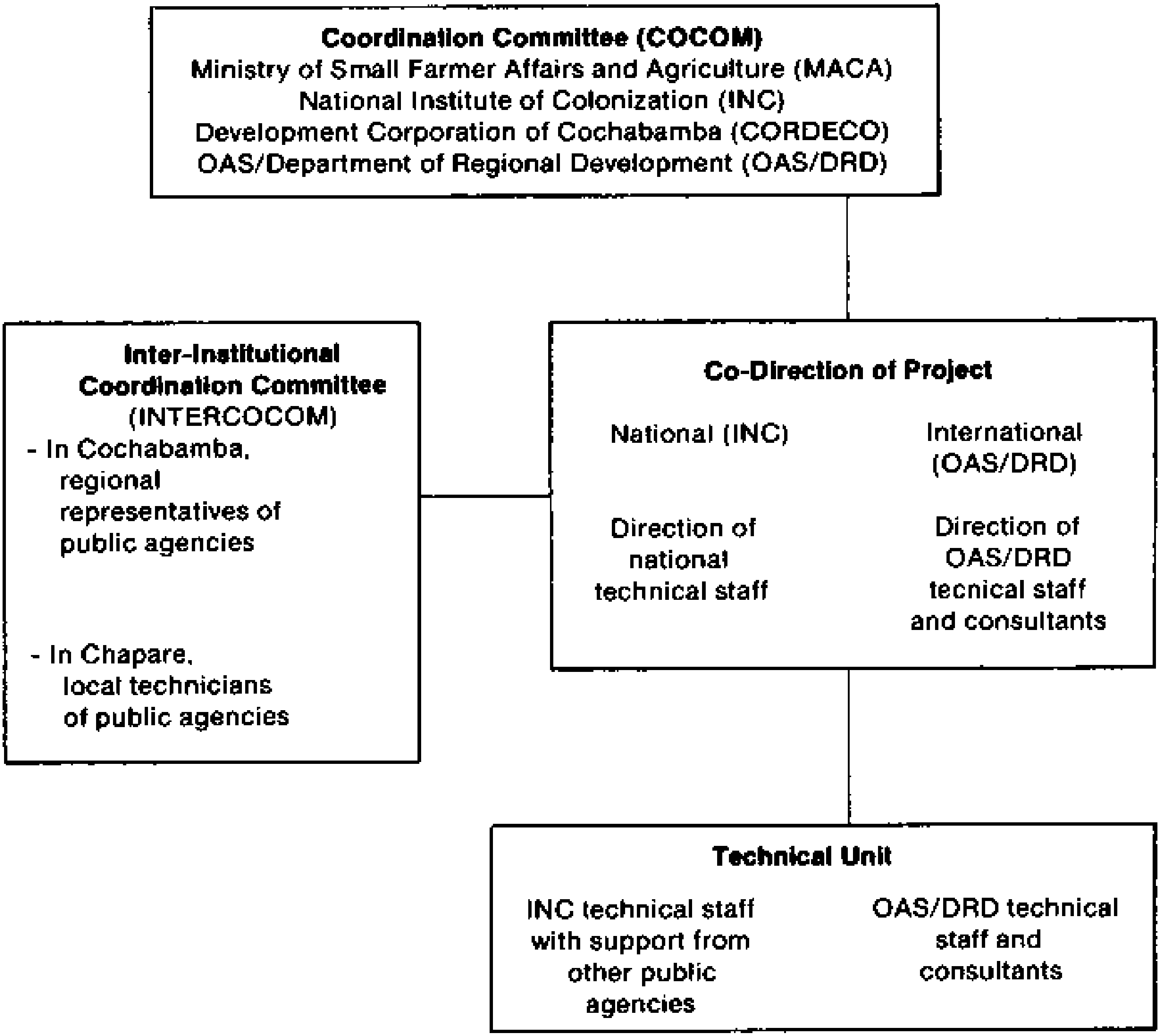
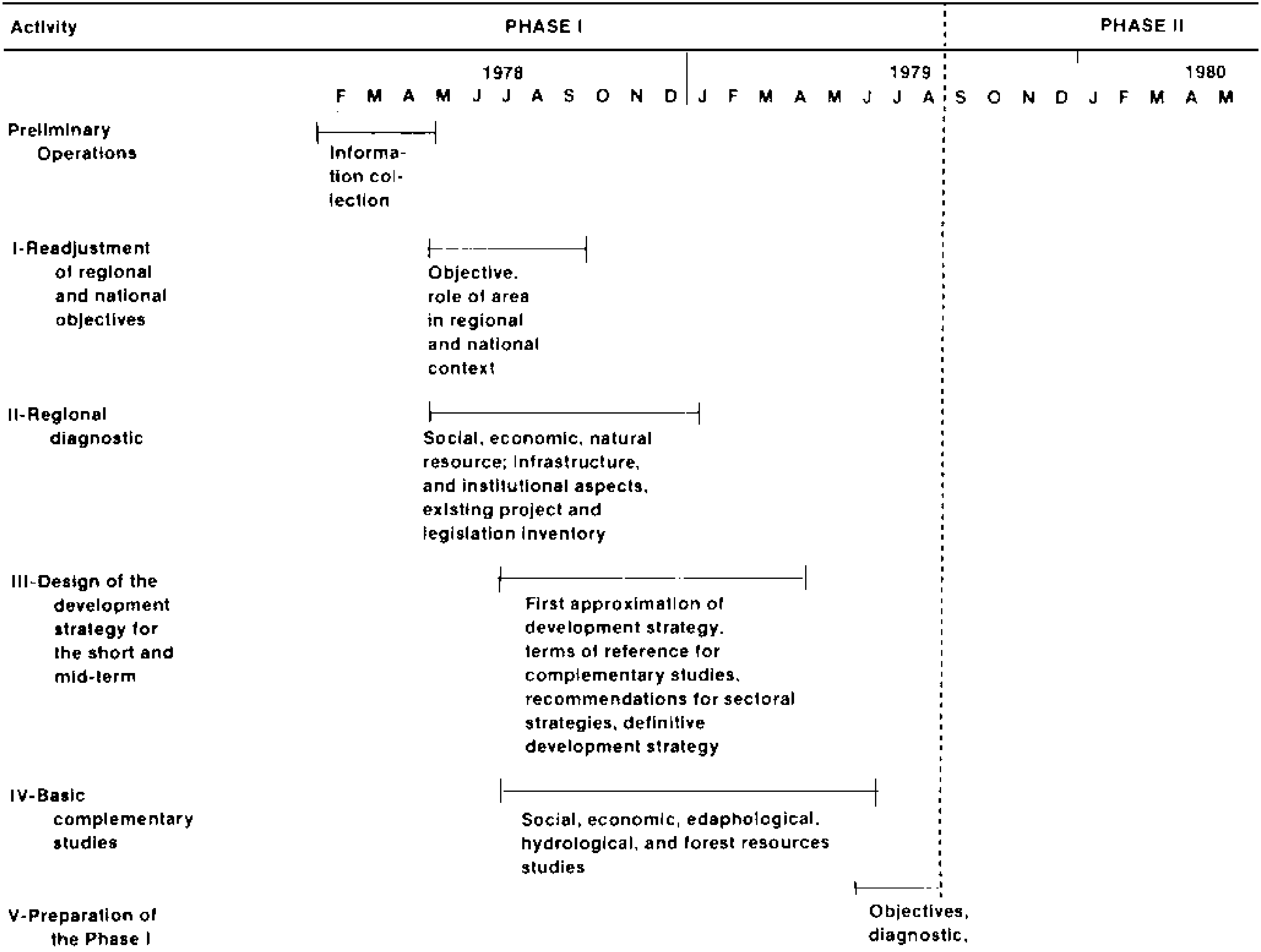
CHAPARE STUDY
REPUBLIC OF BOLIVIA
Location of the Area
CARIBBEAN SEA
VENEZUELA
GUYANA
SURINAM
FRENCH GUIANA
COLOMBIA
ECUADOR
BRAZIL
PERU
CHAPARE STUDY
La Paz
BOLIVIA
Sucre
PARAGUAY
PACIFIC OCEAN
CHILE
ARGENTINA
URUGUAY
OCEAN


ATLANTIC


Coordination Committee (COCOM)
Ministry of Small Farmer Affairs and Agriculture (MACA)
National Institute of Colonization (INC)
Development Corporation of Cochabamba (CORDECO)
OAS/Department of Regional Development (OAS/DRD)
Inter-Institutional Coordination Committee (INTERCOCOM)
- In Cochabamba, regional representatives of public agencies
- In Chapare, local technicians of public agencies
Co-Direction of Project
National (INC)
International (OAS/DRD)
Direction of national technical staff
Direction of OAS/DRD tecnical staff and consultants
Technical Unit
INC technical staff with support from other public agencies
OAS/DRD technical staff and consultants


Activity
PHASE I
PHASE II
1978
1979
1980
F M A M J J A S O N D J F M A M J J A S O N D J F M A M
Preliminary Operations
Information collection
I-Readjustment of regional and national objectives
Objective. role of area in regional and national context
II-Regional diagnostic
Social, economic, natural resource; infrastructure, and institutional aspects, existing project and legislation inventory
III-Design of the development strategy for the short and mid-term
First approximation of development strategy. terms of reference for complementary studies, recommendations for sectoral strategies, definitive development strategy
IV-Basic complementary studies
Social, economic, edaphological, hydrological, and forest resources studies
V-Preparation of the Phase I
Objectives, diagnostic,

Report

strategy, sectoral
projects, selection
and preparation
programming

VI-Selection of programs and projects

List of projects for further study, terms of reference for formulation and evaluation of sectoral projects

VII-Formulation and evaluation of projects

Systematization of preparation, formulation, evaluation, and reformulation of sectoral projects

