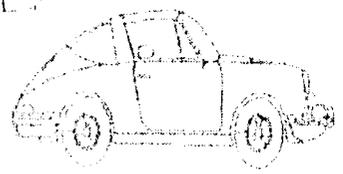
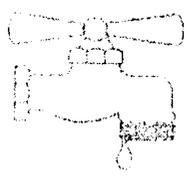


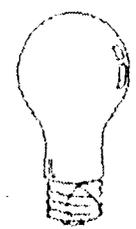
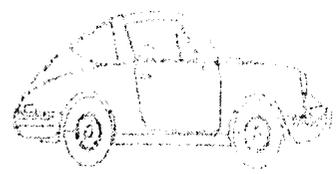
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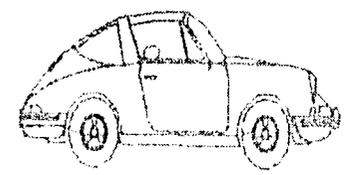
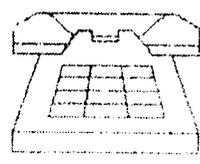
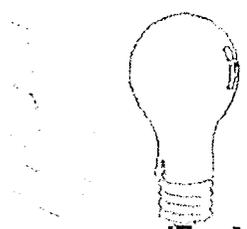
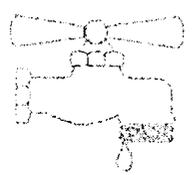
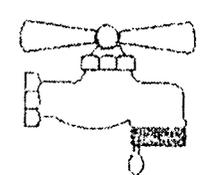


INFRASTRUCTURE SECTOR ASSESSMENT

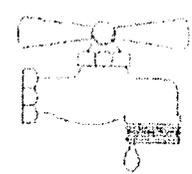


Final Report

Volume I
Summary Report



Tech International, Inc.
Louis Berger International, Inc.
Edificaciones Choussy, S.A. de C.V.



February 1990

**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
MISSION IN EL SALVADOR**

INFRASTRUCTURE SECTOR ASSESSMENT

FINAL REPORT

FEBRUARY 1990

VOLUME I

SUMMARY REPORT

**TECH INTERNATIONAL, INC.
LOUIS BERGER INTERNATIONAL, INC.
EDIFICACIONES CHOussy, S.A. DE C.V.**

**INFRASTRUCTURE
SECTOR ASSESSMENT**

VOLUMES

VOLUME I	SUMMARY REPORT
VOLUME II	TRANSPORTATION
VOLUME III	WATER SUPPLY & SANITATION
VOLUME IV	ELECTRIC POWER & TELECOMMUNICATIONS

This study was prepared under contract between USAID/El Salvador and Tech International, Inc. under contract number 519-0177-C-00-9503-01.

The Consultants wish to thank the generous assistance and contributions provided by the staff of USAID/El Salvador, the Government of El Salvador, its agencies and private firms. They were extremely helpful in providing data and clear explanations of El Salvador and its infrastructure sector. Nevertheless, the Consultants remain solely responsible for all data, opinions, conclusions and recommendations.

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GLOSSARY

AASHO	American Association of State Highway Officials
ADMINCEL	Administration Dept., CEL
ADT	Average daily traffic
AIES	International Airport of El Salvador
ALCATEL	Central American Telecommunications Institute
ANDA	National Water & Sewer Authority
ANTEL	National Administration for Telecommunications
ASTM	American Society of Testing Materials
BAILEY	Type of Temporary Bridge
BCR	Salvadoran Central Reserve Bank
BENKELMAN	Type of Beam used to measure pavement deflections
BID	Interamerican Development Bank
CABEI	Central American Bank for Economic Integration
CAESS	San Salvador Electric Company
CASALCO	Construction Chamber of Commerce
CBR	California bearing ratio, measure of soil strength used for pavement design
CE	Economic Committee
CEL	Executive Committee of Hydroelectric Power for the Lempa River
CEPA	Autonomous Executive Commission for Ports
CONADES	Commission Nacional de Los Desplazados
CONARA	National Commission for Agrarian Reform
CONIAPOS	National Committee of Water Supply and Sanitation
COS	Central Operating System, CEL
CROSSTALK	Inducement from a signal channel to another
DGC	General Directorate for Roads
DHV	Design hour volume
DIDECO	Community Development Directorate, Ministry of Interior
DISCEL	Distribution Dept., CEL
EEC	European Economic Community
ELECTROCEL	Electricity Dept., CEL
ERICSSON	International telephone equipment corporation
ERLANG	Unit of measure for telephone traffic, equivalent to 36 CCs
ESAL	Equivalent standard axle loads, used in traffic
FENADESAL	National Railway System
FHWA	Federal Highway Administration
FINANCIAL	Financial Dept., CEL
FOCEM	Central American Monetary Stabilization Fund
GEOCEL	Geothermal Dept., CEL
GHZ	Gigahertz, 10^9 cycles per second
GTZ	German Agency for Technical Cooperation
HDM-III	Highway Design and Maintenance Standards - III, World Bank Software package for highway engineering/economic analysis
IADB, IDB	Interamerican Development Bank

IBRD	International Bank for Reconstruction and Development (The World Bank)
IDB	Inter-American Development Bank
INVERCEL	Investment Dept., CEL
IRR	Internal Rate of Return
ISA	Infrastructure Sector Assessment
ITT	International Telephone Equipment Corporation
ITU	International Telecommunications Union
KFW	Kreditanstalt fur Wiederaufbau
MIPLAN	Ministry of Planning
MOH	Ministry of Health
MSPAS	Ministry of Public Health and Social Assistance
MW	Unit of measure for power, megawatt
MZ	Unit of measure for surface, equivalent to 10,000 square varas (1 vara = 0.84 m)
NRECA	National Rural Electrification Cooperative Assoc.
PETROCEL	Petroleum Products Dept., CEL
PLANICEL	Strategic Planning Dept., CEL
PLANSABAR	National Basic Rural Sanitation Plan
RASA	Salvadoran Oil Refinery Corporation
REER	Real Effective Exchange Rate
SCF	Standard Conversion Factor
SETEFE	External Technical and Financial Secretariat
SIEMENS	International telephone equipment corporation
SPC	Stored program control
SRE	Shadow Rate of Exchange
UCA	Central American University
VAR	Vehicle availability ratio

A. SUMMARY REPORT

1. EXECUTIVE SUMMARY

The objective of the infrastructure sector assessment (ISA) is to provide a comprehensive informational base relative to the conditions, capacities and development requirements of four sectors, namely transportation, potable water supply and sewerage, electric power, and telecommunications, in order to help plan and direct those investments in an economically efficient manner, and provide a common basis for sector policy dialogue.

After completing the Infrastructure Sector Assessment for El Salvador, the Consultants came to the following conclusions and recommendations.

a. Investments and Priorities

The Consultants have identified \$2.3 billion in infrastructure investment needs through the year 2000. The financial breakdown for each is as follows:

-	transportation	\$412 million
-	water supply & sanitation	\$726 million
-	electric power	\$490 million
-	telecommunications	\$651 million.

ISA has summarized all infrastructure investment needs in order of economic priority. In Table I.A.1, the investment evaluations have been broken down into five levels of priority, according to the ranges of internal rates of return.

Note in Table I.A.1 that only transportation projects are included in the first priority category, and only water and transportation projects in the second. This suggests the following order of priority by sector:

- transportation (highways)
- water supply and sanitation
- electric power and telecommunications.

The nation's highways (special, primary and secondary) promise extraordinarily high social returns, confirming long-term neglect and under-investment in this area. Tertiary and rural roads are not far behind. Simple rural water systems also indicate very good returns. These two areas are consistent with the Government of El Salvador and USAID's top priorities.

Economic analysis suggests two inversions in priorities, however:

- Large urban water supply and sanitation modules show higher returns than larger rural systems, due to higher market price and greater water demand per capita.

TABLE I.A.1

SUMMARY OF 1990-2000 INFRASTRUCTURE INVESTMENT NEEDS
IN ORDER OF ECONOMIC PRIORITY

(INVESTMENT IN MILLIONS OF DOLLARS, NB/I, % IRR)

PRIORITY (IRR)	TRANSPORTATION	WATER SUPPLY AND SANITATION	ELECTRIC POWER	COMMUNICATIONS
I	Coastal Hwy 22.5 11 150 Secondary Hwys 40.6 13.9 149 >100 Spec.Prim.Hwys 32.9 14.4 126			
II	Tertiary Hwys 10.7 4.4 92 Pan-Am. Hwy. 76.8 7.7 75 >40-100 Rural Roads 13.4 3 52	Handpumps- Latrines* 14 3.7 44.9		
III	Acajutla Port >20-40 Repair + 19.3	Urban WS&S for 10000-5000 22.6 1.7 31.7	Miravalles + Diesel Refurb. 2.2	New Lines 325 2.6 30.7
IV	Airport + 12-20 Rehabilitation 4.3	Rural WS&S for 1000-2000 125.6 1.2 14.8	Cerron Grande 43 1.8 19.5 SlowSp'd Diesel 55 1.2 14.2 Ahuachapan Rehab.Geoth. + 16	
V		Urban WS&S <12 for 5000* 25.6 0.8 8.3	Berlin Geoth. 143 0.8 9 Wellhead Geoth. 46 0.5 2.7 Gas Turbine 9 0.2 -3.1	
No priority specified	1995-2000 Road Rehabilitation 170 Bridge Recon. 21.8	San Salvador 334.5	El Tigre Hydro 1.6 17.5 Oil Fired Steam 1 12.1 Distr./Trans. 221	Other invest. 326
TOTAL	412	725.7	535.2	651
GRAND TOTAL				2323.9

Source: Tables I.A

+ priority judged by consultants

* Assume represent 10% of urban/rural needs

Note: the methodology appendices explain the approach. NB/I is preferred to set priorities. This would slightly alter levels to which a few projects are assigned.

- - Hydroelectric generation seems preferable to the geothermal systems which currently have higher GOES priority. Although some geothermal plants are possibly more dependable during the conflict, it would probably be best at this point to begin negotiations and planning for El Tigre in anticipation of peace in the next few years.

b. Country Profile

Heavy recurrent public expenditures, the war, low tariffs and taxes, and structural adjustments have almost decimated GOES funds for its capital budget. Budgets for investments have declined from 12 percent of GDP in 1983 to 2.6 percent in 1988. There is a need to reduce the current budget, increase revenues, and continue external funding.

Low tariffs and taxes generate greater demand for infrastructure services and little revenues to pay for them. This is partly due to an unwieldy, politicized tariff setting system. Either a regulatory body should be set up or the agencies should be given freedom to set rates within clear financial criteria set by GOES.

Many infrastructure services are inefficient, operating at high cost, sometimes with losses. Less-qualified staff are in excess, more in some agencies than others. There is a need for plans to gradually reduce staff and to increase the private sector demand for labor.

The key ecological issues are rapid reservoir siltation, and water pollution. Siltation is caused by deforestation, and erosion, urban refuse, dumping, etc. Water contamination is mostly due to raw sewage disposal. See Table I.A.2.

c. Transportation

(1) Sector Planning

The objectives for each mode of transportation are set and investments planned separately. Tariffs and taxes are set without intermodal coordination. The Minister of Public Works heads a Transport Committee with limited authority.

The questions regarding transportation planning are: how to strengthen transport sector planning without adding bureaucracy, and how to achieve intermodal coordination.

The ISA Consultants propose a national transport study be carried out, possibly managed by the Transport Committee.

TABLE 1.A.2

GENERAL SECTOR CONCLUSIONS

PROBLEM	RESULT	KEY RECOMMENDATIONS
Insufficient capital budget for investments; from 12% of GDP in 1983 to 2.6% in 1988.	Heavy fixed expenses in current budget. Structural adjustment cuts hit capital budget more.	Reduce current budget. Continue external funding.
Low tariffs and taxes generate demand for infrastructure services and little revenue to pay for them.	An unwieldy, politicized tariff setting system.	Agency freedom to set rates within clear financial criteria set by GOES or by future regulatory body(ies).
Inefficiency in implementation, high operating costs and losses.	Agencies studied with excessive, mostly less qualified staff - varies among agencies.	Plan gradual staff reductions. Increase private sector demand for labor.
Rapid reservoir siltation, water contamination and pollution.	Siltation caused by deforestation, urban refuse, dumping, etc. Water contamination mostly from raw sewage disposal.	See recommendations by sector and in Section on Environmental Concerns.

Source: Country Profile, ISA.

(2) **The Ministry of Public Works**

The Ministry of Public Works (MOP) is directly a part of the Central Government and one of the most important infrastructure agencies. MOP has excessive, mostly less qualified staff; lack of internal and external controls; and weak procurement. These inefficiencies, combined with the effects of the war and structural adjustment, have caused the transportation sector to suffer from chronic under investment leading to unusually high internal rates of returns for potential investments.

ISA Consultants propose a management study of personnel levels, job descriptions, procedures and phased reductions in staff, synchronized, whenever possible, with increased private demand for labor.

(3) **Highways**

Based upon a survey of departmental road maintenance personnel, only 26 percent of the roads are in good condition, 27 percent in fair and 46 percent in poor condition. Based upon this survey, traffic analyses, cost calculations and economic analyses of specific roads, 1092 km need rehabilitation and 291 km need improvements. These are organized into a five-year plan for US\$ 197 million. A six-year plan for US\$ 191 million would follow including bridge reconstruction and further road rehabilitation.

About \$14 million were spent inefficiently on routine maintenance in 1988. ISA Consultants propose to double these funds, along with technical assistance in pavement, maintenance and bridge management. See Table I.A.3.

(4) **Rail**

The railroad is run for the government by the Port Authority and is in poor condition and incurring heavy losses. This is further aggravated by low production of traditional cargo, less safety/reliability, and the implicit subsidy to truckers due to low taxes. Little can be done until the conflict recedes, when the ability to attract more traffic and cut costs should be reviewed within the context of the national transport study.

Rail revenues now cover less than half of operating costs as the railroad's market share declined without a proportional reduction in staff. After the National Transport Study, ISA recommends a rail management study to reduce staff, as well as set up planning, marketing and central train dispatching activities.