VIII-Elaboration of the Action Plan

Compatibilization of programs and projects, preparation of Action Plan

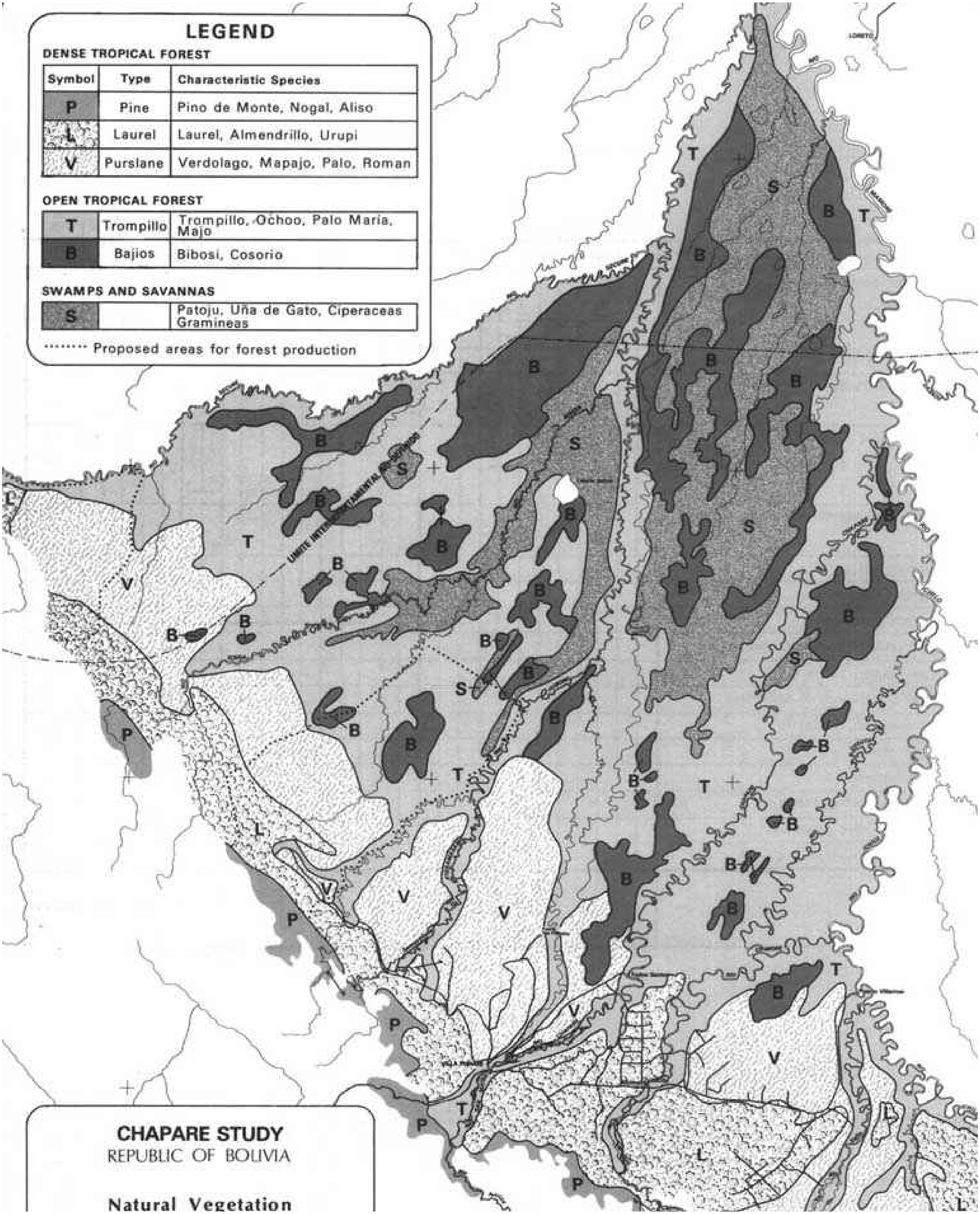
IX-Preparation of the Final Report

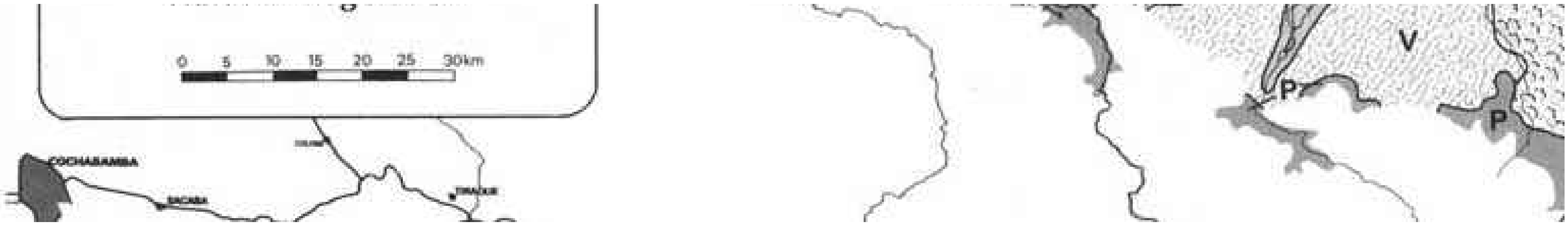
Objectives
Diagnostic
Strategy
Action Plan for 5-7 years

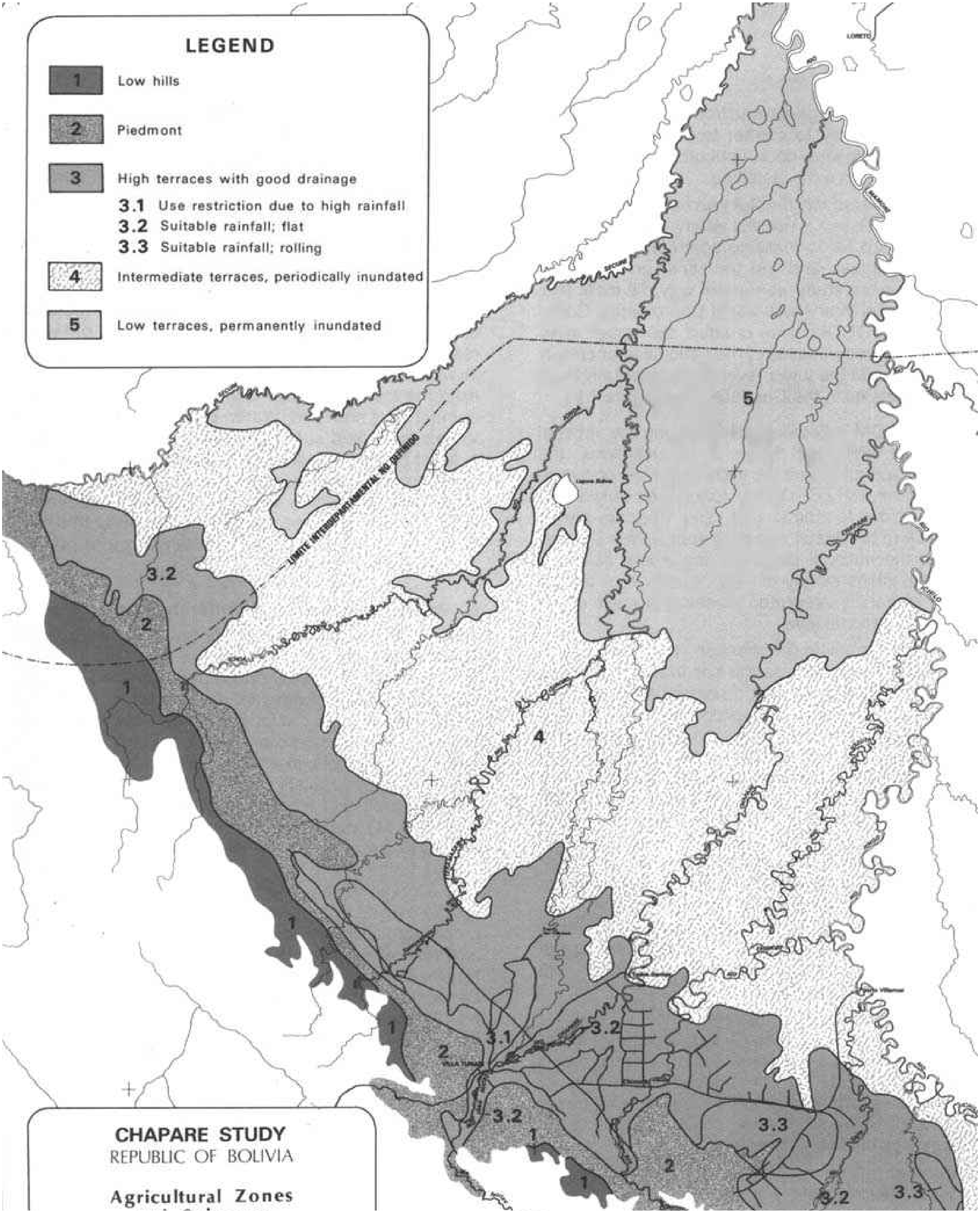
		1978 / 1979 / 1980 (J F M A M J J A S O N D J F M A M J J A S O N D J F M A M)	M/M
1.	Project Chief (Agricultural Engineer)		25.1
2.	Regional Economist 1		1.1
	2		2.0
3.	Agronomist		4.3
4.	Soil Specialist		1.1
5.	Labor and Employment Specialist 1		2.1
	2		0.7
6.	Cartographer 1		0.1
	2		2.0
	3		1.0
7.	Forest Development Specialist 1		1.3
	2		1.0
8.	Agro-ecologist		1.1
9.	Regional Planner		1.5
10.	Project Economist		15.4
11.	Institutional Development Specialist		1.0
12.	Agro-industry Specialist		1.1
13.	Rural Electrification Specialist		1.8
14.	Potable Water Specialist		1.0
15.	Animal Health Specialist		1.1
16.	Road Engineer		1.6
17.	Cattle Production Specialist		1.5
18.	Water Resources Specialist		1.7
19.	Project Formulation Specialist		0.7
		TOTAL	74.4