(5) **The Port of Acajutla**

A new finger pier and more equipment have been proposed. However, the Consultants conclude that these will not substantially alleviate the cargo-handling capacity shortage for this port, which can best be met by expanding the cargo-handling area at the existing piers. New lay-outs should be studied such as the one indicated in this report. The port's infrastructure is also in poor condition and needs urgent repair. This and other projects will cost about US\$ 19 million.

TABLE I.A.3
 TRANSPORTATION SECTOR SUMMARY
 (HIGHWAYS)

1/2

PROBLEM	RESULT	KEY RECOMMENDATIONS
Modal objectives set & investments planned separately. Tariffs and taxes set without intermodal coordination. Minister of MOP heads Transport Committee with limited authority.	How to strengthen transport sector planning without adding bureaucracy? How to achieve intermodal coordination?	Charge Transport Committee with these responsibilities and with managing simplified national transport study - NTS.
MOP has excessive, mostly less qualified staff; lack of internal and external controls; and weak procurement.	How to make MOP more operational?	MOP management study of personnel levels, job descriptions, procedures, phased reductions in staff. Increase private labor demand.
Road conditions Survey of DGC dept'l maintenance staff: Good 26% Fair 27% Poor 46%	Of roads studied: 1602 km need rehabilitation, 291 km need improvements.	These investments proposed as 5-year program. Bridge reconstruction and further road rehabilitation thereafter.
About \$14 million spent inefficiently on routine maintenance in 1988.	How to spend more, more efficiently?	Double funds for routine maintenance. Provide T.A. in pavement/maintenance/bridge management, etc.

SOURCE: Volume II

(6) **The International Airport**

The only identified needs are the rehabilitation of the airport's pavement and other minor investments, for a total of nearly \$4 million. See Table I.A.4.

d. Water Supply and Sanitation

USAID, and other donors are providing considerable support to the rural water supply and sanitation sector. However, coverage will still be low at the end of the century. The available funds could be stretched further if costs were lower. This would be possible with greater community participation, decentralization and simplification of design and construction.

More than one agency often plans to provide service to a given community, resulting in a costly planning redundancy when there are still so many who lack water. ISA Consultants propose that either CONIAPOS, a stagnant sector coordinating committee, or its successor prepare a rural water policy paper. This paper should be done with technical assistance and include proposals on the above topics as well as maintenance and cost recovery. ANDA should delegate responsibilities for setting up and managing smaller systems to regional offices.

Also, since the practices and procedures for urban and rural water systems are so different, ANDA should consider setting up an entirely separate entity for rural water with different methods and institutional culture.

PLANSABAR is an agency with poor financial controls within the Ministry of Health. But, it has good rural community participation experience. Its future role should be reviewed in depth.

ISA's preliminary economic evaluation of modular water supply and sanitation systems suggests first priority for rural handpump-latrine systems, second priority for urban communities of about 10,000 and more and only third priority for medium size systems serving rural and urban communities in the 1,000 to 5,000 range. This suggests two strategies:

- Review standards for this range of 1,000 to 5,000 people, considering handpump-house connection combinations, less water consumption per capita, smaller pipe diameters, etc. IDB has included a similar study in its current rural water supply project.
- Give more priority to urban areas with populations of 10,000 or greater.

ANDA's urban water systems are poorly maintained, the design periods of many are overextended, equipment has been damaged, especially by power cuts, and populations have grown faster than expected. The agency lacks a full inventory and maintenance system which should be prepared in order to identify, plan and implement maintenance needs.

Over 42,000 tons of raw sewage are dumped daily into streams, rivers and lakes. A preliminary analysis shows it is feasible to treat sewerage for populations of about 25,000 or more.

Most towns have less sewerage than water connections. The feasibility for balancing urban sanitation systems to cover those with water connections and expand both should be evaluated.

TABLE I.A.4
 TRANSPORTATION SECTOR SUMMARY
 (OTHER MODES)

2/2

PROBLEM	RESULT	KEY RECOMMENDATIONS
RAIL traffic low due to less safety/reliability and highway subsidy. Has no long-term goals.	What to do about the railroad's long-term investments?	Define rail needs in National Transport Study NTS.
Rail revenues cover less than half of operating costs, as market share declined without proportional reduction in staff.	Should costs be cut now? What if peace increases demand?	After NTS, do rail mgmt. study to reduce staff. Set up planning, marketing and central train dispatching. Provide T.A.
PORT of Acajutla cargo-handling capacity will be short. Pier "A" in poor condition.	Does port need equipment, finger pier or handling area? Lacks only container handling capacity.	Study new lay-out. Expand cargo handling area at pier. Repair Pier "A".
Low traffic at Cutuco Port	Investments in second port doubtful.	Consider as part of NTS.
AIRPORT OK except for pavement, navigation, generation equipment.	When and how should it expand?	Design pavement and rehabilitate. Buy equipment. Consider expansion

Source: Volume II.

Despite ANDA's concessionary debt, it does not have the revenue to service it or cover operating expenses. ANDA's overall fees should be raised gradually by a real 40 percent. The people can meet these fees because water is a very small share of a family's budget, and those who obtain water from other sources pay many times more than they would pay ANDA, even with this adjustment. See Table I.A.5.

e. Electric Power

In the electric power sector, tariffs do not even begin to cover all CEL costs. As a result, CEL is currently not eligible for long-term credits. Debt burden is high. Government users are in arrears. Tariffs are approved through a long, politicized process which doesn't take into account the impact of not adjusting them.

ISA Consultants recommend either a utility regulatory body be set up or, if not feasible, CEL be given the freedom to set rates within clear financial criteria set by GOES in accordance with funding agency guidelines. Then, by phasing in a minimum real increase of about 14 percent, CEL could once again become eligible for financing and there would be about a 7 percent cut in demand. CEL should also collect debts from government users, and reschedule its debt payments.

A shortfall of about 55 Megawatts in generating capacity is expected by 1994. While low tariffs stimulate demand, there is little promotion of efficient power use. There is thus a short-term need for both peak and energy-oriented facilities. ISA proposes an effective industrial demand charge and a tariff adjustment. CEL should install 40 MW of slow-speed diesel facilities to meet increased energy demand. If measures are not taken to lower demand, another peak-oriented plant such as a 20-MW gas turbine would be needed.

A minimum of distribution investments have been made in the last decade due to termination of concessions. The distribution system is overloaded. There have been negotiations between the GOES and ex-concessionaires and a settlement is still pending. There has been little consideration given on managing distribution in the future. GOES should thus set up a committee to plan a profitable and credit-worthy distribution system to attract private investors. Meanwhile, it should continue to develop a plan for emergency measures, such as programmed rationing in order to preserve existing equipment.

The capacity of the Cerron Grande Reservoir will disappear in 10 years at the current rate of siltation. The only economically feasible solutions are to repair collapsed drop structures, and to add check dams and similar structures on Lempa River tributaries. A further study of sewage disposal, urban refuse, dumping, and reforestation may identify other feasible medium- and long-term measures.

Geothermal plants are key to CEL's generation plans for the year 2000. The plants, however, are responsible for water pollution, kill surrounding vegetation and are probably not economically feasible. Considering the lead time needed of about 10 years, CEL should plan for hydroelectric expansion, including related environmental impact studies. Environmental impact studies should also be prepared for existing geothermal plants, including recovering the energy and pollutants from the hot water released. Another option is concessions for self-generation and energy sharing to industrial users.

TABLE I.A.5

WATER SUPPLY & SANITATION SUMMARY

PROBLEM	RESULT	KEY RECOMMENDATIONS
Rural water supply construction costs too high.	Insufficient community participation, management too centralized, projects oversized.	ANDA set up separate, decentralized entity with simplified systems adapted to rural areas.
Several agencies plan and execute under different guidelines.	Lack of coordination among agencies and donors.	Coordinating committee prepare rural water policy paper.
PLANSABAR is slow with poor financial controls but good community participation experience.	How to preserve positive elements of PLANSABAR's experience?	Detail and review options for PLANSABAR's future role and structure.
Economic priority of typical systems: population priority 400 1 >10,000 2 1000-5000 3	Possibly oversized systems. Lack of priority for larger systems.	Review standards, give more priority to urban systems.
Urban systems poorly maintained and overextended.	Lack of inventory and maintenance system	Prepare computerized inventory, design and implement maintenance system.
42,000 tons of raw sewage dumped daily.	Limited plans for sewage treatment	Study sewage treatment for towns over 25,000.
Less sewerage than water connections.	Evaluate balancing and expansion of sewerage facilities.	Complete studies and build new systems.
ANDA's revenue does not cover operating expenses.	How to overcome resistance to fee increases?	Fees less than for other water; fees should be gradually raised over 40%

Source: Volume III

Depending on the tariff adjustment scenario investments from 1990-2000 in generation, transmission and distribution would total US \$403 million to 535.2 million. See Table I.A.6.

f. Telecommunications

CEL should plan for hydroelectric expansion, There will continue to be a need for new phone lines and improved equipment. ANTEL has hired an International Telecommunications Union (ITU) team to prepare its medium and long-term plan by April 1990. It will contain full-economic analysis of proposed projects; the actual economic and financial feasibility of a large program will depend upon economic growth, operating efficiency and the tariffs that are set. Actual expenditures will depend upon the levels of ANTEL's capital budgets approved by the GOES and its ability to obtain financing at attractive rates. Total investment needs through 2000 are estimated at US \$651 million.

Although it has one of the most qualified management teams of the agencies studied, ANTEL lacks trained staff, especially for planning, and there is fast staff turnover. While its immediate needs are being solved with ITU support, there is further need to implement the training program being designed by ITU. This should include designing and carrying out planning and traffic analysis short courses.

Operations and maintenance teams are now organized by type of equipment, making problem solving difficult. These teams would best be organized on a regional basis.

There are potential equipment imbalances, partly due to lack of traffic measuring equipment and trained staff. Equipment needs should be planned through careful traffic measurements and forecasting.

The private sector's role is limited and can be enhanced in the areas of construction, public phones, FAX, mobile phone and data transmission services.

ANTEL has many other businesses which may divert management from its key goals. It should consider spinning off these activities. See Table I.A.7.

2. INTRODUCTION

a. Objectives

(1) The Infrastructure Sector Assessment

The objective of the infrastructure sector assessment (ISA) is to provide a comprehensive informational base relative to the conditions, capacities and development requirements of four sectors, namely transportation, potable water supply and sewerage, electric power, and telecommunications, in order to help plan and direct those investments in an economically efficient manner, and provide a common basis for sector policy dialogue.

TABLE I.A.6

ELECTRIC POWER SECTOR SUMMARY

PROBLEM	RESULT	KEY RECOMMENDATIONS
Tariffs do not cover CEL costs. CEL is not eligible for long-term credit. Debt burden is high. Government users in arrears.	Tariffs approved through unwieldy politicized process. Impact of failure to adjust not considered	Deregulate tariffs: Give CEL tariff authority within specified criteria. Phase in minimum of 14% real increase. Become eligible for credit. Reschedule debt. Collect from government. Implement.
A shortfall of about 55 MW is expected by 1994. Little promotion of efficient power use.	Short term need for both peak & energy oriented generation.	Introduce industrial demand charge along with tariff adjustment. Install 40MW slow-speed diesel. If no tariff increase, add more peak.
Minimal distribution investments in last 10 years due to expected and actual termination of concessions. Negotiation.	Distribution systems overloaded. Settlement still pending. Little planning on how to manage distribution.	Seek settlement. Emergency measures may be needed. Set up committee to plan profitable/creditworthy distribution system to attract private investors.
Cerron Grande reservoir capacity gone in ten years at current rate of siltation.	Short-term measures needed.	Repair collapsed drop structures, add check dams. Study refuse, dumping, sewage disposal, reforestation.
Geothermal plants key to CEL generation plans for year 2000: Cause water pollution, kill vegetation. Uneconomical.	How to achieve generation goals for year 2000?	Plan now for hydroelectric expansion.
Industrial back-up generation more costly for one than for several.	CEL has generation monopoly.	Concessions to industrial groups for back-up.

Source: Volume IV

TABLE I.A.7

TELECOMMUNICATIONS SECTOR SUMMARY

PROBLEM	RESULT	KEY RECOMMENDATIONS
ANTEL lacks trained staff, especially for planning. Fast staff turnover.	Immediate need solved with ITU support. How to meet long-term need?	Implement ITU training program. Design and carry out planning and traffic analysis short courses with ITU support.
O&M teams organized by type of equipment.	This makes problem solving tougher.	Reorganize O&M into regionalized teams.
Potential equipment imbalances among lines, outside plant, central offices, etc.	Lack of traffic measuring equipment and trained staff.	Plan equipment needs through careful traffic measurements and fore-
Private sector limited to some maintenance support.	Lack of private sector participation in Telecommunications.	Consider roles in construction, public phone, mobile phone and data transmission services.
ANTEL has several non-telecommunication businesses.	Diversion of management from goals.	Consider spinning-off these activities.

Source: Volume IV.

For each sector the following is provided:

- a comprehensive data base on conditions, capacities and requirements, including:
 - inventory of facilities
 - projects underway and planned
 - design standards
 - costs of construction, installation, operation and maintenance
 - capability of the private engineering and construction industry
- a review of national priorities, issues and policies for each sector
- financial, institutional and environmental analyses
- economic evaluation, sector needs and significant recommendations to the economic development of El Salvador
- the appropriate future strategy, direction, pace and priority of sector investments and activities, as well as the appropriate measures for their implementation.

The study also includes a synthetic profile of El Salvador's environment, demography, economy, and institutions.

(2) USAID Infrastructure Strategy

According to the FY1990-1994 Country Development Strategy Statement (CDSS), the Mission's strategy is to:

- Maintain a quick response capability to repair sabotaged facilities in:
 - electric power
 - public works
 - the railroad
- Strengthen these agencies' management and implementation capabilities in order to deal with the deferred maintenance and repair needs of:
 - secondary and tertiary roads
 - rural water supply, etc.
- in those areas not funded by other organizations, help meet critical needs for the extension of:
 - electrical distribution systems
 - rural potable water systems.

The ISA considers all infrastructure needs in the four sectors, but keeps in mind this carefully enunciated strategy in carrying out the study.

(3) Impact of the Infrastructure Sector

Rehabilitation, maintenance and improvements in El Salvador's infrastructure will help achieve three of AID's key goals in El Salvador:

- economic and social stabilization
- economic growth and
- broadening the benefits of growth.

AID's fourth goal, the strengthening of democratic institutions, will also be supported through expanded dependable and efficient infrastructure implemented through the services provided and the development of the responsible institutions.

(4) Implementation of ISA Recommendations

The final results of the study will serve the following purposes:

- to provide information for the development of USAID's policy dialogue agenda with GOES, other bilateral donors, and financial institutions;
- to enhance the ability of GOES, in selecting the most promising candidate donors and financial institutions as probable projects or programs for study, financing, and implementation; and
- to a lesser extent support USAID programmatic requirements and facilitate the management of its activities, including the Public Services Improvement Project (519-0320).

b. Background

(1) General

El Salvador is the smallest, most densely populated nation on the hemispheric mainland. It is ranked as the fifth poorest country in Latin American in terms of per capita income, indicating a serious poverty problem which is aggravated by the skewed income distribution.

Over the past decade, the human, social and economic fabric of El Salvador has been torn by a civil war, economic depression, a disastrous earthquake, and an international conflict.

War and poverty have generated a massive emigration from rural to urban areas and other countries. Nevertheless, with the exception of the San Salvador Department, the country remains predominantly rural. As of 1986, approximately 40 percent of the population was urban and 60 percent rural. In recent years development has been more evident in the urban community, leaving few resources for rural people.

El Salvador is a tropical country. Its fragile soils, linked to the heavy dependence upon subsistence agriculture, has led to rapid deterioration of the environment.

Health and education have been severely disrupted during the conflict and services could not be effectively provided to many areas for a number of years. Still, health indicators have improved. For example, while infant mortality rates increased briefly in the early 80s, there was an overall improvement from 77 per thousand births in 1979 to 50 per thousand in 1988.

(2) The Economy

The 1960s and early 1970s were relatively prosperous with an average annual economic growth rate of 5.4 percent. A global recession beginning in 1979 reduced international prices for El Salvador's primary agricultural products (e.g. coffee, cotton and sugar) and dampened demand for Salvadoran manufactured exports. War damage, related deferred maintenance, and the San Salvador 1986 earthquake contributed heavily to an already overwhelming infrastructure problem. Except for the year of the earthquake, the economy's growth rate has shown improvement but income per capita is still declining.

(3) Effects of the War and Deferred Maintenance upon Infrastructure

The indirect cost of the war, such as the restoration of electricity, water, bridges, roads and other vital public services, when combined with losses sustained by the productive sector due to interruptions in these services, are substantial, with current estimates exceeding \$1.5 billion. This and other financial burdens associated with the continued conflict have impeded the Government from responding to the needs of both the urban and rural poor. While A.I.D. has contributed to meeting the costs of restoring public service, the GOES has had to redirect resources to meet the lion's share of this indirect cost, in addition to meeting the financial burden of maintaining a much larger military force.

Roads and bridges have been primary targets of guerrilla attack. Practically all major bridges have been replaced with temporary and/or new permanent bridges. The primary road network has received stop-gap repair and is serving its function in most places; in other instances, portions are being by-passed by alternate routes. Secondary and tertiary rural roads have received either limited or no maintenance for ten years and are in serious disrepair.

The ports of Acajutla and Cutuco handle most of the imports and exports of the country. Maintaining port operations is important to ensure timely, low cost shipments. The two ports have not been attacked directly, but have deteriorated due to indirect damage and lack of maintenance.

Water supply and sanitation have been damaged less directly. However, equipment deterioration has occurred as a result of power disruptions.

The electric power grid has been repeatedly attacked. A.I.D. funding has largely financed the replacement of electrical lines and spare parts to maintain the provision of this essential service.

Telecommunications facilities, have also been the target of attacks, resulting in severe disruptions and delays to the phone systems.

c. Methodology

(1) Overall Approach

This report is intended to define a strategy for the continued development of the infrastructure sector as a whole, and also for its four principal sub-sectors: transportation, water supply and sanitation, electric power, and

telecommunications. Within the time frame of this study, a comprehensive picture of the existing infrastructure assets in El Salvador is presented and a balanced plan for its rehabilitation, improvement and development is proposed.

In order to accomplish this step towards an integrated policy for infrastructure management, a methodology permitting such comparisons is presented in Appendix I.A.1. As ISA is a macro study, its implementation will require additional studies at the feasibility and detailed engineering levels before implementation can begin.

Figure I.A.1 lists the various components of the ISA. This will lead to the definition of an infrastructure strategy, program and implementation proposals.

(2) National Priorities and Policies

ISA's terms of reference call for setting priorities "on the basis of economic analysis ... together with consideration of their socio-cultural impact and merit". Since the set of priorities and policies are defined by the newly elected GOES, and are guided by the principles of efficient resource allocation combined with the support of the poorest segments of society, the ISA integrates itself harmoniously into the GOES policy framework. In order to do this, however, a careful study of these policies and of their impact on prices, exchange rates, and investment decisions is necessary.

(3) Macroeconomic, Financial and Institutional Analysis

Macroeconomic, financial and institutional analyses provide the study's frame of reference. Their main function is to evaluate the implementation capabilities of the GOES, its autonomous agencies, and that of the private sector. These capabilities have been studied focusing on budget and debt burden. The review of budget execution permits an assessment of operations and maintenance capabilities (current budget), as well as the GOES investment program (development budget). Providing some measure of counterpart funding capabilities and requirements, such as the PL-480 or ESF programs.

The financial and institutional analyses address the implementation capabilities of various organizations, their finances, as well as the building and operation of infrastructures. It thus permits the identification of implementing agencies for the selected projects.

(4) Project Identification and Evaluation

Figure I.A.2 presents a summarized flow-chart of the major tasks of project identification and evaluation.

The cornerstone of project identification and evaluation is an inventory of existing facilities. The inventory lists facilities currently in place in El Salvador, their location, their basic design characteristics including nominal capacity, and their condition including effective capacity.

Figure I.A.1

Infrastructure Sector Assessment Overall Methodological Context

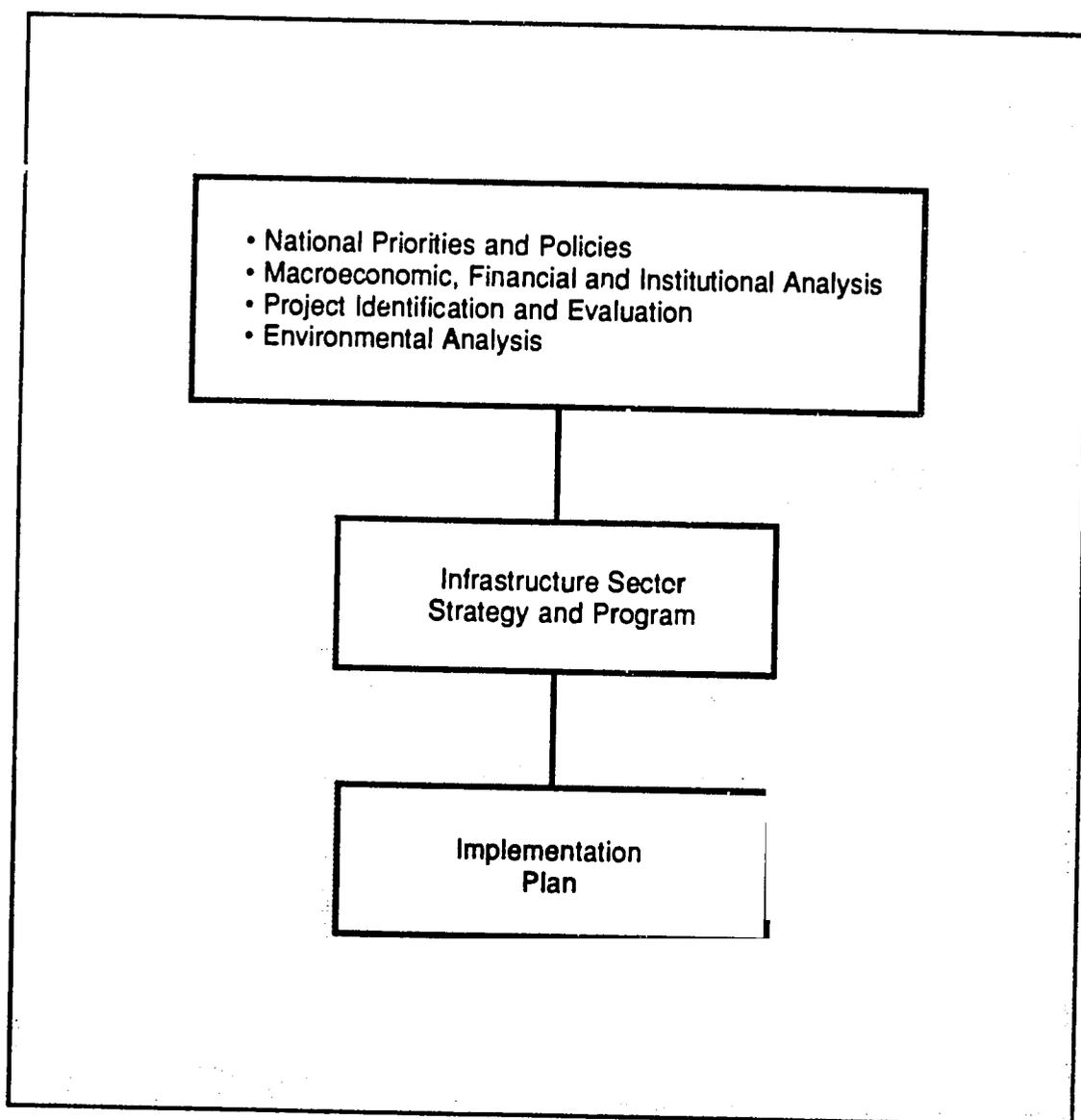
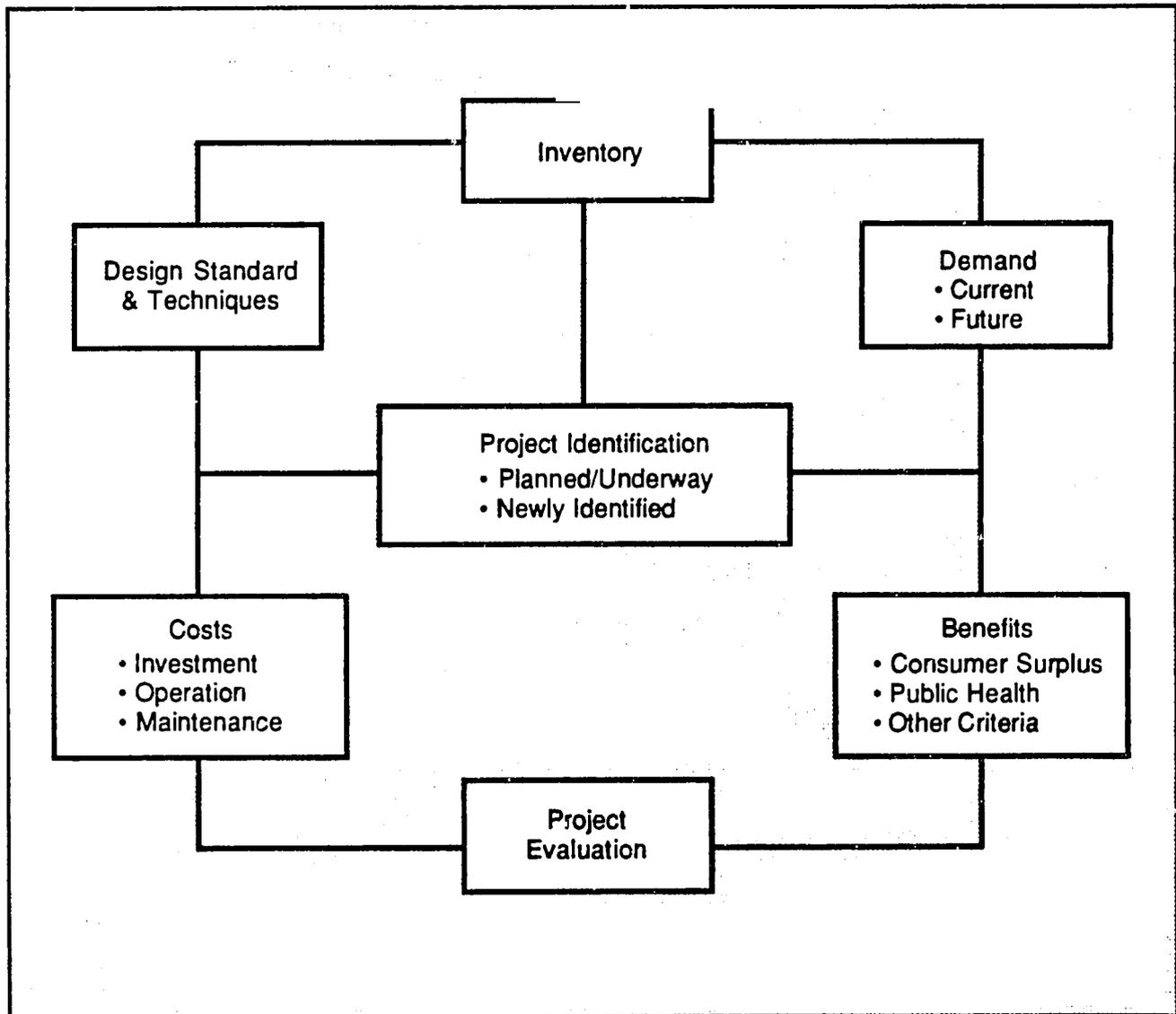


Figure I.A.2
Sector Evaluation



The criteria used in identifying projects varied for each sector. The total investment needs of each sector should not be compared to each other due to the different nature and means available for analysis. These criteria are presented in Table I.A.8.

TABLE I.A.8
BASIS FOR DEVELOPING SECTOR NEEDS

SECTOR	CRITERION	JUSTIFICATION
Transport	Evaluate all roads on DGC and donor "wish" lists plus those added by Consultants	Impossible in time available to analyze 12,000km network.
	Evaluate key investment proposals for rail, port and airport.	Other investments minor, modes less important
Water Supply & Sanitation	Programs to achieve universal coverage as per national objective - analyze modular systems.	Individual communities too many to identify & obtain data.
Electric Power & Telecommunications	Evaluate identified projects and, regarding power generation, those proposed by ISA.	Insufficient data on distribution and other needs to consider universal coverage (not a national objective).