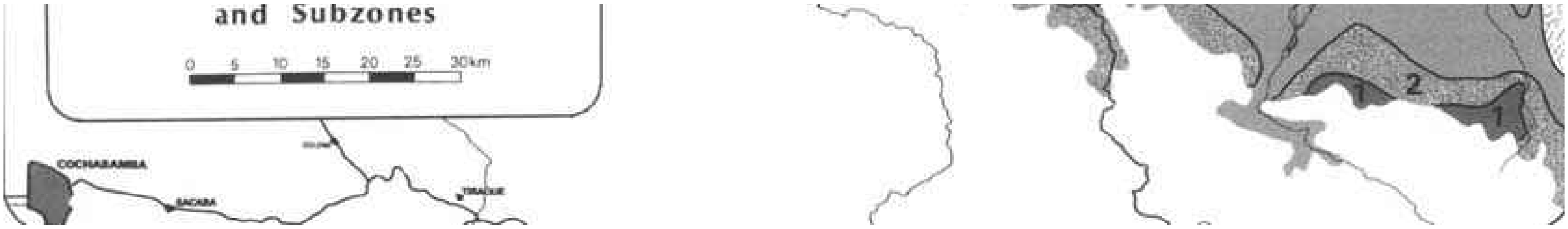
Courses

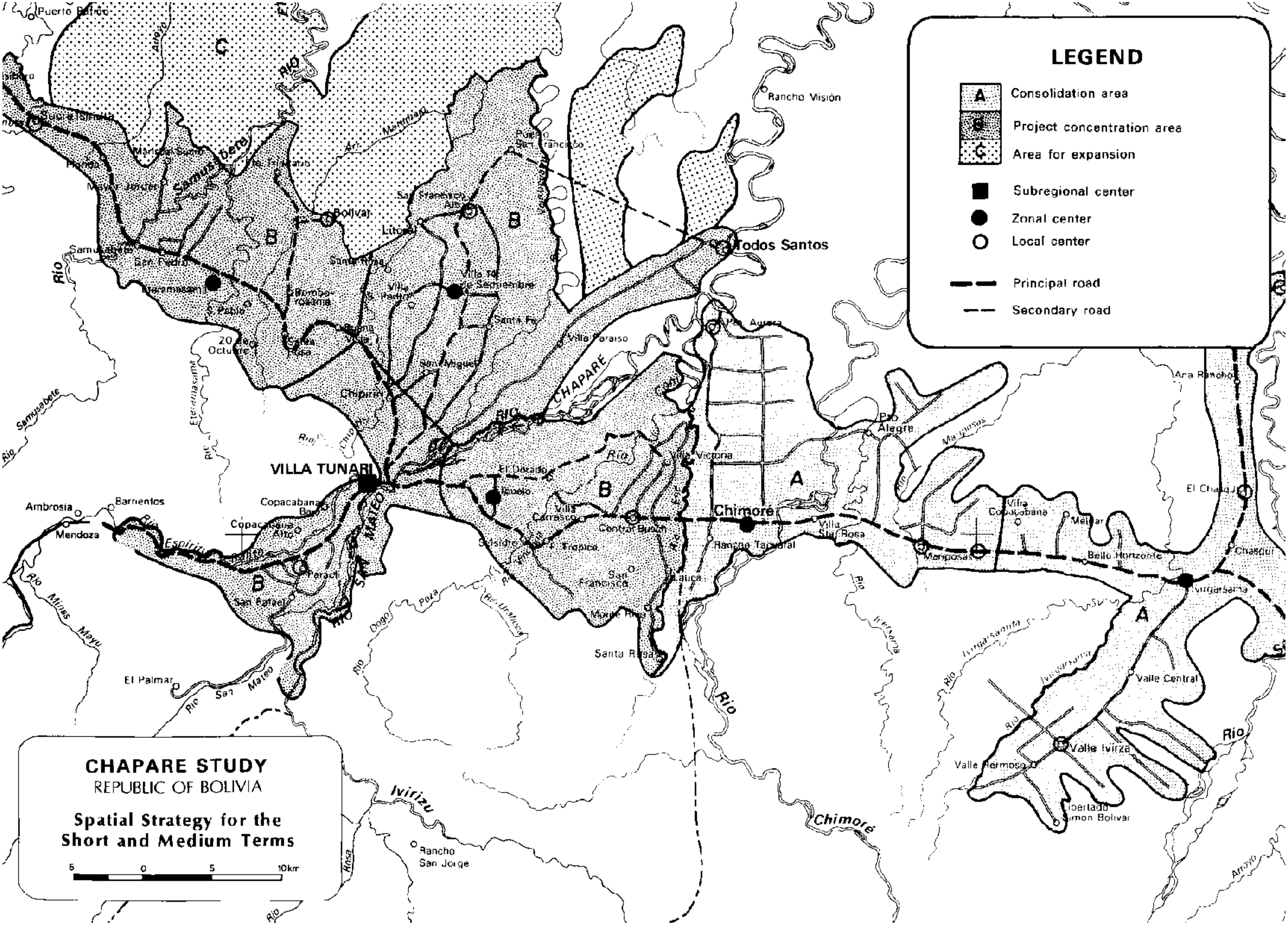
CIDIAT

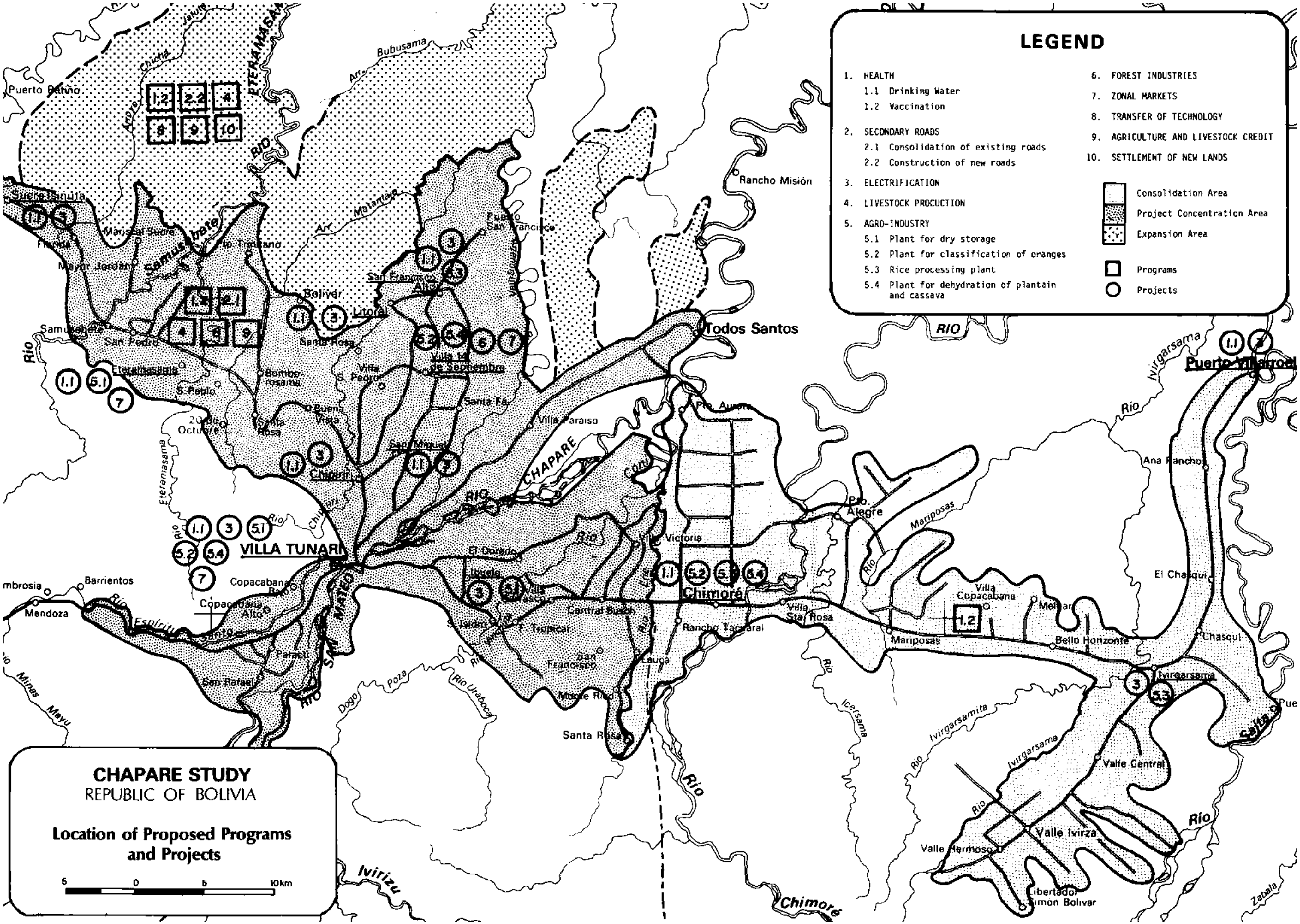

LEGEND
DENSE TROPICAL FOREST
Symbol | Type | Characteristic Species
P | Pine | Pino de Monte, Nogal, Aliso
L | Laurel | Laurel, Almendrillo, Urupi
V | Purslane | Verdolago, Mapajo, Palo, Roman
OPEN TROPICAL FOREST
T | Trompillo | Trompillo, Ochoo, Palo Maria, Majo
B | Bajios | Bibosi, Cosorio
SWAMPS AND SAVANNAS
S | | Patoju, Uña de Gato, Ciperaceas Gramineas
Proposed areas for forest production
CHAPARE STUDY
REPUBLIC OF BOLIVIA
Natural Vegetation


0 5 10 15 20 25 30km
COCHABAMBA
SACABA
V
P
P


LEGEND
1 Low hills
2 Piedmont
3 High terraces with good drainage
3.1 Use restriction due to high rainfall
3.2 Suitable rainfall; flat
3.3 Suitable rainfall; rolling
4 Intermediate terraces, periodically inundated
5 Low terraces, permanently inundated
LIMITE INTERDEPARTAMENTAL NO DEFINIDO
1
2
3.1
3.2
3.3
4
5
CHAPARE STUDY
REPUBLIC OF BOLIVIA
Agricultural Zones


and Subzones
0 5 10 15 20 25 30km
COCHABAMBA
SACABA
TIRAQUE
1
2
1


LEGEND
Consolidation area
Project concentration area
Area for expansion
Subregional center
Zonal center
Local center
Principal road
Secondary road
CHAPARE STUDY
REPUBLIC OF BOLIVIA
Spatial Strategy for the
Short and Medium Terms
5
0
5
10km
VILLA TUNARI
Todos Santos
Chimoré
Rancho Visión
Bolivar
Villa 14 de Septiembre
Santa Fe
Villa Paraiso
CHAPARE
Puerto Aurora
Victoria
Pto Alegre
Mariposas
El Chaquí
Ara Rancho
Chasqui
Bello Horizonte
Villa Copacabana
Villa Sta Rosa
Rancho Tacuaral
Central Busch
Villa Carrasco
Isidro
Tropico
San Francisco
Santa Rosa
El Dorado
San Pablo
San Miguel
Chipiriri
20 de Octubre
San Pedro
Samusabete
Ambrosia
Barrientos
Mendoza
Copacabana
Copacabana Alto
San Rafael
El Palmar
Río San Mateo
SAN MATEO
Espiritu
Ivirizu
Rancho San Jorge
Chimoré
Valle Central
Valle Ivirza
Valle Hermoso
Libertador Simon Bolivar
Ivirgarsama
Puerto Patiño
Río
Rio Mitus Mayu
Rosa
Arroyo
A
B
C


LEGEND
1. HEALTH
1.1 Drinking Water
1.2 Vaccination
2. SECONDARY ROADS
2.1 Consolidation of existing roads
2.2 Construction of new roads
3. ELECTRIFICATION
4. LIVESTOCK PROCUCTION
5. AGRO-INDUSTRY
5.1 Plant for dry storage
5.2 Plant for classification of oranges
5.3 Rice processing plant
5.4 Plant for dehydration of plantain and cassava
6. FOREST INDUSTRIES
7. ZONAL MARKETS
8. TRANSFER OF TECHNOLOGY
9. AGRICULTURE AND LIVESTOCK CREDIT
10. SETTLEMENT OF NEW LANDS
Consolidation Area
Project Concentration Area
Expansion Area
Programs
Projects
CHAPARE STUDY
REPUBLIC OF BOLIVIA
Location of Proposed Programs and Projects
5 0 5 10km
Puerto Patiño
Bubusama
Rancho Misión
Todos Santos
Puerto Villarroel
VILLA TUNARI
Chimoré
CHAPARE
Villa Paraiso
Santa Fé
San Miguel
Chipiriri
Bolivar
Litoral
Santa Rosa
Samusabete
San Pedro
Eteramasama
S. Pablo
Bombo-rosama
Mayor Jordan
Mariscal Sudre
Copacabana
Mendoza
Barrientos
El Dorado
Central Busch
Tropical
Rancho Tacaral
Lauca
Santa Rosa
Villa Victoria
Mariposas
Bello Horizonte
Ivirgarsama
Chasqui
El Chasqui
Ana Rancho
Villa Copacabana
Valle Central
Valle Ivirza
Valle Hermoso
Libertador Simón Bolivar
Pto. Alegre
Ivirizu
Chimoré
RIO
Río
Zabala

Looking ahead

A book of case studies and guidelines drawn from experience is by definition historical. Much of value for the future can be gleaned from history, but the fact remains that conditions in most developing areas in the world are changing very rapidly, especially in Latin America and the Caribbean. This book would therefore not be complete unless it identified some of the major development challenges and speculated about how the regional development planning methodologies presented here may have to be gradually adjusted. Appropriately, this approach underscores a fundamental conviction that development planning must be as dynamic as development itself.

I. Trends in Latin American Development in the 1980s

The current decade is already characterized by economic stagnation, severe problems of foreign debt, reduced government spending, widespread unemployment, and social unrest. The constraints imposed by physical resources are becoming very evident in many countries and natural resource management problems are demanding serious attention. Also of great importance are major population shifts within countries and, in some cases among countries.

The following section discusses these three major sets of problems in very global and simplified terms as background for predictions about needed changes in regional planning methodology.

A. Economic Constraints in the 1980s

Latin America is facing severe economic recession, limited or no economic growth and massive foreign debt, Exports have decreased in response to a fall in demand in the industrialized countries and protectionist pressures. Debt repayment is difficult and external funds for new investments are becoming increasingly scarce.

In all likelihood, foreign capital will continue to be scarce for the remainder of the decade, thus forcing Latin American countries to depend heavily on indigenous capital for development. Growth and development will probably continue to be slow, and both internal consumption and investment will grow at slower rates than in the 1960s and 1970s.

These new development prospects will probably induce important development policy changes in many countries. Governments will postpone many capital investments in large development projects until financial conditions improve. With large external debts to pay, governments will gravitate toward modest projects that produce or save foreign currency and toward export-production and import-substitution projects. Most likely, the number of "patch up" projects will increase and the number of "structural change" projects will decrease.

B. Physical Resource Constraints in the 1980s

Latin America in the 1980s must cope with an expanded population and the aftermath of the rapid economic growth that took place during the 1960s and 1970s. Supplying the needs of rapidly growing populations, while attempting to raise millions above the level of poverty, will continue to be the central concern of most governments. But more and more physical resource constraints will be a cause for concern and a focus of development planning. In the 1980s, four major types of problems loom particularly large: 1) problems caused by deforestation of large areas of Latin America; 2) water resource development problems, including water supply shortages for industry, agriculture, and domestic use, as well as pollution of surface and groundwater and an increased flooding as a result of deforestation; 3) deterioration of soil resources and significant losses of productive agricultural land through erosion and salinization; 4) urban development problems that reflect increasing limitations on clean air, clean water and space.

C. Migration Dynamics in the 1980s and its Implications

The structural changes occurring in the economies of Latin America and the Caribbean, as well as physical resource constraints, will combine to increase competition for the use of national territory to fulfill economic and social goals. Pressures will be especially acute in the smaller countries with high population density in relation to physical resources and in regions of larger countries with similar problems. In many places, space suitable for development with modest investment is becoming scarce.

Among the results of these pressures will be continued heavy migration of population to cities, movement into less populated regions, and accelerated migration between countries. In many cases, the migrants are economic refugees, and in a few cases they will include political refugees. These population shifts will aggravate existing shortages of food, water, energy, and social services in areas where the migrants congregate. Localized population growth will clearly put new stresses on the physical resource base and pose new challenges for environmental management. Governments will be hard-pressed to develop new infrastructure (water supply and sanitation, energy production, roads, ports, urban facilities) since funds to finance it will diminish. Urban development problems will become particularly critical as large populations in search of employment take up a marginal existence in or near urban centers. According to the Inter-American Development Bank,[1] urban population is expected to grow from 224 million in 1980 to 322 million in 1990. The problems associated with "urbanization" in Latin America will probably reach crisis proportions by the end of the decade, if not before.

1. *The Role of the Bank in Latin America in the Decade of the Eighties.* Table III-1. IDB, Washington. D.C., 1981

II. New Requirements for Regional Development Plans and Projects

These conditions will establish some new requirements for regional development plans and will affect the kinds of investment projects that will be possible in the 1980s. The practice of regional development planning will have to adapt to these trends and changes if it is to fulfill a useful role in the development process.

A. A Modified Focus for Regional Development Plans

Based on the foregoing analysis, the focus of planning efforts in the late 1980s is likely to shift, and certain types of regions will receive greater attention than in the past while others receive less:

1. Relatively developed regions where the major infrastructure is already in place will probably receive renewed attention for development planning.

2. Conversely, regions that require massive investments in infrastructure - such as remote areas without roads, power, etc. - will probably be lower development priorities. Empty regions will be the focus of major development efforts only if the required government investments are low and the benefits are substantial. (Unfortunately, this trend may further stimulate the "cheap" spontaneous colonization of accessible marginal areas, which entails unfavorable environmental consequences.)

3. Regions composed of urban areas and their hinterlands could well become the focus of major regional planning efforts as larger investments are planned to accommodate urban growth and solve urban problems.

4. Multinational regions, such as border areas, may receive increased attention as nations discover that the least expensive development options cannot always be found entirely within a country's boundaries. Multinational planning sometimes will be required to capitalize on these options, as well as to deal with conflicts over resource use.

B. A Modified Focus for Investment Projects

If the capital shortages evident in the early 1980s continue, different types of development projects and plans will be necessary:

1. Emphasis will shift from the creation of new infrastructure to the better use of existing infrastructure or to the creation of small additions that can substantially improve the existing infrastructure's social usefulness. (Such additions include, for example, connections to telecommunications networks or construction of stretches of roads that complete important main routes.)

2. Institutional or legislative changes that require little or no additional investment, but may significantly affect the dynamics of a region, will be emphasized.

3. Programs and projects already under way will have more priority than usual over projects that are still on the drawing board. By the same token, projects to complement or supplement existing programs and projects will have preference over completely new ones.

4. Small, low-cost alternatives to large projects will be sought. For example, small energy-generation projects based on local resources will be preferred to high-cost electrical connections to remote villages or towns. Similarly, energy-conservation projects will be appealing alternatives to increased energy generation.

5. Projects that produce foreign exchange will be needed to help reduce most developing countries' foreign debt. The planning challenge is making sure that such projects do not divert basic necessities from local populations or otherwise prejudice their well-being.