ISA does not pretend to produce an exhaustive list of all infrastructure in the country. It does evaluate, however, how well the country is equipped to provide transportation, water supply, electric power and telecommunication services.

Based on macroeconomic and demographic projections, ISA has estimated the current and future demand for these facilities. ISA's investment horizon is the year 2000, but demand forecasts have been prepared for additional years according to the life of each project.

ISA also reviews design standards or techniques, O & M technologies, as well as the private engineering, and construction industry. These tasks use inventory analysis as a base: O & M refer to existing systems, while construction techniques permit the transition from the current state of the inventory to the future, according to demand requirements.

ISA then identifies the infrastructure sector requirements as a list of projects under consideration for the years 1990 through to 2000. This list has been prepared from two major sources:

- planned and underway, at the various ministries, agencies and donor organizations
- projects identified by the ISA where current capacities are unable to satisfy forecasted demand.

Investment and O & M costs have been evaluated for each project, and benefits have been analyzed in three groups:

- direct economic benefits measured by the consumer surplus method, representing lower costs and increased use of infrastructure services
- quantity of jobs created
- public health benefits, national priorities, inter-sector relationships and environmental considerations.

The socio-economic impacts generated by investments in the infrastructure sector have been considered in this study and are described in Appendix I.A.2. Appendix I.A.1 explains the consumer surplus technique which has been used to measure direct economic benefits.

Economic evaluation cannot be the sole basis for sector decision-making. The study takes into account the three types of benefits described above.

- For economically measurable impacts (direct benefits) the ranking is based on the net-benefit-over-investment ratio (NB/I) and the internal rate of return (IRR). Appendix I.A.3 compares the advantages of these alternative indicators.
- For employment creation benefits, ranking is based on the amount of direct employment created. Special consideration is also given to the number of unskilled laborers used in the project, as it is assumed that this is the group in greatest economic need. ISA objectives were too broad to estimate the more significant indirect impact of infrastructure investments upon employment.
- qualitative measures of the other criteria mentioned.

A major social benefit of infrastructure development is public health. Particularly, infant morbidity/mortality brought on by waterborne diseases. Thus, health is a major concern in this sector analysis. However, in reviewing the impact that each sector has on health it became immediately clear that the provision of potable water and sanitation facilities, with concomitant education activities was by far the most important of the four sectors. While impacts of transportation, telecommunications and power upon health are important, they are of marginal importance at this stage of El Salvador's development. Therefore, water is the only sector in which the impact on health is numerically evaluated.

(5) Environmental Analysis

Based on past experience, the ISA has identified those projects which should be subject to additional scrutiny from the environmental standpoint. This environmental analysis is not in lieu of an environmental impact assessment. It only identifies problem areas for further review. The Consultants have agreed to identify major projects with potentially significant water uses.

(6) Infrastructure Sector Strategy and Program

The above analysis has been condensed into a program for each infrastructure sector. It includes overall sector priorities, a list of projects, and the institutional and financial policies which should accompany project implementation in order to maximize their impact.

(7) Implementation

ISA concludes each sector analysis with an implementation proposal which provides guidelines for the execution of the ISA recommendations.

3. TRANSPORTATION

a. Sector Planning

This sector lacks the proper planning to set its overall objectives and priorities. There is a transport committee headed by the Minister of Public Works with limited authority to carry out sector planning. There is a need for greater intermodal coordination in establishing and implementing tariff policies and modal financing.

Recommendations # 1

There is a need for a simplified national transport study designed to address:

- the strengthening of planning mechanisms
- the preparation of a long range overview of regionalized development opportunities, including the potential impact of peace and other changes upon Central American transport demand
- an analysis of sector finance
- a study of intermodal freight and passenger demand at the corridor level
- the definition of the roles of major highways, railways, ports and airports, and related studies
- financial policy and investment recommendations.

The study would not necessarily go below the corridor level. Specific projects would not be analyzed unless required.

The transport committee could be given the authority to define and manage this study.

b. MOP Organization

MOP does not have an efficient organization due to the following factors:

- inadequate staffing (too many people overall and lack of trained personnel in some specific areas), drawing away resources from achieving MOP objectives
- lack of internal and external controls
- weak procurement.

Recommendation # 2

We recommend a management study of MOP designed to address personnel levels by department and their possible reduction, the definition of job descriptions, training requirements and operating procedures.

c. Five-Year and Six-Year Highway Plans

(1) Rehabilitation and Reconstruction

The road network is in poor condition. Furthermore, several segments experience delays due to congestion.

Recommendation # 3

As presented in Section 9 (Consolidated Project Recommendations), we propose:

- funds be allotted to rehabilitation/reconstruction work for both paved and unpaved roads. The proposed US \$197 million 5-year program will upgrade 291 km and rehabilitate 1,602 km of roads. This amount covers expected road improvement needs to the year 2000.
- the Consultants also propose a six-year road rehabilitation program for 1995 - 2000. This program should address rehabilitation needs that were not included in the first five-year plan. Total expenditure should amount to \$170 million.

(2) Maintenance

Resources for routine and major maintenance needs are scarce, and as a result maintenance is usually deferred. The limited available resources are inefficiently used. Major maintenance depends on international financing (roughly three quarters of current investment). Roads should be systematically maintained at adequate service levels.

Recommendation # 4

There is a need to:

- spend effectively twice as much on routine maintenance
- provide technical assistance and training in the areas of pavement management, contract administration and both routine and major maintenance activities
- the development of an integrated highway pavement and maintenance management system. The proposed system should help in managing road maintenance and rehabilitation.

(3) Bridges

About one fourth of the Salvadoran bridges (69 out of 289), require repair or replacement.

Recommendation # 5

Due to more immediate and cost effective highway needs, the permanent replacement of damaged bridges should be postponed. Meanwhile, a bridge management system should be implemented for programming purposes. ISA Consultants have recommended the investment of US \$21.8 million for bridge reconstruction/ rehabilitation for the 1995-2000 period, based on a tentative list prepared by the Consultants.

d. Rail

Railway traffic volumes are low due to the reduced production of traditional cargoes, safety, reliability and indirect subsidy to the highway sector. Due to the war, prospects for improvement are poor. The District 1 line (San Salvador - La Union) has the least prospects for significant improvement.

There is a lack of long-term goals, but two investment projects are under consideration. These are the Santa Ana - Santa Lucia -Guatemalan Border line and the Cutuco - Pueblo Viejo extension.

Recommendation # 6

No investments should be made without further study. Little can be done as long as the conflict continues.

The proposed national transportation study should also address the following issues:

- feasibility of the railway system
- value of the railway as an alternative to highways
- geopolitical importance of the railway
- review of the feasibility of projects now under consideration
- types of cargo on which the railway should concentrate
- acceptable levels of subsidy for the railway.

Due to the decline in the railway's market share before and during the conflict, revenues represent a very small share of operating cost, while personnel has not declined proportionately.

Recommendation # 7

After completion of the national transport study, we recommend a management study of FENADESAL in order to:

- determine personnel needs and actions for its reduction
- define job descriptions
- help create planning and marketing departments, develop central train dispatching and consolidate shops.

Technical assistance should be provided at the completion of this study.

e. Marine Ports

The steel cells of Pier "A" at the Port of Acajutla are highly corroded. This should seriously affect the pier's structural stability in the medium-term, precluding port operations.

Recommendation # 8

Repair Pier "A" steel cells (\$15,000,000). On an emergency basis visibly-deteriorated cells should be filled with concrete or sand.

The port has limited capacity to handle more cargo. This is due to current port configuration rather than the lack of equipment or piers; as traffic increases (particularly container traffic), this problem will become critical.

Recommendation # 9

A port study should be conducted to develop a new pier layout or container pier according to modern port technology. The study and lay-out concept in Volume II provides guidelines for this project. Meanwhile, existing equipment should be rehabilitated, but no major investments should take place.

In addition to Acajutla, El Salvador has two secondary ports in the East, Cutuco and Punta Gorda, with very low traffic volumes.

Recommendation # 10

The proposed national transportation study should also address:

- feasibility of Cutuco
- possible need for an alternative port to Acajutla
- possible need for a port to help revitalize the Salvadoran East
- Cutuco's relationship with Punta Gorda

f. Airports

The International Airport of El Salvador, is in good shape, except for its pavement structures (runways, taxiways and aprons). There is a need to improve its aeronavigation radio-control equipment and to obtain a new back-up electricity generator.

Recommendations # 11

ISA Consultants recommend:

- the rehabilitation of the pavement structure.
- the acquisition of new aeronavigation radio equipment and a generator.

The terminal and pavement infrastructure of San Salvador's alternative airport at Ilopango have deteriorated. Heavier aircraft loads are for military traffic, while civilian traffic is almost exclusively for general aviation. Despite its closeness to the San Bartolo Free Zone, the altitude difference makes Ilopango non-competitive in the cargo market.

Recommendation # 12

Ilopango needs rehabilitation and repair. Civilian share should be estimated and its financial feasibility evaluated. At any rate, it is a low priority investment, and not recommended at this time.

4. WATER SUPPLY AND SANITATION

a. Economic Evaluation

The economic evaluation of complete modular water supply and sanitation systems, serving typical communities of specific sizes, indicate higher priority for:

- small, rural handpump latrine systems because of their low cost
- large urban systems due to high prices for water from other sources and high per capita demand.

Modular systems serving 1,000 to 5,000 people are marginally feasible.

Recommendation # 1

A total of \$725.7 million is recommended for investment based on this evaluation.

We also recommend a review of the design standards, as well as construction and contracting procedures with a view toward reducing per capita cost, especially for communities of 1,000 to 5,000 people. With lower costs, higher coverage targets can be set.

b. Rural Water Supply Institutions

The principal institutions in charge of the rural water sector are MOP through ANDA and MOH through PLANSABAR.

Local communities are at the receiving end of decisions taken by the above organizations. Community participation is limited to taking part in the civil works during construction and to paying for maintenance and operation. As a result, systems are poorly maintained and their operation is not always efficient. Communities may also be targeted by more than one institution, adding planning redundancy in a sector with many unfulfilled needs. USAID's Grant agreement 0519-320 clearly defines the need for sector coordination.

International agency experience and recommendations favor maximum community participation, projects without community participation cost between 50 and 100 percent more, even when the cost of contributed labor and materials is fully valued. Not only does participation lower cost, but the community becomes identified with the project, its operation and maintenance.

Recommendation # 2

If improved coverage is to be achieved by the year 2000, there is a need to define sector policy for rural project implementation. This should include:

- closer donor coordination
- coordination between existing agencies
- community participation in planning and execution decisions
- and contracting at the municipal and community levels.

Terms of reference should be prepared for a sector policy paper to be reviewed by CONIAPOS or an equivalent coordinating body. Its technical committee could then work with international technical assistance in preparing this paper for GOES consideration.

The ideal result of this review of water policy would be for ANDA and PLANSABAR to decentralize operations gradually, with communities taking the lead role in planning, building, operating and maintaining local water systems. The agencies should progressively reduce their role, limiting it to financial and technical assistance.

Another option would be to delegate small system responsibilities to regional offices. Regardless which option is selected, ANDA's rural program should be administered separately with simplified procedures and as an entirely separate regionalized entity.

PLANSABAR has a number of serious problems including lack of autonomy and insufficient financial controls. Yet, it has several positive aspects. Its experience in rural water supply and sanitation field is too valuable, even within its present limitations, to be lost once its ongoing program with the IDB is completed.

Recommendation # 4

These facts need to be carefully reviewed along with alternatives to PLANSABAR's future role, efficiency, effectiveness and whether it should be relocated within the Ministry of Health or elsewhere in the Government.

c. Urban Water Systems

(1) Conditions

The condition of the water systems have been surveyed by a number of studies, and in general it was favored that:

- systems have had little or no maintenance and the design period of a number of them has been over-extended

-
- in some cases, population served has increased much faster than planned
 - electromechanical equipment has suffered from power shortages, lack of spare parts and regular maintenance.

Recommendation # 5

ANDA should set up a routine preventive maintenance program that would cover regular oiling, adjustments, changing of gaskets, etc. At present, these operations are carried on an emergency basis only. As a first step, an inventory should be made and computerized, showing present condition and maintenance needs, coinciding with an IDB request.

(2) Waste Water

Urban waste water collection and disposal facilities need urgent attention. Waste is currently dumped into rivers, streams and lakes without treatment.

Recommendation # 6

Sewage treatment plants for the main discharges should be considered immediately. The San Salvador Metropolitan Area collectors should be considered first. This study should be conducted in tandem with the urban refuse, or solid waste, study that is detailed in the electric power sector.

(3) Rehabilitation and Expansion

Only 51 percent of the urban population have house connections, whereas others have outdoor latrines. In many towns, there is an imbalance between water supply and sewerage services.

Recommendation # 7

In order to meet urban water supply and sanitation needs rehabilitation and/or replacement of existing systems should be given priority. The following programs still require funding:

- Expansion of water supply and sewerage disposal in the cities of Santa Ana, Sonsonate and San Miguel. Feasibility studies were to be completed in December, 1989.
- Sanitation systems (sewers or latrines) to balance services in municipal seats that at present have water supply systems. Most of the urban communities to be served are small. Economic feasibility of the program may require a review of design standards, in terms of consumption per capita and pipe diameters.

5. ELECTRIC POWER

a. Institutional Framework

The production and distribution of electricity is operated under the authority of the Ministry of the Economy. CEL is the autonomous institution in charge of generating and distributing electric power and although it faces numerous constraints, it is a generally efficient and professional company. The institutional framework of the power sector is sound.

b. Distribution

As a result of the GOES terminating distribution company concessions in 1986, minimal investments were made in the previous decade since then. Thus, the distribution system is overloaded.

Recommendation # 1

The GOES should seek a settlement, and proceed to set up viable operating entities. If needed investments are not made, emergency measures may soon need to be implemented to avoid more rationing.