III. Specific Adjustments in Regional Development Planning Methodology

The foregoing prognostication has some obvious implications for the use of the integrated regional development planning methodologies described in this book. Hence, it is important to indicate the probable changes in methodology, some of which are already underway.

1. The constant effort to shorten the diagnosis phase of development planning will be given added impetus by a shortage of funds for studies and a reduced need to identify major new

investment projects. This trend may be partly counterbalanced by more in-depth analysis of projects that are already scheduled for implementation but that can be made more efficient.

2. Energy as a critical ingredient of regional development is already receiving greater attention in development diagnosis and new methodologies will have to be developed to rapidly evaluate energy demand and supply in geographic terms, to identify efficient low-cost solutions to energy problems, and to prepare comprehensive spatially oriented investment plans for energy production and distribution.

3. Food supply and distribution problems will receive larger attention, so more projects will have to be identified to deal with these issues as part of a regional development strategy.

4. Methodologies for dealing with conflict resolution in the use of natural resources will have to be further refined to deal with problems involving more than one country. A case in point is the. problem of transfrontier pollution, which is becoming serious in some places. Only governments acting cooperatively can solve the problem. (Air, water pollution, and other problems along the U.S. Mexico border are already the focus of joint studies.) Similarly, distribution of water rights among riparian countries in international river basins is becoming a major issue. The participation of international technical assistance organizations may be appropriate to assist riparian countries in identification of alternative uses and distribution arrangements and in giving advice about establishment of institutions for administration and monitoring of international waters.

5. New methods for dealing with the critical problems of urban growth are needed. Especially critical are new mechanisms for evaluating the carrying capacities of the natural resource systems that support cities since a clearer understanding of the resource base is needed to improve the efficiency of urban investments.

6. Migration within and between countries now involves political as well as economic refugees. To accommodate both, new methodologies for planning longer-term settlements of refugees are needed to make settlers more self-sufficient and to reduce the burden on the host country and international donor agencies.

7. Defenses against natural disasters should be built into regional development plans. The keys here are incorporating better risk-assessment information and designing development projects to minimize damage to investments in the event of flood, earthquakes, hurricanes, and other disasters.

8. More attention will have to be devoted to preparing proposals other than those for investment projects. Recommendations for tax incentives, pricing changes, modification of regulations, and improvement of management capability of development institutions will take on added importance. Institutional improvements may be designed to substantially increase the efficiency of use of available financial resources,

9. The evaluation of investment projects and the preparation of action plans is likely to become more sophisticated. The need for more integrated economic analysis may lead to increased use of regional simulation models to both formulate and evaluate development programs and projects. With models that depict the economic relationships within the studied region, and between the region and the rest of the country, planners can study the

impact of groups of projects, as well as individual projects, on the region and the country. These models will also help decision-makers accept or reject projects and groups of projects on the basis of selected indicators that reveal development impacts.

10. The increased use of systems analysis and computers in handling the increasing volume of data needed for integrated regional development planning seems virtually inevitable. Integration of data and professional inputs during planning is a central theme of this book. Unfortunately, as the fund of human knowledge increases and professional specialties become more narrow, the problem of integration becomes more difficult. Nowhere is this more evident than in dealing with issues referred to as environmental. To help people and institutions to interact effectively in dealing with these issues, technical assistance agencies as well as universities will have to offer the kind of broad multi-disciplinary training that will make more professionals effective integrators and team leaders. In addition, the simple integrative tools that are now applied may gradually have to be replaced by more sophisticated "systems" manipulated by computers.

11. Finally, some better means are needed for making the institution-building efforts of technical assistance more efficient. While in-service training works well, reaching all the state governments, regional agencies, and river basin authorities that could benefit from such service would take years using conventional methods. Helping development agencies to help each other and strengthening agencies that provide assistance to selected groups of countries will speed up the process of "horizontal cooperation".

IV. Some Long Range Challenges for Regional Development Planning

Beyond the short-term methodological adjustments outlined here lie more profound challenges to governments and international institutions. The future of technical cooperation in regional development depends upon the success with which new problem-solving techniques are applied to the following emerging needs:

1. Promotion of concepts of regional planning within national economic and social development planning so as to deal more effectively with the geographic balance of the growing demands for employment and basic needs.

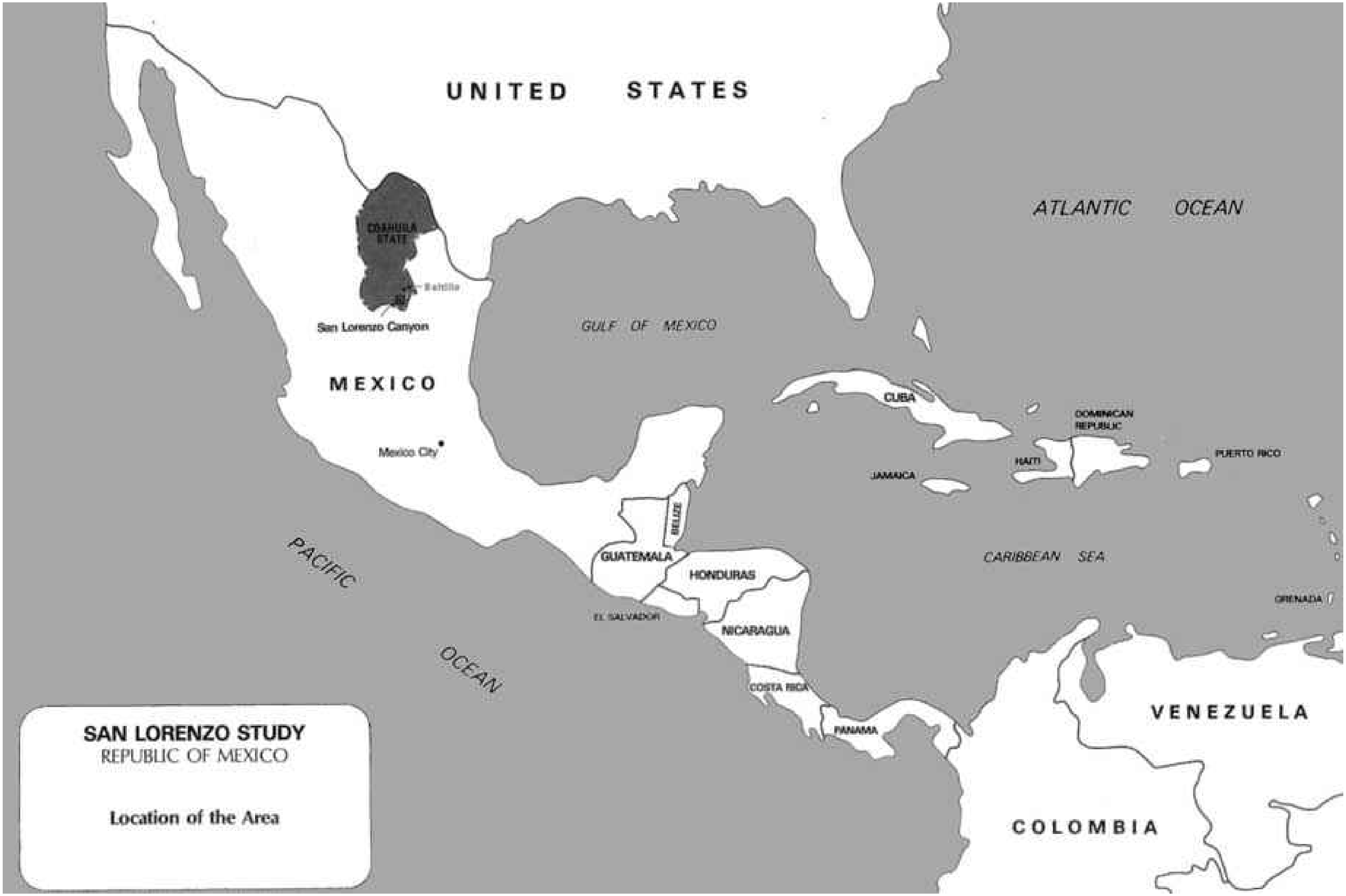
2. Establishment of functional links between regional planning and national and sectoral planning.