Also, there appears to be insufficient plans to manage the distribution system once this settlement is reached.

Recommendation # 2

Plans should begin now to set up such a system. One option under consideration is to set a country-wide distribution utility with the participation of private capital in financing and management. To become an attractive investment, it would have to be established on a sound institutional and financial basis. The GOES could nominate a committee to prepare a proposal on this matter. Investments in distribution could then proceed more effectively.

c. Finance

CEL is in a difficult financial situation. The company has been losing money since the 1986 devaluation. At that point, debt and debt service increased more than twofold without any compensating tariff adjustment or debt restructuring. To compound this problem, tariff adjustment procedures are complex and arrears are due to from public entities.

Recommendation # 3

ISA Consultants have devised the following set of financial recommendations:

- There should either be a utility regulation agency to support needed adjustments or CEL should be given the authority to adjust tariffs to compensate for increases in operating costs and debt payments. This authorization should not be for a one time adjustment only. CEL needs to be allowed to continuously adjust its tariffs according to the specified financial criteria.
- There is a need for a comprehensive tariff study to analyze tariff adjustment requirements and deal with the above issue.
- ISA estimates that the minimum real rate increase needed is approximately 14 percent over the 1988 period. This should be phased in gradually to avoid a consumer price shock and keep a positive business climate.

-
- The number of tariffs should be reduced to six, one for each type of user. The number of blocks should also be limited. This will cut administrative costs.
 - CEL's debt should be rescheduled given clear investment objectives. This will permit a gradual implementation of this increase.
 - Arrears by State Enterprises should be paid to CEL.

d. Planned Energy Use

The present situation of low tariffs and lack of power directly limits investment and maintenance while increasing demand, thus jeopardizing the power supply situation. Also industry has little incentive to conserve energy, modernize energy use, and schedule energy use to reduce CEL's load factor. The demand charges on the current tariff schedule are insignificant. Thus, users have no incentive to reschedule energy consumption. As a result, an expensive generation facility may soon be required to meet increased peak requirements.

Recommendation # 4

Implement an effective industrial demand charge to reduce CEL's heavy load factor.

e. Generation

The most serious generation problem is the rapid siltation of El Salvador's most important reservoirs. The capacity of the Cerron Grande Reservoir, on the Lempa River, at its current rate, will be gone in 10 years. Deforestation is a major contributing cause to soil erosion and siltation, but the dumping of urban refuse from the San Salvador Metropolitan Area is another important factor. Since dredging is not an economical solution, reservoir siltation cannot be reversed.

Recommendation # 5

CEL should proceed on an emergency basis to repair collapsed drop structures and add check dams and other soil containing structures on tributaries to the Rio Lempa, such as Rio Acelhuate and Rio Sucio. Mid- and long-term measures such as sewage treatment, collection of urban refuse, and reforestation should be planned for immediate implementation. A study of urban refuse and dumping is needed.

Geothermal power plants can have a strong negative environmental impact. Currently, water from the existing central geothermal unit is let into national water ecosystems without prior treatment. This hot water contains high concentrations of minerals and acids. Steam from the planned wellheads will also contain these elements which will be dispersed without any control over a radius from the wellhead units thus covering local vegetation. CEL is currently studying a recycling process to obtain more energy and reduce pollution. Given increasing environmental awareness, this negative impact will certainly constrain the availability of international funding for such projects.

Recommendation # 6

CEL should prepare in depth environmental studies for existing geothermal projects, and strive to implement protection and mitigation measures.

To prevent a shortfall in supply and its consequences, such as rationing, new generation facilities should be rapidly added. With no tariff adjustments and given the expected December, 1989 peak of 407 MW, a comparison of 1994 needs with the new projects expected to come on line by then yields the following shortfall:

	<u>Capacity</u> <u>Mw</u>	<u>Yearly Energy</u> <u>Gwh</u>
New facilities Needed by 1994	105	630
Expected Plant Addition	50	335
Shortfall by 1994	55 Mw	295 Gwh

The proposed tariff adjustment will improve the financial situation, make CEL eligible for major loans and postpone generation needs by a year or so.

Recommendation # 7

The Consultants suggest that the proposed tariff adjustment and industrial demand charges be implemented. If this reduces the load factor sufficiently, then only the 20 MW slow speed diesel generators will need to be installed. If not, further peak-oriented facilities will be needed.

CEL's plans to increase power generation through the year 2000 rely extensively on the use of the geothermal resources of the country. While this is an attractive source of energy, it has a number of disadvantages. Besides its environmental impact, geothermal plants are very expensive; the economic evaluation demonstrates it is one of the least economical energy generation systems. The expansion of existing hydroelectric plants, together with their preservation, presents a much higher return. In addition, geothermal plants are risky as it is always difficult to know how much energy will be available for each plant until the wells are dug.

Recommendation # 8

CEL should reconsider its power generation plans in light of the results of this study. Greater emphasis should be put on existing and future hydro plants; these are the most economical and have the least negative environmental impact.

f. Total Investments

After careful review, ISA proposes a total of \$ 490 million in investments through the year 2000.

6. TELECOMMUNICATIONS

a. The Financial Constraints of Meeting Demand

The future of telecommunications in El Salvador will not be determined by the demand for services, but rather by the development strategy of the GOES and the role it attributes to this sector. Investments are not planned based exclusively on retained earnings and potential returns from reinvestment. They are determined, however, by the level of investment budgets approved by the Government. That is, while ANTEL has extensive liquid funds available, its expansion depends upon the priority attributed to this sector by the government.

Consequently, there is considerable backed-up demand for additional subscriber service. A total of 76,000 applications are pending for new lines and an additional 30,000 would probably apply if they thought there would be a chance for their requests to be met. Meanwhile, ANTEL is preparing a National Telecommunications Plan with assistance from the International Telecommunications Union.

Recommendation # 1

GOES should consider giving ANTEL more leeway in reinvesting its income in expansion. Recommended that ANTEL continues its expansion program until the ITU-supported national plan is completed. It should then be promptly renewed and approved by GOES.

b. Staff Turnover and Training

ANTEL has been affected by the quick turnover of qualified staff, and its training program does not sufficiently match its needs. There is a need for a massive, redundant program to make sure qualified staff is available, despite the turnover. Planning and traffic forecasting are special areas that require a more experienced staff and a strong training program. The agency's immediate need is being met by ITU support, both in developing a national plan and in specific training support.

There is some question as to whether ANTEL's long-term training (especially planning training) needs can be met.

Recommendation # 2

ANTEL should approve and implement the training program currently being developed with ITU assistance. It should develop and carry out training in planning, traffic measurement and forecasting and digital technology, with ITU support.

c. Operations and Maintenance Organization

O&M is organized by type of equipment. There is a need for considerable interaction between teams to identify and solve specific maintenance problems. For example, outside plant, commutation and trunk line teams need to coordinate to identify where problems originate. This makes problem-solving difficult.

Recommendation # 3

ANTEL should reorganize its O&M activities on the basis of regionalized teams.

d. Equipment Balancing

ANTEL has the potential for equipment imbalances among lines, outside plants, central offices, etc. ANTEL lacks traffic measuring equipment and the trained staff needed to measure the extent of these possible imbalances.

Recommendation # 4

Plant equipment needs based on careful traffic measurements and forecasting.

e. Private Sector

The private sector's participation in telecommunications is severely limited. ANTEL thus depends almost exclusively upon its own efforts to promote the use of its facilities.

Recommendation # 5

In addition to examining the feasibility of a greater private sector role in construction and maintenance, it is recommended that new opportunities for concessions to private firms be identified for the following services: public phone offices, FAX, mobile phones and data transmission.

f. Non-Telecommunication Activities

ANTEL has a number of activities not directly related to its major function. It runs a major hospital, has a vehicle repair shop and makes real estate investments. These activities may distract management from efforts in the telecommunications area.

Recommendation # 6

Consider spinning off those activities considered distracting from the development of the telecommunications sector.

7. INTERSECTOR RELATIONSHIPS

This section deals with the specific interactions between the sectors including:

- certain services which should precede others
- needs for coordination and planning
- comparisons among sectors and of growth rates among sectors

a. Relationships

Table IA.9 shows a matrix of possible relationships between agencies. The rows correspond to the agencies needed by those listed in the columns. Essential preconditions to construction and operations are:

- local access - required by water systems and required by electric service
- telecommunications and water systems require electric power
- there is a need for considerable coordination among agencies within the transport and especially the water sector
- coordination is also needed among water users, especially CEL and ANDA.

b. Projected Growth Rates

Projected growth in demand for these services are largely consistent with population projection and economic scenarios. Total population is projected to grow at 2.5 percent per year and GDP at 1.0 percent through 1993 and 4.5 percent thereafter.

On the other hand, road transport, according to each department, is expected to grow at 5 to 7 percent per year, power at 5 percent per year through 1993 and 7 percent thereafter, while telecommunications demand is projected at about 6 percent. These growth rates are reasonable within the typical demand projection function of :

$$g = n + ey$$

g = rate of growth of demand
n = population growth rate
e = income/elasticity of demand
y = rate of growth of income per capita

This function is adjusted for other variables relevant of each sector. Water is not projected on a demand but on a basic need basis.

TABLE I.A.9

INSTITUTIONAL RELATIONSHIPS BETWEEN SECTORS
INSTITUTIONAL NEEDS

SECTOR/ INSTITUTION PROVIDED BY	ROADS MOP	OTHER TRANSPORT CEPA	WATER AND A AND A	WATER PLANSABAR PLANSABAR	POWER CEL CEL	POWER Dist.Cos. Dist.Cos.	TELECOM ANTEL ANTEL
ROADS	X	need coordinated planning	road access needed	road access needed	road access preferred	road access preferred	road access preferred
OTHER TRANSPORT CEPA*	imports through ports	X	coordination with ports	no need	imports through ports	imports through ports	imports through ports
WATER AND A	no need	no need	X	need coordinated planning	water res & sewage planning	coordination utility services	coordination utility services
WATER PLANSABAR	no need	no need	need coordinated planning	X	no need	coordination utility services	coordination utility services
POWER CEL	road operations	all operations	pumping operations	pumping operations	X	coordinated planning	for all operations
POWER Dist.Cos.	road operations	all operations	pumping operations	pumping operations	power distribution	X	for all operations
TELECOM ANTEL	road operations	all operations	all operations	all operations	all operations		X

8. ENVIRONMENTAL CONCERNS

a. Introduction

Concern for the environment has been slow to develop in El Salvador. Yet, prospective lenders are acutely aware of environmental concerns and are likely to condition financing to appropriate measures. In many cases, measures to protect the environment make good economic sense to the agencies involved so they can be counted on to support them. Other measures do not entail additional cost, requiring only care in implementation.

This section covers three topics:

- negative environmental impacts on infrastructure
- infrastructure impacts upon the environment
- potential competition for Lempa River Water Resource

b. Impact of Environmental Problems upon Infrastructure

(1) Deforestation and Erosion

The negative impacts of deforestation are numerous. We are concerned especially with its detrimental impact upon the rate of erosion and the resulting supply of electric power and drinking water.

Deforestation is one of the causes of erosions and increased siltation in reservoirs, their reduced capacity and reduced productive life at hydroelectric plants. It also causes reduced flows in many wells and other water sources as watersheds retain less water. This section discusses in some detail the impact upon siltation.

(2) Reduced Generating Capacity

Due to an increasing siltation rate, the generating capacity of the reservoirs on the Rio Lempa is diminishing. This reduces electricity production because:

- Loss of storage means that the excess water of the rainy season cannot be used during the dry season. Therefore another source of electricity must be found.
- If the excess water of the rainy season has to be spilled over the dams to the sea, rather than used in the turbines, it is lost and production of electricity for the whole year diminishes. In other words, as the capacity to store water is lost, the hydro plants become run-of-the-river plants which only produce as much power as there is water in the river at the time.

(a) The Existing Resources

There are four hydroelectric plants on the Lempa River, each with a storage reservoir. The Cerron Grande Plant is the most important. The table below helps explain the importance of each plant. CEL estimates of live storage, made through standard engineering techniques, details of which have not been available to ISA consultants, are expressed below both in million cubic meters of water and in millions of kilowatt hours which the water can generate in the plant itself. The MW capacity of the plant and the altitude above sea level of the reservoirs are also shown:

HYDRO PLANT	1988 STORAGE CAPACITY in millions of		INSTALLED CAPACITY MW	ALTITUDE meters
	m ³	kWh		
Gurajayo	15	..
Cerron Grande	231	..	135	243
5 de Noviembre	80	..
15 de Septiembre	393	22	156	49

By dividing the storage in kWh by the installed capacity in kW (1MW = 1000kW), we can obtain the approximate number of hours it would take to empty the reservoirs if there were no inflows.

As for the general usefulness of each plant within the system, it must be remembered that the water that flows through one plant will eventually reach all other plants downstream, and will be used again. It follows that storage capacity is more valuable in the plants higher up the river basin.

(b) The Cerron Grande Reservoir

The most important reservoir on the Lempa River is Cerron Grande. It is the largest and there are two more plants downstream that use its water.

CEL has paid particular attention to this reservoir and has periodically carried out measurements to determine how much storage capacity is left. The conclusions from the table below are alarming. If sedimentation continues at the 1988 rate, the storage capacity will be lost within 10 years. If the rate slows down, the life of the reservoir can be extended for a few years. Measurement errors, if they exist, would alter the gravity of the problems, only to a degree.

STORAGE VOLUME LOSS Lines at Cerron Grande Reservoir

DATE OF MEASUREMENTS	STORAGE CAPACITY million m ³	LOSS OF STORAGE CAPACITY	
		Between measurement million m ³	Average per year million m ³
February, 1979		122	13.6
February, 1988		24	24
November, 1988			

c) Other Reservoirs

While Cerron Grande has been selected as an example because of its importance, it is in no way unique. The first plant built by CEL (5 de Noviembre) has suffered the following reduction in storage capacity.

YEAR MEASURED	LIVE STORAGE (million m3)
1953	168
1963	133
1973	90
1983	..