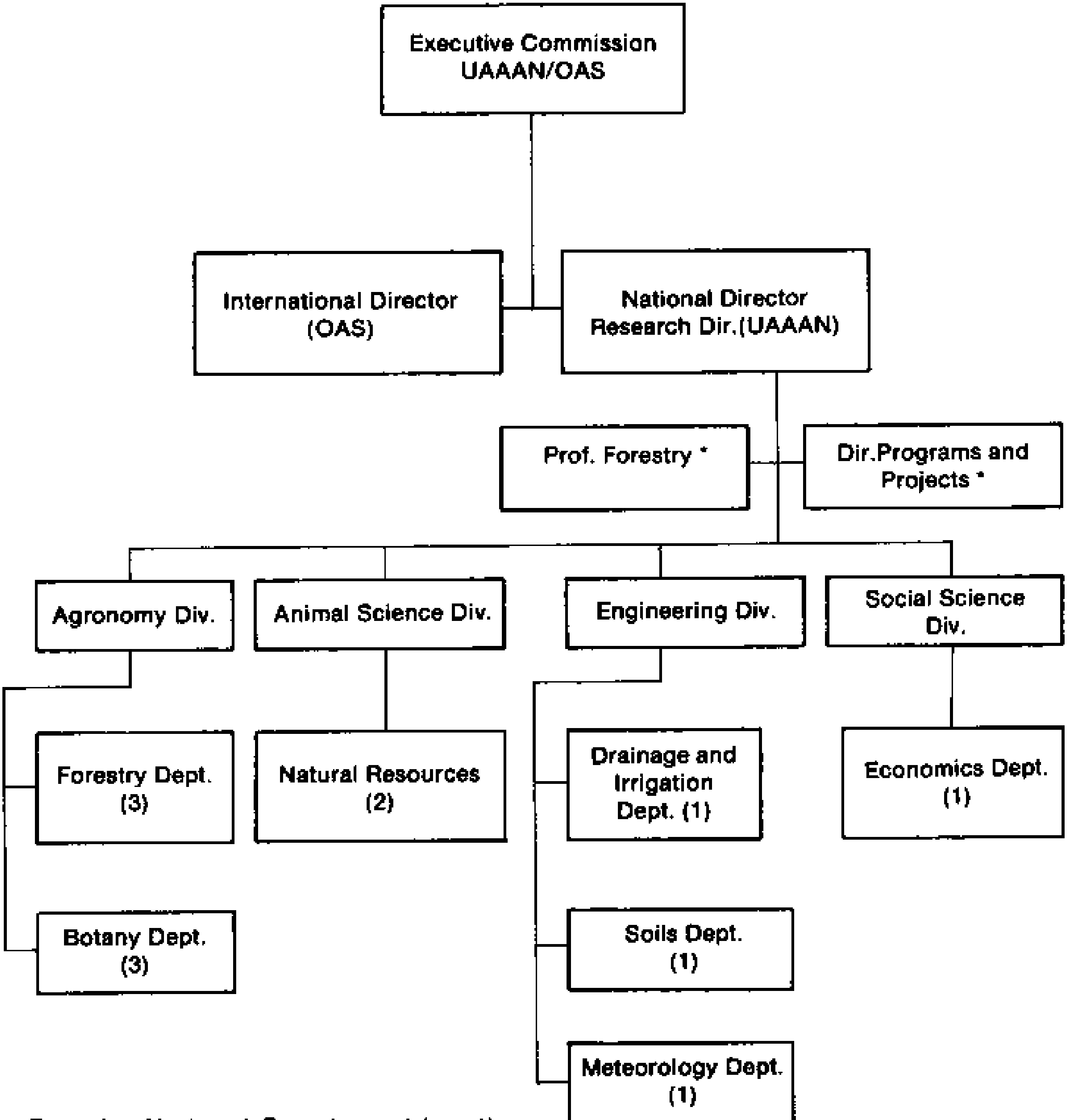
3. Substantial improvement of regional development implementation by strengthening of regional institutions.

4. The definitive integration of environmental issues into standard regional development methodology followed by further clarification of practical tools for regional environmental management.

5. The introduction of regional programming as a method for designing and implementing development projects on behalf of major development-financing institutions,

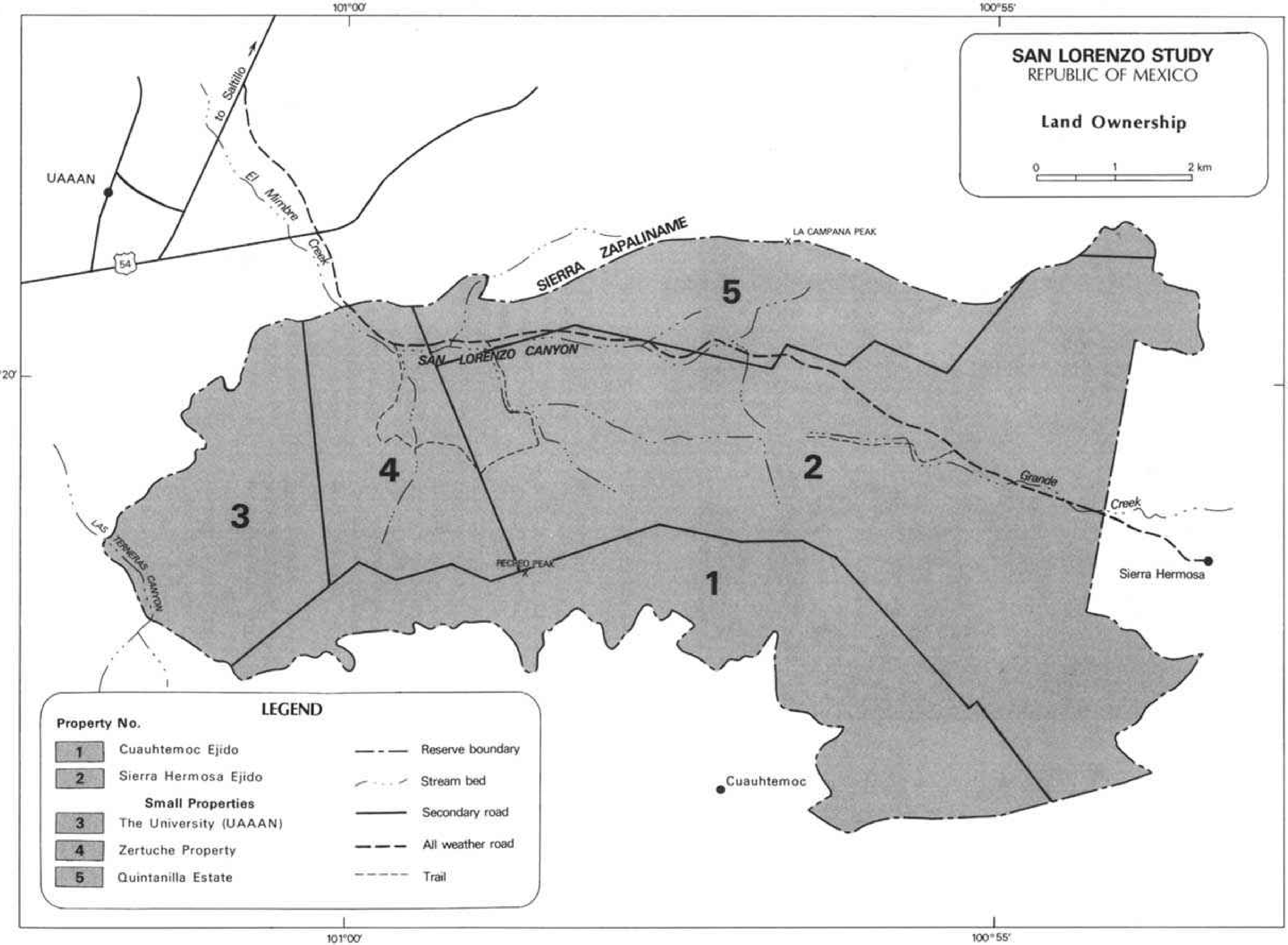
Success or failure in dealing with these challenges will determine the continuing validity of the integrated regional development planning approach. Success or failure in dealing with some of these issues may determine the future of development itself.

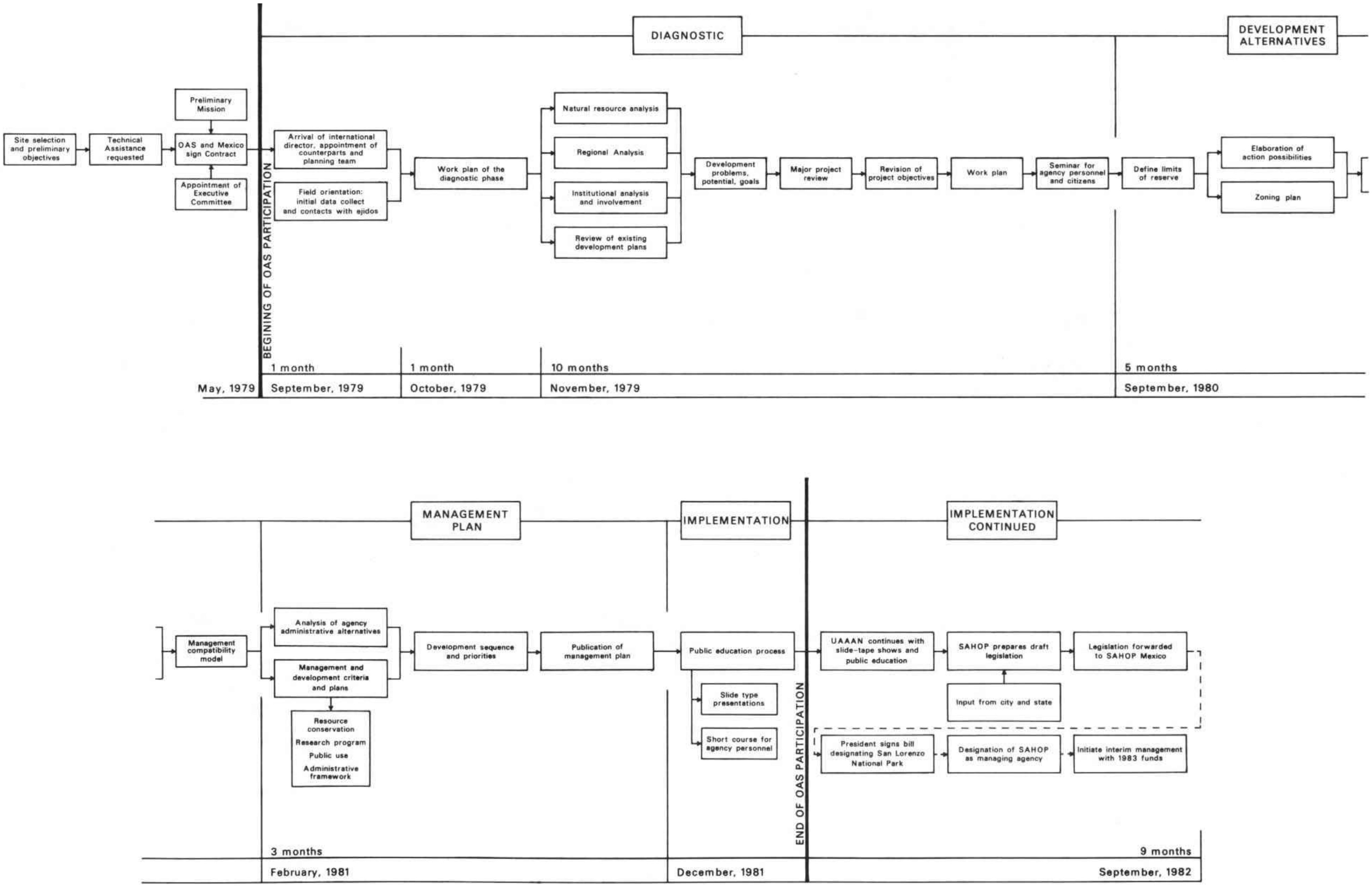

UNITED STATES
ATLANTIC OCEAN
GULF OF MEXICO
San Lorenzo Canyon
MEXICO
Mexico City
CUBA
DOMINICAN REPUBLIC
HAITI
PUERTO RICO
JAMAICA
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
CARIBBEAN SEA
GRENADA
PACIFIC OCEAN
VENEZUELA
COLOMBIA
SAN LORENZO STUDY
REPUBLIC OF MEXICO
Location of the Area