(3) Sewage, Urban Refuse and Excavation

These concerns are especially serious in the San Salvador metropolitan area, as they may contribute to accelerated reservoir siltation and reduced hydroelectric capacity. The rivers in the area are a dumping ground for all kinds of urban refuse. Much of the debris of the 1986 earthquake ends up in the gullies that feed these rivers. So does the earth excavated from new construction sites. There is no end in sight to the development of the metropolitan area. Development will certainly spread to other centers in the Lempa Valley and the dumping is bound to continue.

(4) Recommendations

We recommend that the issues of reforestation, treatment and collection of urban and industrial refuse, and enforcement of regulations against indiscriminate dumping should be addressed as quickly as possible.

The short-term remedy is more pressing. The above measures recommended above will be too late to save the Cerron Grande and other reservoirs. The GOES should stop the bedload of the Acelhuate and other rivers from reaching the reservoir. This can be achieved by repairing the drop structures that have collapsed and by adding check dams, weirs and like structures. Emergency and subsequent plans are laid out in Volume IV - Electric Power.

c. Infrastructure Impacts upon the Environment

(1) Transportation

(a) Highways

While opening new roads may have important negative impacts upon the environment, highway rehabilitation and improvement do not. Nevertheless, the following impacts need to be considered:

- change in land and water use
- change in water drainage
- insufficient slope stability and rock slides
- vehicle exhaust pollution.

1) Land Use

The proposed highway projects will have the greatest impact upon land use:

- **Direct Impacts:** as a result of the improvements proposed for the first five year plan (due to road widening and new geometry), approximately 400 hectares of land will be taken for additional right-of-way.
- **Indirect Impacts:** As rehabilitation and improvements reduce travel times, vehicle maintenance and user costs, there will be some limited generated traffic and shifts in land use patterns. Industry, residential areas and commerce may find decentralized locations more feasible. Thus these uses may become more dispersed, absorbing some additional green areas and farm land. However, this may also alleviate some problems related to urban concentration.

2) Drainage

Poor drainage conditions along roadways, in addition to the damage to the roadbed, contribute to increased erosion and destruction of the original environment. The road rehabilitation and improvement program, through improving drainage, will minimize watershed interference and potential dislodgings from water saturation along roadway sections.

3) Slope Stability

Proper slope design and appropriate construction techniques should minimize only risk that a widened right-of-way might lead to unstable slopes and eventual mud and rock slides.

4) Vehicle Exhaust

This is a significant problem, especially in urban areas. However, for the recommended highway investments, the impact is expected to be positive. Road rehabilitation and improvements will result in more fuel-efficient travel speeds, less traffic congestion, and, as a result, less exhaust pollution.

5) Conclusion

ISA Consultants expect the proposed highway program will not adversely affect the environment. A mildly negative land-use impact will be offset by drainage improvements and reduced air pollution.

(b) Ports

Proposed construction work in other modes do not pose environmental problems of any importance. All planning of Acajutla rehabilitation or expansion should mitigate potential shoreline impacts such as sanding, erosion and silting.

(c) Airports

No expansion in capacity is proposed at present for either the International Airport of El Salvador nor for the Ilopango airport. However, there should be a review of increased noise levels for any future expansion, especially larger airliner capacity at Ilopango.

(2) Water Supply and Sanitation

(a) Direct Discharge of Waste Water

The most serious problem is the discharge of raw, untreated sewage into streams, rivers and lakes. A minimum of 42,000 cubic meters are dumped daily, much of which into the Acelhuate, Tomayate and Las Canas rivers in the San Salvador area. Contaminated and polluted watermantles create hazardous health and environmental conditions, and contribute to the destruction of the natural habitat for water fauna and flora. It is also a cause of siltation in rivers and reservoirs, thus reducing reservoir capacity. The GOES should consider the installation of sewage treatment plants.

(b) Defective Pipelines

The distribution pipelines in many systems present much greater than accepted water losses. Due to advanced age, pipes have developed substantial leaks. During low pressure periods and service interruptions, extraneous, non-potable underground water can be absorbed.

This was discussed with ANDA maintenance staff during ISA field trips. The replacement of defective pipes is costly.

Asbestos-cement pipes are also known to have been used in water supply systems. This could result in serious community health hazards.

(c) Sewerage Coverage

The higher the urban water supply coverage is the more reach of sewerage systems becomes a matter of concern. Providing water supply and not providing sewerage imply that sewage is discharged into open ditches, alongside streets leading to foul-smelling health hazards.

Therefore, ISA strongly recommends new urban programs to balance sewerage services with water supply.

(d) Other Sources of Water Supply

Water supplied from non-public sources such as springs, hand-dug wells, rivers and lakes are subject to pollution from effluents, chemicals, animals and people, and are generally considered major sources of water-borne diseases. There is little information on the water quality at these non-public sources.

(e) Well and Latrine Location and Design

The ISA Consultants did not have an opportunity to review the implementation of past hand-pump and latrine projects in small rural communities. If instructions were not followed regarding location and design, it is entirely possible there are latrines located too close to underground water supply sources, which then become contaminated. There may also be a need to further consider alternative latrine designs to the dry latrines that are currently being used.

(f) Impact of Proposed Projects

In general, new or expanded water supply projects have positive environmental and health impacts. This is not the case, however, when water is supplied without making adequate provision for waste water collection and disposal, nor when sewage is discharged without previous treatment.

Proper site selection in rural areas will ensure that water supply projects do not have other negative impacts. Thus:

- The site should be free from natural hazards such as flooding and landslides.
- Vegetation and topsoil should not get washed away regularly by surface water runoff and related contamination.
- Water table levels should be considered.
- Vegetation removal is minimized.

The positive impact of water supply and latrine projects in rural areas is enhanced when accompanied by effective health education programs.

(3) Power

The most significant negative environmental impact of electric power projects are the geothermal plants. The Ahuachapan geothermal plant is fed by wells which produce a mixture of water and steam. A considerable quantity of water is discharged by the plant into a concrete-lined canal which carries the water to the sea, 60 km away. The water contains large amounts of chemicals, salts and acids and is highly corrosive. Concrete and steel corrode and leak resulting in damage to the environment. CEL has 38 people working continuously on this canal.

The water can be reinjected into the ground, but there is a fear that this may reduce the steam production of the reservoirs, so it is not done.

GEOCEL has recently prepared two proposals to use the heat of the discharge water to produce more power through a "binary cycle process". The estimate is to produce 6.6 MW in plants estimated to cost \$8 million.

One effect of the proposal would be to cool down the water, which would then deposit some of its chemical content at the plant, rather than carry it to the sea.

If the cost figures are correct, it would be a good business idea to install the binary cycle plant and there may be other compensating environmental benefits.

Oil-fired generation facilities may result in air pollution. Projects should be reviewed for the possible need of mitigation measures.

Transmission and distribution facilities seldom encroach upon the environment. There may be a need to review security measures against accidents and monitor the effects of human activities near high-voltage electricity.

(4) Telecommunications

Telecommunications infrastructure has a very limited impact on the environment. Civil works are generally small and localized, the use of energy is minimal and, because it essentially relies on electric power, it is relatively clean. Unless large buildings or antennae are needed in ecologically fragile areas, environmental assessments are not warranted for telecommunication projects. In that case, the impact of electric charges upon life should be examined.

Telecommunications can actually have a positive ecological impact, allowing for early reporting and better response to alleviate human suffering and damage in the event of national disasters.

d. Potential Competition for Lempa River Water Resources

Water is a scarce resource in El Salvador, and since demand is increasing, the availability is expected to decline, presenting potentially serious problems. ISA Consultants agreed in an amendment to this contract, to examine the major demands upon the use of water resources. Demands upon the water resources of the Lempa River were identified as a potential problem and, therefore, we have reviewed available information on the river's water balance.

Information on the water balance of the Lempa River has been gathered from the Ministry of Agriculture, CEL's Hydrology Management and the Pan American Health Organization (PAHO).

The fundamental objective of this study is to determine whether there is a need to investigate whether preventive measures or institutional cooperation is needed to deal with limited water resources. The quantity of Lempa River water needed to generate electricity and for domestic, industrial and irrigation purposes have been calculated in order to compare with the current availability of water.

9. CONSOLIDATED PROJECT RECOMMENDATIONS

This section presents:

- for each sector, a summary of investment needs by project or program and their economic and social impacts
- a discussion of qualitative evaluation criteria
- a summary of recommended planning and project-related studies, technical assistance and training activities.

a. Transportation Investment Needs

Table I.A.10 presents a summary of the identified highway investment needs, broken down by the six rehabilitation and improvement programs proposed for the 1990-1994 five-year plan, and the subsequent six-year plan made up of further rehabilitation work and bridge reconstruction.

MOP's inefficiency, combined with the effects of the war and structural adjustment, leads the highway sector to suffer the most from chronic underinvestment. Thus the unusually high internal rates of return presented in this report for investments in the improvement and rehabilitation of roads. The nation's special, primary and secondary highways promise extraordinarily high social returns, confirming their long-term neglect.

TABLE I.A.10
HIGHWAY INVESTMENT NEEDS, 1990-2000

PROGRAM	TOTAL COST (US\$1000)	NB/I @ 12%	IRR %
1. 1990-1994 Five-Year Rehabilitation and Improvement Plan			
Pan-American Highway	76,792	7.7	75
Coastal Highway	22,500	11.0	150
Special and Primary Highways	32,868	14.4	126
Secondary Highways	40,759	13.9	149
Tertiary Highways	10,697	4.4	92
Rural Roads	13,422	3.0	52
SUBTOTAL	197,037		
2. 1995-2000 Rehabilitation Plan	170,000		
3. Bridge Reconstruction Plan	21,800		
TOTAL	388,837		

Source: ISA Consultants

Table I.A.11 lists the costs of investment needs in other modes for the 1990-2000 period. These include emergency repairs of the Acajutla port and rehabilitation of the International Airport's pavement structure. Expansion of these facilities in the later 1990s may be required after further study. Volume II contains a preliminary evaluation of these expansion needs. Rail investments should be considered as part of a full review of its role in the transport system.

b. Water Supply and Sanitation Needs

Table I.A.12 summarizes water supply and sanitation investment needs for 1989-2000, including projects underway during 1989. Costs per capita were multiplied by populations to be served to obtain totals. While the costs of current and proposed projects are agency and ISA estimates, the remaining needs are computed as differences and not on a per capita basis. Thus, since actual per capita costs vary by project, the total remaining needs figures are less accurate.

Table I.A.13 shows the results of the economic and health impact analysis of seven complete modular water supply and sanitation systems. The table indicates a higher priority for:

- small rural handpump - latrine systems due to their low cost
- large urban systems due to high prices for water from other sources and high per capita demand.

Modular systems serving 1,000 to 5,000 people are marginally feasible. This suggests a need to review design standards, construction and contracting procedures with a view toward reducing per capita cost, especially for communities of 1,000 to 5,000 people. With lower costs, higher coverage targets can be set.

Other than consumer surplus, benefits include health care and human resource savings, corresponding to reduced morbidity and infant mortality. Also, since diarrhea incidence is greater and per capita costs are smaller in rural areas, the health impact in rural areas is much greater.

c. Electric Power Needs

Table I.A.14 summarizes electric power investment needs and an economic evaluation of proposed alternative generation facilities. In order to meet short- and medium-term generation needs, economic evaluation indicates that slow-speed diesel generators are preferred. If, as discussed elsewhere, peak demand is not checked and work on expanding Cerron Grande cannot be accelerated, CEL would have to consider a non-economical gas turbine generator to meet additional demand.

CEL has placed heavy emphasis on geothermal plants to meet generation needs forecasts for the year 2000. However, these plants are very expensive and economic evaluation demonstrates it is one of the least economical energy generation systems. The expansion of existing hydroelectric plants, together with their preservation, presents a much higher return.

TABLE I.A.11

SUMMARY OF PORT & AIRPORT INVESTMENT NEEDS, 1990-2000

MODE / PROJECT	TOTAL COST (US\$1000)
PORT OF ACAJUTLA	
1. Repair of Pier "A"	15000
2. Repair of Damaged Cargo-Handling Equipment	3,160
3. Others (Appendix II.B.3)	1,100
SUB-TOTAL PORTS	19,260
INTERNATIONAL AIRPORT OF EL SALVADOR	
1. Pavement Structure Rehabilitation	3,000
2. Purchase of Electrical and Navigational Aid Equipment	520
3. Others (Appendix II.B.2 Vol.Transport.)	441
SUB-TOTAL AIRPORTS	3,961
TOTAL PORTS & AIRPORTS	23,221

Source: ISA Consultants

TABLE I.A.12

WATER SUPPLY AND SANITATION INVESTMENT NEEDS
(1989-2000)

AREA/PROGRAM	POULATION COVERED		ESTIMATED COST (US \$1000)
	WATER SUPPLY	SANITATION	
RURAL AREAS			
=====			
PROJECTS UNDERWAY & PLANNED			
AND AID-0320	600,000	600,000	30,050
AND AID PILOT	72,500	72,500	6,300
AND A KFW	110,000	110,000	8,500
PLANSABAR IDB-III	378,000	193,200	23,520
PLANSABAR-UNICEF	-	360,000	6,840
Save the Children	25,000	25,000	700
TOTAL	1,185,500	1,360,700	75,910
REMAINING NEEDS			
1989 - 1994	500,000	-	30,250
1995 - 2000	1,500,000	980,000	109,370
TOTAL	2,000,000	980,000	139,620
=====			
URBAN AREAS			
=====			
AND A PROJECTS UNDERWAY & PLANNED			
Rehabilitation	150,000	-	40,000
AND A PROJECTS UNDER STUDY			
S.Salvador Metro Sewerage Exp.	-	200,000	150,000
Sta.Ana/San Miguel/Sonsonate	100,000	167,000	27,000
12 System Waste Water Treatment	-	40,000	6,000
Balance Municipal Sewerage Sys.	-	349,000	11,000
TOTAL	250,000	756,000	234,000
REMAINING NEEDS			
1989 - 1994	150,000	-	33,300
1995 - 2000	532,000	137,000	134,270
TOTAL	682,000	137,000	167,570