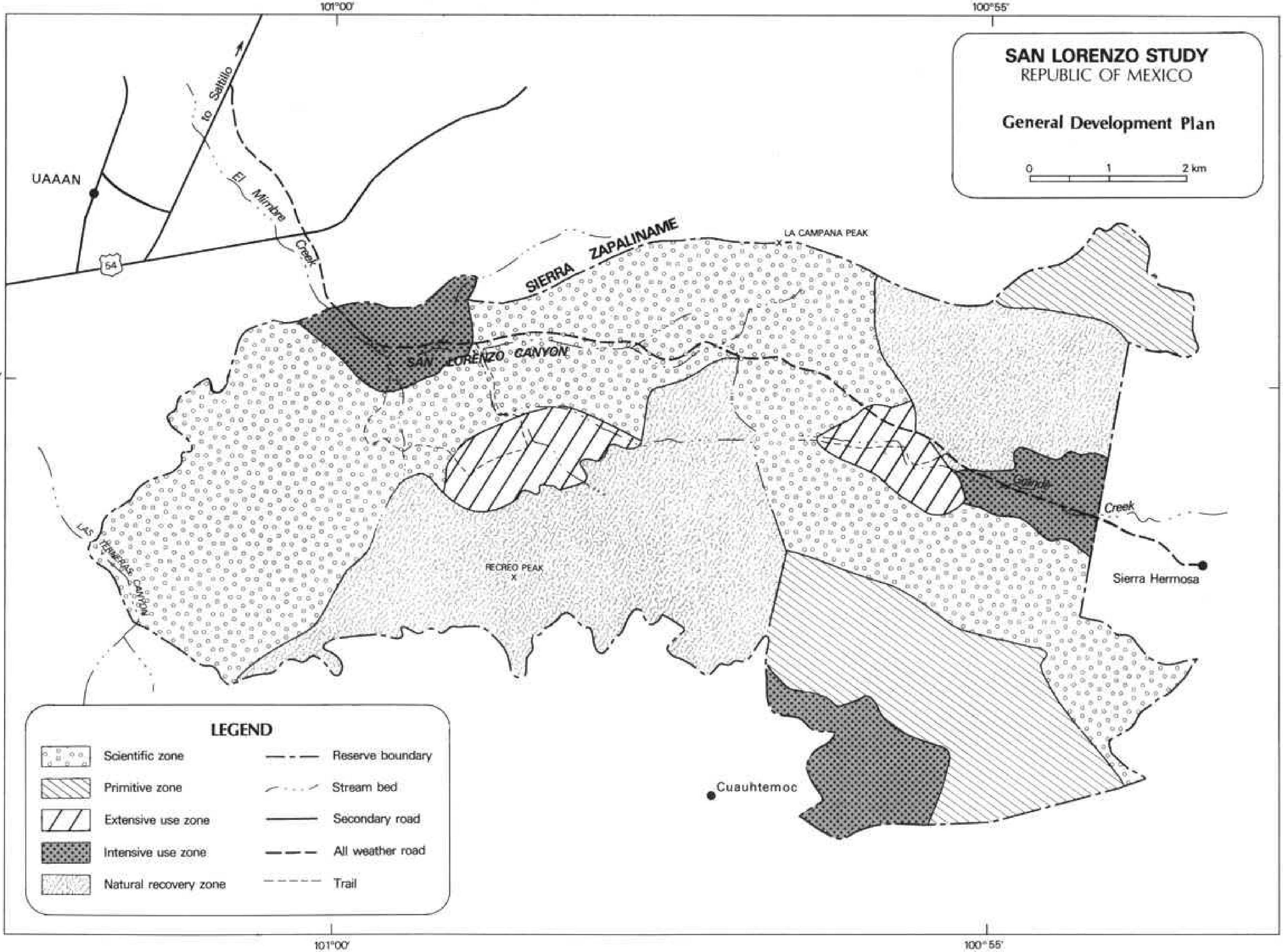


* Exercise National Counterpart functions.

( ) Number of personnel from each department.


SAN LORENZO STUDY
REPUBLIC OF MEXICO
Land Ownership
0 1 2 km
101°00'
100°55'
25°20'
UAAAN
to Saltillo
54
El Mimbre Creek
SIERRA ZAPALINAME
LA CAMPANA PEAK
SAN LORENZO CANYON
Grande Creek
LAS TERNERAS CANYON
PECHO PEAK
Sierra Hermosa
Cuauhtemoc
1
2
3
4
5
LEGEND
Property No.
1 Cuauhtemoc Ejido
2 Sierra Hermosa Ejido
Small Properties
3 The University (UAAAN)
4 Zertuche Property
5 Quintanilla Estate
Reserve boundary
Stream bed
Secondary road
All weather road
Trail


DIAGNOSTIC
DEVELOPMENT ALTERNATIVES
Preliminary Mission
Site selection and preliminary objectives
Technical Assistance requested
OAS and Mexico sign Contract
Appointment of Executive Committee
BEGINING OF OAS PARTICIPATION
Arrival of international director, appointment of counterparts and planning team
Field orientation: initial data collect and contacts with ejidos
Work plan of the diagnostic phase
Natural resource analysis
Regional Analysis
Institutional analysis and involvement
Review of existing development plans
Development problems, potential, goals
Major project review
Revision of project objectives
Work plan
Seminar for agency personnel and citizens
Define limits of reserve
Elaboration of action possibilities
Zoning plan
1 month
1 month
10 months
5 months
May, 1979
September, 1979
October, 1979
November, 1979
September, 1980
MANAGEMENT PLAN
IMPLEMENTATION
IMPLEMENTATION CONTINUED
Management compatibility model
Analysis of agency administrative alternatives
Management and development criteria and plans
Resource conservation
Research program
Public use
Administrative framework
Development sequence and priorities
Publication of management plan
Public education process
Slide type presentations
Short course for agency personnel
END OF OAS PARTICIPATION
UAAAN continues with slide-tape shows and public education
SAHOP prepares draft legislation
Legislation forwarded to SAHOP Mexico
Input from city and state
President signs bill designating San Lorenzo National Park
Designation of SAHOP as managing agency
Initiate interim management with 1983 funds
3 months
9 months
February, 1981
December, 1981
September, 1982


SAN LORENZO STUDY
REPUBLIC OF MEXICO
General Development Plan
0
1
2 km
101°00'
100°55'
25°20'
25°20'
UAAAN
to Saltillo
El Mimbre Creek
54
SIERRA ZAPALINAME
LA CAMPANA PEAK
SAN LORENZO CANYON
RECREO PEAK
LAS TENERIAS CANYON
Gainda Creek
Sierra Hermosa
Cuauhtemoc
LEGEND
Scientific zone
Primitive zone
Extensive use zone
Intensive use zone
Natural recovery zone
Reserve boundary
Stream bed
Secondary road
All weather road
Trail
101°00'
100°55'

Glossary

Action plan	An integrated package of investment projects together with (1) supporting proposals for regulatory and legislative changes, subsidies, and incentives, (2) sources of financing, and (3) a short- or medium-term investment schedule. All components fit within a development strategy designed to bring about sustainable development in a region or country.
Cadastral survey	An inventory and registry of landed property used to assess taxes (fiscal cadaster) or record land rights and transactions (legal cadaster). In fiscal cadaster, property boundaries are mapped and a system of land evaluation is developed. In Latin America, land capability mapping is commonly used to evaluate land for fiscal cadasters.
Comprehensive regional development planning	The systematic identification, generation, and coordination of public actions in a region and its subregions. Each subregion's role is assigned in accordance with its resource problems and potentials and socio-economic conditions. The regional plan resembles a small-scale version of a national development plan: each proposed action is localized and its impact analyzed. Demands and restrictions imposed at the national level are taken into account, and the macroeconomic and sectoral approaches that characterize national planning are applied.
Counterpart agency	A national agency that works with a technical assistance agency in a development study or project. In DRD's usage, national agencies share dual management of the studies.
Critical path method	A technique for planning the most efficient way to achieve a given objective by determining the activities and events required and showing how they relate to each other in time.

Disclimax vegetation	A community of woody and herbaceous species, different from that which would be expected under prevailing climatic, edaphic, and topographic conditions. Disclimax vegetation develops after human intervention or natural catastrophic events.
Ecological reserve	A space delineated by planners or governments that is relatively undisturbed by human activity and whose use is generally restricted to scientific study of the form and function of its component ecosystems.
Ecosystem	A unit of space defined by an interacting, interdependent complex of physical and biotic components and processes that have created characteristic energy flows and material cycling or movement.
Environment	The form and function of those natural and man-made ecosystems that surround and support life. The term normally refers to human life (as in "the human environment").
Environmental unit	An area distinguished from other areas by its physical and biotic characteristics.
Feasibility study	The final determination of the viability of a proposed investment project. Only the best alternative identified in a pre-feasibility study is developed in a feasibility study, which covers all economic, institutional, social, and engineering aspects of the project. The need for the project is analyzed along with resource availability, and refined estimates are made of (1) project benefits, (2) capital costs of construction, (3) annual costs of operation and maintenance, (4) economic parameters for evaluation, i.e. Net Present Value, Internal Rate of Return or other, and (5) repayment probabilities. (Compare "pre-feasibility study.")
Fluviomorphology	The study of the formation of the distinctive characteristics of river channels by stream-flow erosion.