SOURCE : ISA Consultants, Tables III.L.1 and L.5

TABLE I.A.13

MODULAR WATER SUPPLY & SANITATION SYSTEMS
ECONOMIC EVALUATION AND HEALTH IMPACT

POPULATION SERVED	DESIGN L/P/D	INTERNAL RATE OF RETURN (%)	NET BENEFIT/ INVESTMENT	INVESTMENT/ REDUCTION IN MORTALITY \$1000	INVESTMENT/ REDUCTION IN MORBIDITY \$1000
Rural					
400	100	44.9	3.69	10.6	0.6
1,000	100	13.3	1.08	10.6	0.6
2,000	100	16.2	1.27	10.6	0.6
Urban Expansion without Treatment					
5,000	175	8.3	0.79	18.9	1.8
10,000	200	35.8	1.73	18.9	1.8
25,000	250	28.2	1.49	18.9	1.8
50,000	250	31.2	1.61	18.9	1.8
Urban Expansion with Treatment					
10,000	200	9.0	0.82	18.9	1.8
25,000	250	17.9	1.39	18.9	1.8
50,000	250	21.2	1.63	18.9	1.8

SOURCE: ISA Consultants

TABLE I.A.14

ELECTRIC POWER INVESTMENT NEEDS
(in millions of US\$)

INSTALLATION	ADDED CAPACITY		1989 - 1994		1995 - 2000	NB/1	IRR
	MW	GWH	FUNDED(1)	TO BE FUNDED	TO BE FUNDED		
						TOTAL	%
GENERATION							
Miravalles Diesel Refurb.	15	80	2.2			-	
4 Wellhead Geothermal	20	140	46			0.53	2.7
Ahuachapan Geoth. Rehab.	15	115	16			-	
Gas Turbine (at Soyapango?)	20	80		9		0.19	-3.1
Slow-speed Diesel(at Acajutla?)(2)	40	320		55		1.19	14.2
Cerron Grande Expansion	144	80			43	1.75	19.5
Berlin Geothermal	70	500			143	0.76	9.0
SUBTOTAL			64.2	64	186	(5)	
TRANSMISSION							
Interconnection with Honduras Expansion (3)	70	300	28	23	25		
SUBTOTAL			28	23	25		
DISTRIBUTION							
Refurbish Urban Systems				30			
Urban Expansion				30	45		
Rural Electrification			17		23	(4)	
SUBTOTAL			17	60	68		
TOTAL TRANSMISSION/DISTRIBUTION			64.2	64	186		
TOTAL					535.2		

Source: CEL, CAESS and ISA Consultants

- (1) Funding arranged or being negotiated.
- (2) If proposed tariff agreements are not adopted to reduce load factor.
- (3) Rough estimate, currently under CEL review.
- (4) Includes rough estimate for USAID 1995 funding and possible future funding. Excludes local funds.
- (5) NB/1 and IRR for other possible generating facilities: oil-fired steam, 1.02, 12.1; El Tigre Hydro, 1.56, 17.5; San Marcos, 0.68, 8.5.

d. Telecommunications Needs

Table I.A.15 presents a summary of telecommunications investment needs based on ANTEL's preliminary plan through 1994. These plans should be revised as soon as the National Telecommunications Plan is completed during the first semester of 1990. The estimates for the 1995-2000 period assume a 50 percent increase in investment needs, equivalent to a 7 percent growth rate in demand. ANTEL has also included unforeseen costs since its estimates result from preliminary studies. The economic evaluation of new lines concludes with an estimate of a 30.7 percent IRR and a 2.2 NB/I ratio.

e. Social Impact and Qualitative Criteria

Table I.A.16 represents an intersector comparison of the direct employment impacts of infrastructure investments, in terms of dollars of investment needed to generate one direct job for one year. The order of priority in terms of direct employment impact would be:

- labor-intensive rural water supply
- urban water supply
- highway improvements
- hydroelectric and oil-fired generation facilities.

Highway and airport rehabilitation, geothermal generation and telecommunications investments are capital-intensive and contain limited employment impact. The ideal criterion would include the generally greater indirect employment impact not measured here due to lack of resources. The resulting priority order would not necessarily be the same.

Additional criteria need to be considered in designing an investment program. One key area to be addressed is the determination of which investments are feasible during the conflict and which should wait until it is ended. This suggests that investments in secure areas, and areas less subject to damage, take priority.

Another fact often considered is potential political gains such as achieving political support for the government in conflictive areas. This would suggest that areas recently brought into government control be given priority in meeting basic needs.

Certainly, impacts upon income distribution should be taken into account. Rural and urban water supply easily contain the strongest distribution effect, because a greater share of the beneficiaries will tend to be poor. Transportation and electric power projects will generally benefit the economy, but probably not affect income distribution significantly. Several studies in Latin America have shown that roads often benefit larger, more market-oriented farmers, and with few exceptions these projects are, at best, income neutral.

Electricity is usually not available in poorer households, so expanded service tends to benefit more those who already use it. Certainly, in the long run, through their impact on the rate of economic growth, transport and power projects may effectively have an economically progressive impact. Telecommunication investments tend to benefit the middle classes, being somewhat more regressive in their investments in other sectors.

This brief discussion of the numerous elements which need to be considered in evaluating project impact on income distribution clearly indicates the breadth of analyses which would be needed, project-by-project, to arrive at any strong set of priorities based on social criteria. The ISA consultants conclude, after these discussions of social criteria, that a straight use of an economic evaluation criterion be used to set priorities.

TABLE 1.A.15

TELECOMMUNICATION INVESTMENT NEEDS
(in millions of US\$)

INVESTMENT	1989-1994	1995-2000
1. Installation of new telephone lines	130.0	195.0
2. Reconstruction of Damaged Services	55.5	83.5
3. New Technical and Administration Bldgs.	9.5	-
4. Digitation of the Regional Network	8.0	12.0
5. Expansion of New Long-Distance Central Office	3.0	4.5
6. Improvements in the Data & Cellular Phone Network	9.5	14.0
7. Other Projects	6.0	9.0
8. Unforeseen Costs	44.5	67.0
TOTAL	266.0	385.0

TABLE I.A.16

DIRECT EMPLOYMENT IMPACT OF
INFRASTRUCTURE INVESTMENTS

SECTOR / AREA OR PROJECT	US\$ INVESTMENT/ PERSON-YEAR OF DIRECT EMPLOYMENT(1)
TRANSPORTATION	
Highway Improvement	24,400
Highway Rehabilitation	146,000
Airport Rehabilitation	146,000
WATER SUPPLY & SANITATION	
Rural Systems	6,100
Urban Systems	11,300
ELECTRIC POWER	
Cerron Grande Hydro Exp.	30,900
Gas Turbine	47,400
Slow-speed Diesel	39,600
Central Geothermal-Berlin	160,000
Wellhead Geothermal	
TELECOMMUNICATIONS	
New Lines	382,000

Source: ISA Consultants

(1) in construction only

f. Recommended Studies and Technical Assistance

Table I.A.17 shows a summary of recommended studies, technical assistance and training. One proposal is for overall GOES tariff deregulation to depoliticize the tariff adjustment process.

With respect to transportation, a simplified national transport study is proposed to help make basic intermodal and modal strategy decisions. MOP and rail management studies should also be considered in order to come up with detailed proposals for streamlining and achieving operating efficiency. Technical assistance in pavement and maintenance management is also proposed.

To improve the rural water supply institutional framework, a GOES-produced policy paper should be prepared with technical assistance. Subsequently, a specific institutional review of PLANSABAR is recommended. A tariff study is also proposed. Technical assistance is proposed in design standards, inventory and maintenance of urban systems and in several areas for rural water programs.

To help solve some of the arranged electric power sector's key problems, a GOES committee to design a profitable and credit worthy energy distribution system is proposed along with a general tariff study, a study of siltation reduction measures and another of the environmental impact of geothermal plants.

Since the International Telecommunications Union (ITU) is helping ANTEL prepare a national plan, no specific additional studies were identified. ITU should continue participating with a technical assistance and training program.

TABLE I.A.17

RECOMMENDED STUDIES, TECHNICAL ASSISTANCE AND TRAINING

Sector Agency	Planning Studies	Management Studies	Project/Environment Studies	Technical Assistance and Training
Transportation: MOP	Simplified National Transportation Study	MOP Management	Feasibility and design of all proposed projects with available funding	-Highway Pavement and maintenance Management System -Bridge Management System
CEPA		Rail Management	Acajutla Port expansion; airport pavement rehab. design	
Water Supply and Sanitation: ANDA	Rural water water policy paper	Tariff study	Design: -Expansion for 3 cities -Sewage treatment 12 cities Feasibility: -Urban balancing & expansion	-Review design standards -Inventory and maintenance system -Rural Water T.A.
PLANSABAR		Review of PLANSABAR		
Electric Power: CEL	Tariff study	Committee: distribution management system	-Siltation reduction measures -Impact of geothermal plants	Not yet identified
Telecommunications	ITU plan underway			Design and implement training program
Infrastructure Sector				Tariff deregulation (1)

Source: From each sector report.
(1) or by sector as indicated.

B. COUNTRY PROFILE

This profile covers the overall environmental, demographic, economic, and institutional aspects of El Salvador.

1. ENVIRONMENT

This is an environmental overview of El Salvador and not an environmental statement. A section on specific environmental concerns regarding planned and identified projects is included in the previous chapter.

a. General Climatic and Topographical Conditions

The dominating factor in the climate of El Salvador is its location at approximately 13° North latitude. This tropical location results in little variation in the number of hours of daylight throughout the year. Variations in the climate are the result of changes in elevation from the coastal plains to the mountains, and of the weather patterns generated by the Atlantic and Pacific Oceans and invasions of polar air, unique to Central America. When the Atlantic weather patterns are dominant, polar invasions result in excessive rains. Otherwise, the result is dry, clear, sunny conditions during the day and frosts in the mid-level valleys and highlands at night.

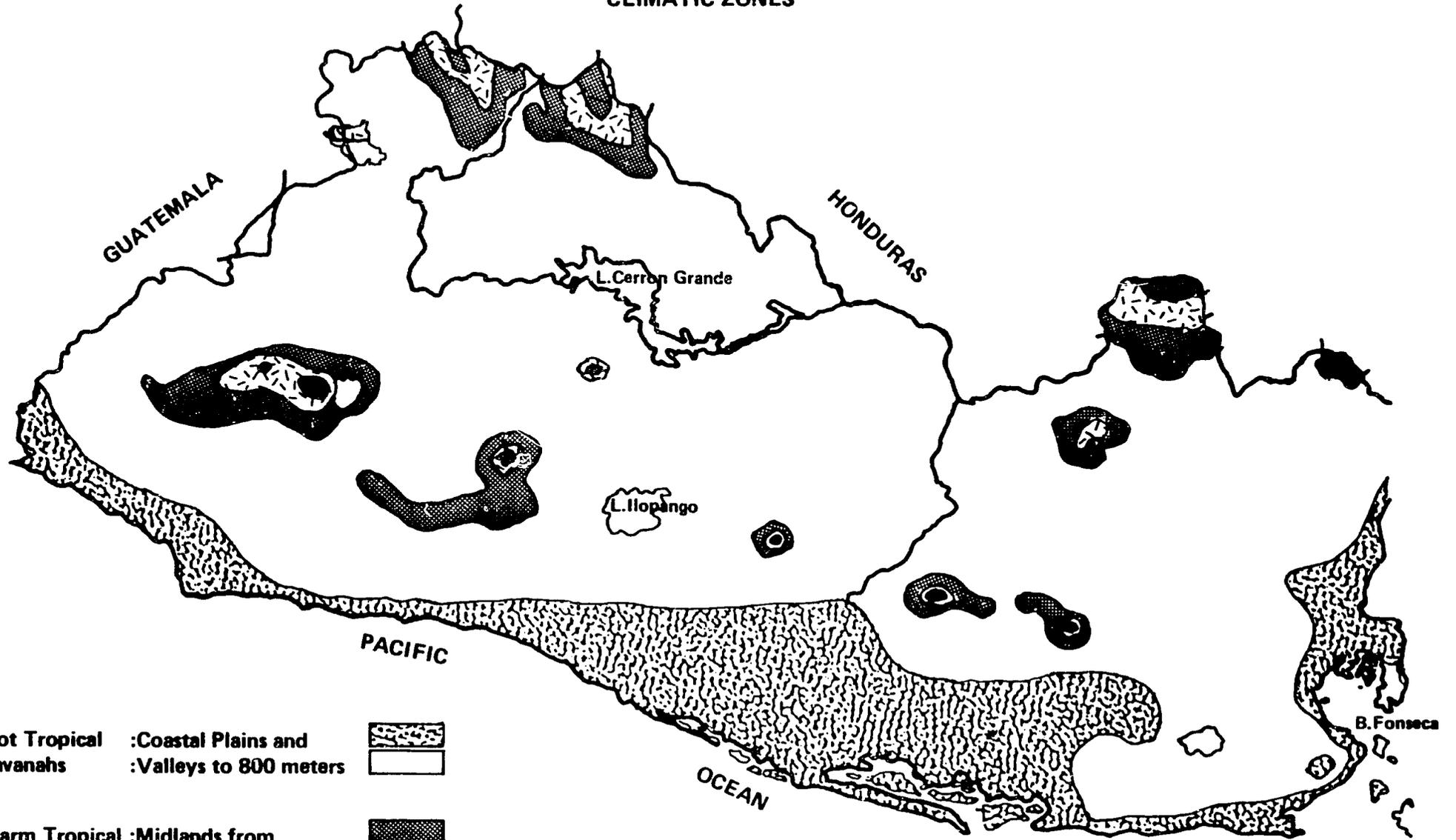
The other major factor in the climate is topography. El Salvador's south side lies along the Pacific Ocean while a central mountain range in Ahuachapan, Santa Ana, Sonsonante and La Libertad separates the coastal plains from the Northern highlands in Chalatenango, Santa Ana and Morazan. The mountain ranges are generally volcanic, steep, and interspersed with valleys. These valleys experience a wide range of climatic conditions within the tropical parameters.

The mountains result in three distinct climatic zones (see Figure I.B.1). The first, "Hot Tropical Savannahs", cover elevations from sea level to 800 meters. This includes all of the coastal plains and the mountain foot hills. This is the zone commonly thought of as the "tropics" with consistently high year-round temperatures and lush vegetation. Interestingly, all but two of the departmental capitals are found within this zone. The average monthly temperature varies from 18° C to 22° C, with the hottest part of the year being right before the rainy season. As elevation increases in El Salvador the temperature drops approximately .60° C every 100 meters. This results in parts of the hot tropical savannahs which are cooler than the coastal plains.