Integrated regional development planning	A three-part technique for bringing about beneficial social and economic change in a region: (1) diagnosis of principal problems and potentials; (2) preparation of a development strategy; and (3) formulation of a coordinated package of infrastructure, production, and service projects within an action plan for implementing the strategy.
Internal delta	A geomorphological formation created by extensive alluvial deposition upstream of the mouth of a river.
Internal rate of return	An indicator of the net benefits expected from a project over its lifetime, expressed as a percentage comparable to the opportunity cost of capital or the interest rate prevalent in the market.
Land-capability classification	A system for evaluating potential uses of land in association with particular management practices. One example, modifications of which have been used in some DRD studies, is the eight-level system of the U.S. Soil Conservation Service: Classes I-III, suitable for cultivation of annual crops with increasing limitations and management requirements; Class IV, suitable for pasture and perennial crops, and annual crops under special conditions; Class V, suitable for rice cultivation and pasture; Class VI, suitable for permanent crops and woodlands; Class VII, suitable for woodlands; and Class VIII, suitable for conservation.
Life-zone mapping	The use of temperature and precipitation data to delineate land areas that are distinguished by both their climatic characteristics and their associated natural vegetation,
Natural goods and services	Those naturally occurring components and processes of natural and man-made ecosystems of interest to individuals or groups of people.
Natural resource reconnaissance survey	The rapid collection and evaluation of data by soil scientists, geologists, hydrologists, and other specialists on an area's goods and services for the purpose of identifying development potential and delineating areas that merit more detailed study. Part of such a survey is the integrated mapping of natural resources to obtain a comprehensive view of a region's resource potential.

Package of projects	Complementary investment projects in infrastructure, production sectors, and services. The set of projects is designed to be implemented in a coordinated manner to achieve predetermined economic and social objectives. (Compare "program.")
Phytogeography	The study of the natural causes of the geographic distribution of plants.
Plan	A unified group of decisions that expresses a country or region's economic and social development options, including the specific measures required to achieve selected objectives. The plan is composed of (1) a definition of objectives; (2) an ordering of human and material resources; (3) an explicit determination of the methods and forms of organization, and a timeframe; (4) the sectoral and spatial location of activities; and (5) other specifications necessary to orient the execution and control of the development process.
Pre-feasibility study	A preliminary assessment of the technical and economic viability of a proposed project. Alternative approaches to various elements of the project are compared, and the most suitable alternative for each element is recommended for further analysis. Costs of development and operations are estimated. Anticipated benefits are assessed so that some preliminary economic criteria for evaluation can be calculated. (Compare "profile" and "feasibility study.")
Production sector	An economic sector that produces a material good. Production sectors include mining, forestry, fishing, agriculture, industry, and energy, but exclude government activity and social services.
Program	A coherent and interactive set of proposals and projects within one economic sector that are synchronized within a planning and implementation scheme. (Compare "package of projects.")

Project	A planned and goal-oriented socio-economic development activity requiring financial investment or human participation over a given time. Examples include construction of physical infrastructure, the extension of credit or financing, the diffusion of new technology, the conservation or management of natural resources, and human resource development. As used by DRD, this term does not cover most research and planning activities.
Project idea	A tentative investment proposal based on the initial identification and evaluation of demand or resources. No benefit/cost analysis is conducted, but the proposal must address a problem or a need. (See "profile".)
Project profile	A preliminary project proposal in which costs and benefits are estimated. Profiling is the second stage of successively more detailed project analysis, a process that proceeds from project idea, to profile, to pre-feasibility, to feasibility and to final design.
Region	An area that a country delimits for purposes of planning or development, A region may comprise parts of more than one country.
Regional accounts	A system for measuring and displaying the goods and services produced and consumed in a region, usually within a parallel system of national accounts.
Strategy	The logical framework and set of coordinated decisions linking development goals with the actions required to achieve them. In DRD usage, the proposed strategy, having economic, social, environmental, and spatial components, specifies the major problems to be alleviated and the opportunities to be realized by short- to medium-term investments in specific projects.
Sustainable development	Within a country or region, gradual change characterized by economic growth, increased social equity, constructive modification of ecosystems, and maintenance of the natural resource base.

Topical mapping	The graphic depiction of the geographic distribution of such physical phenomena as soils, climate, transportation networks, and energy production and distribution, etc. In comprehensive natural resource inventories, DRD also prepares index maps of existing map coverage in such fields as soils, land use, and vegetation.

List of acronyms

CEPLAES

Center for Planning and Social Research.

CETREDE

Inter-American Training Center for Formulation and Evaluation of Projects.

CIC

Intergovernmental Coordinating Committee.

CIDIAT

Inter-American Center for Integrated Development of Land and Water Resources.

CINDER

Inter-American Center for Regional Development.

CNC

National Federation of Small Farmers.

COCOM

Coordination Commission.

CONADE

National Development Council.

CONARENA

National Council on Natural Resources.

CONZUPLAN

State Planning Agency of Zulia.

CORDECO

Cochabamba Departmental Development Corporation.

CORPOURABA

Regional Corporation for the Development of Uraba.

CORPOZULIA

Development Corporation of the Zulia Region.

DELNO

Development Action Plan for the Northwest Corridor (DELNO).

DRD

Department of Regional Development.

ECLA

Economic Commission for Latin America.

ECOPLAN

Ecological Development Plan.

EDIBAP

Study for the Integrated Development of the Upper Paraguay River Basin.

FLACSO

Latin American Social Science Faculty.

FONPLATA

Financial Fund for the Development of the Plata Basin,

IAD

Dominican Agrarian Institute.

IAEA

International Atomic Energy Agency.

IBRD

International Bank for Reconstrucion and Development (World Bank).

IDB

Inter-American Development Bank.

INC

National Colonization Institute.

INCyTH

National Institute for Water Science and Technology.

INDRHI

Dominican Water Resources Institute.

INERHI

Ecuadorian Water Resources Institute.

INESPRE

National Institute for Price Stabilization.

INTERCOCOM

Inter-Institutional Coordination Committee.

IUCN

International Union for the Conservation of Nature and Natural Resources.

JNV

National Housing Board.

JUNAPLA

National Planning Board.

MACA

Ministry of Small Farmer Affairs and Agriculture.

MIPPE

Ministry of Planning and Economic Policy.

MT

Ministry of Transportation.

NPS

National Park Service.

OAS

Organization of American States.

ONAPLAN

National Planning Office.

PRODIAT

Project for the Integrated Development of the Araguaia-Tocantins River Basin.

PRONAREG

National Regionalization Planning Agency.

RENARE

Renewable Natural Resources Unit.

SAE

Subsecretariat for Economic Affairs.

SAHOP

Secretariat of Human Settlements and Public Works.

SARH

Secretariat of Agriculture and Water Resources,

SEA

Secretariat of Agriculture.

SRA

Secretariat of Agrarian Reform.

UAAAN

Autonomous Agrarian University "Antonio Narro."

UANL

Autonomous University of Nuevo Leon.

UNDP

United Nations Development Programme.

UNESCO

United Nations Education, Science, and Cultural Organization.

UNICEF

United Nations Children's Fund.

USAID

United States Agency for International Development.

THE ORGANIZATION OF AMERICAN STATES

The purposes of the Organization of American States (OAS) are to strengthen the peace and security of the Hemisphere; to prevent possible causes of difficulties and to ensure the pacific settlement of disputes that may arise among the member states; to provide for common action on the part of those states in the event of aggression; to seek the solution of political, juridical. and economic problems that may arise among them: and to promote, by cooperative action, their economic, social, and cultural development.

To achieve these objectives, the OAS acts through the General Assembly; the Meeting of Consultation of Ministers of Foreign Affairs; the three Councils (the Permanent Council, the Inter-American Economic and Social Council, and the Inter-American Council for Education. Science, and Culture); the Inter-American Juridical Committee; the Inter-American Commission on Human Rights: the General Secretariat; the Specialized Conferences; and the Specialized Organizations.

The General Assembly holds regular sessions once a year and special sessions when circumstances warrant. The Meeting of Consultation is convened to consider urgent matters of common interest and to serve as Organ of Consultation in the application of the Inter-American Treaty of Reciprocal Assistance (known as the Rio Treaty), which is the main instrument for joint action in the event of aggression. The Permanent Council takes cognizance of matters referred to it by the General Assembly or the Meeting of Consultation and carries out the decisions of both when their implementation has not been assigned to any other body; monitors the maintenance of friendly relations among the member states and the observance of the standards governing General Secretariat operations; and. in certain instances specified in the Charter of the Organization, acts provisionally as Organ of Consultation under the Rio Treaty. The other two Councils, each of which has a Permanent Executive Committee, organize inter-American action in their areas and hold regular meetings once a year. The General Secretariat is the central, permanent organ of the OAS. The headquarters of both the Permanent Council and the General Secretariat is in Washington. D.C.

The Organization of American States is the oldest regional society of nations in the world. dating back to the First International Conference of American States, held in Washington, D.C., which on April 14.1890. established the International Union of American Republics. When the United Nations was established, the OAS joined it as a regional organization. The Charter governing the OAS was signed in Bogota in 1948 and amended by the Protocol of Buenos Aires, which entered into force in February 1970. Today the OAS is made up of thirty-two member states.

MEMBER STATES: **Antigua and Barbuda, Argentina, The Bahamas, Commonwealth of, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Commonwealth of, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua. Panama. Paraguay, Peru, Saint Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States, Uruguay, Venezuela.**