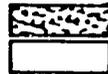
Warm tropical savannahs encompass those areas between 800 and 1,200 meters and consist of the high plains and upper foothill areas. These lands are very similar to hot tropical savannahs except for the gradual change in temperature as elevation is increased. Sometimes polar invasions cause atypically cold nights, occasionally resulting in frosts. These savannahs account for the majority of the land in El Salvador.

Cool tropical highlands are located at elevations in excess of 1,200 meters, up to the highest in El Salvador at 2,730 meters. These highlands are found in northern parts of Santa Ana, Morazan, and Chalatenango and in the central volcanic mountain range in Santa Ana, Ahuachapan, Sonsonate, and La Libertad. The mountain forests, being rapidly depleted, are located here. Frosts are common in these areas in December, January and February, even at low altitudes, caused by cold air passing over the mountain tops and, being heavier than the warm tropical air, cascades down the mountainsides and is collected in the valleys. In the Valley of the Oranges (located in Sonsonate), the surrounding terrain funnels cold air into the valley causing frost at an altitude of only 1,450 meters.

MAP I.B.1
CLIMATIC ZONES



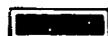
Hot Tropical :Coastal Plains and
Savanahs :Valleys to 800 meters



Warm Tropical :Midlands from
Savanahs :800 to 1800 meters



Cool Tropical :Highlands above



Weather in El Salvador, as is normal for the tropics, is divided into wet and dry seasons. Generally the dry season lasts from November to April and the wet season from May to October. The seasonal characteristics are shown below.

AVERAGE SEASON CHARACTERISTICS

Time of Year	Begins	Ends	Days	Duration Weeks
Dry Season	Nov. 14	April 19	157	22 1/2
Transition	April 20	May 20	31	4 1/2
Wet Season	May 21	Oct. 16	149	21
Transition	Oct. 17	Nov. 13	28	/04

Source: Meteorologic Service, Natural Resources Center, Min. of Agric. & Livestock.

The distribution of rainfall in El Salvador is shown in Figure I.B.2. A cursory glance will show that the quantity of rainfall is directly proportional to the elevation of the land; it follows the topographic map almost exactly.

b. Environmental Impacts of Land Use and Tenure

(1) Land Use

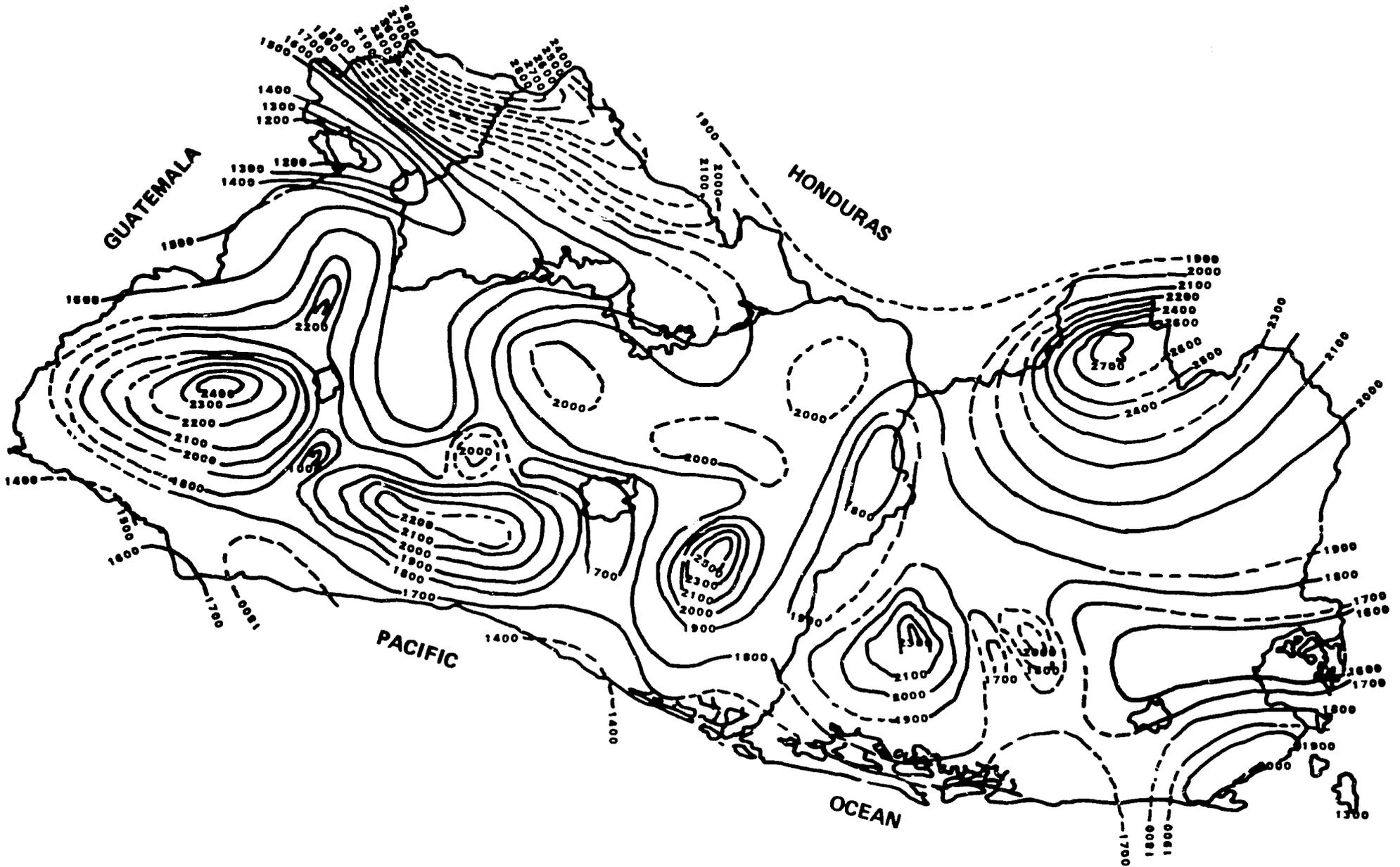
Land in El Salvador is overwhelmingly used for agriculture purposes. The area of land used in agricultural production is shown by crop in the table below. A full explanation of each crop system ecological impact is then presented.

Year	PRODUCTION CROP 1983-1988 (in 1,000s of manzanas)					
	Coffee	Cotton	Sugar	Corn	Beans	Rice
1983/4	248.2	52.5	53.0	345.0	80.5	18.0
1984/5	243.9	53.3	57.0	347.7	82.5	21.9
1985/6	234.2	39.3	59.0	362.1	83.3	24.7
1986/7	234.2	29.6	58.7	368.1	87.1	17.2
1987/8	234.2	19.4	56.6	398.5	89.3	16.7

Food crops in El Salvador consist primarily of corn, beans, and rice. These, plus horticultural crops, make up the diet of the majority of Salvadorans. Export crops consist of coffee, cotton and sugar cane. Coffee is grown on the mountain slopes while cotton and sugar cane require large quantities of relatively level land. For the time period under consideration, land used for corn production has expanded by 16 percent to 398,500 manzanas. Land used for beans has increased by 11 percent to 89,300 manzanas while rice land has decreased from a high of 24,700 manzanas in 1985 to 16,700 mz. in 1987. The expansion of corn and bean land, depending on its location, can have potentially disastrous results. Assuming most food crop farmers have very small holdings, the consequences are deforestation, erosion, fertility loss, and siltation of the reservoirs and rivers. The poorest of the poor, with land least suitable for row crop agriculture, rely on slash and burn land clearing as a way of life. This opens the land to erosion and fertility deterioration.

MAP I.B.2

NORMAL QUANTITIES OF RAIN DURING THE YEAR (in MMS)



Coffee is the most important cash crop in El Salvador generating most of the foreign exchange and ranking second only to corn in cultivation area. Price declines from 1982 to 1984 had the effect of reducing the quality of husbandry provided to the land. The result was not only a reduction of coffee yield but a deterioration in the fertility of the land and increased erosion. Stable world prices eliminated the decline in land devoted to coffee production for the years 1985-88, being the amount of land (234,200 mz.) unchanged for these years.

The amount of land devoted to cotton production in 1987 (194,000 mz.) was only 40 percent of its 1983 level, due to declining world prices. Cotton production requires a high level of skills regarding the appropriate use of pesticides, herbicides and fertilizer. Improper use of these chemicals has damaged fields and forests surrounding the cotton fields, caused serious reduction in wildlife due to chemical poisoning, and has led to the deterioration of water quality in down-stream watersheds.

The amount of land devoted to sugar cane production has remained fairly constant from 1983 to 1987, with 56,600 mz. devoted to its production in 1987. Sugar cane production requires the burning of the crop, while it is still standing, to clear the leaves that sustain the plant. This makes the field accessible for harvest, but creates two negative impacts. First, the burning of thousands of manzanas of cane fields causes much air pollution and second it deprives the soil of the return of the nutrients in the leaves.

Figures for land used in livestock production were not available. Livestock production has two potential negative environmental impacts. One is overgrazing which depletes ground cover and contributes to soil erosion. The other may arise from feed lot production where concentrated animal wastes may make their way into water systems, thereby polluting streams and lakes, and contributing to growth of algae that kills the fish population.

Ocean and brackish water fisheries are not yet responsible for negative environmental impacts. However, two important issues must be identified at this point. First, as ocean fisheries are expanded, the concept of the ocean as a resource that has to be managed in order to maintain desirable levels of production should be instilled in those entering this field. Second, brackish water environments in the form of mangrove swamps are being destroyed at an increasing rate. This not only creates an imbalance in the ecosystem, but can destroy a resource of great potential economic value, should shrimp farming be introduced and developed here.

Regrettably, harvesting of forest products is one area that has shown alarming long-term growth. This activity provides a great potential for sustained benefits. Yet, at the levels that it has been carried out, it is perhaps the most destructive economic activity in the country, being the main contributing factor to serious erosion. Forests are harvested for commercial lumber and firewood as well as used to clear land for food crops. Generally, the first two uses can be managed and trees can be treated as a renewable resource. However, this is not the case when trees are cleared to provide land for food crops. This is only viable where the land's slope is suitable for farming.

(2) Land Tenure

The land tenure system is summarized in Table I.B.1.

TABLE I.B.1
LAND TENURE, 1971

Farm Size	No. of Farms	%	Area in Hectares	%
Under 2 Ha.	191,527	70.1	151,326	10.4
2 to 4.9 Ha.	43,414	9.1	131,984	9.1
5 to 9.9 Ha.	15,598	5.8	110,472	7.6
10 to 49.9 Ha.	16,150	5.9	342,430	23.6
50 to 99.9 Ha.	2,238	.8	154,164	10.6
100 to 500 Ha	1,739	.6	342,878	23.6
More than 500 Ha	202	.07	218,641	15.1
Total	270,868	100.00	1,451,875	100.0

Source: Third Census of Agriculture, 1971. DIGESTYC. Taken from El Salvador Perfil Ambiental Estudio de Campo, EMTECSA de C.V. and USAID 1985.

In 1982, UCA's "Boletín de Ciencias Económicas y Sociales" estimated the average annual income of economically active people in El Salvador to be C2,075 per year. However, 98 percent or 1,116,000 of these people made less than C950 per year. We are reasonably sure that these figures include nearly all of the farmers owning less than 4.9 Ha. of land. These are the people with the least arable land, due to slope or fertility, and yet who must work their land the most intensively without regard to conservation. Herein lies the root of the problem discussed above. The small farmers must stop farming slopes that are susceptible to easy erosion. This means providing them with opportunities to acquire land that is more suitable to cultivation, thereby allowing the land that they now farm to be reforested or returned to its natural state of trees and underbrush to stop erosion.

c. Environmental Problems

The 1988 population of El Salvador is estimated to be approximately 5,000,000. Given that its surface area is only 21,000 square kilometers, people are the major source of environmental problems. The number of people, when combined with the land tenure situation, their need for fuel and food, and the instability brought on by the war, is an environmental disaster in action.

The war has caused steady migration from rural to urban areas at a rate, assumed for the purposes of this study, of 1.5 percent per year since 1984. However, the war is not the only cause. The absence of opportunity for economic or social well being in the countryside has itself been the engine for years of steady migration to the cities of El Salvador as well as other countries.

This migration, rather than relieving the pressure on the land, has concentrated the problems of water supply and sewerage disposal in a number of burgeoning metropolitan areas that do not have the resources to deal with these problems. And while nearly half of the population now lives in the cities, the other half continues to exert tremendous pressure on the land. These environmental problems do not exist independent of each other. Three major problem areas are discussed below.

(1) The Land

A root cause of the Salvadoran environmental problems is deforestation, whether for fuel, lumber, or to clear land for cultivation. The immediate effect of this is the erosion of the topsoil. This is a function of the land's gradient and the care with which it is managed. Given that much of El Salvador's forests are located on gradients of greater than 8 percent slope, the impact is immediate when the first rain falls. Further, in many areas, land use is monocultural which, without proper husbandry techniques, denies it the opportunity for rejuvenation and is conducive to erosion. Finally, soil and land conservation techniques are practically unknown in El Salvador.

The watersheds of the Lempa river and its tributaries are in a state of extreme erosion. It is estimated that 44 percent of the area north and north west of the Cerron Grande dam, an area of 1,200 km², is virtually without protective vegetation. This stripping of the land and subsequent loss of the top soil not only reduces productivity, increasing the cost of production, but also reduces the absorptive capacity of the land, diminishes the subterranean aquifers and silts the rivers and dams.

(2) The Water

The Salvadoran hydrologic system consists of lakes, rivers, lagoons, estuaries, aquifers and the Pacific Ocean. From these the country takes its water for human consumption, agricultural and, industrial use, fish, and hydroelectric power.

The quantity and quality of these waters are diminishing at a rate, that threatens the generating capacity of the country's power system. The heart of the problem is the erosion brought on by deforestation and poor land management. These two factors contribute to the loss of subterranean waters and to the premature aging of the surface water system. Rivers and lakes are slowly but steadily filling with silt, trash, chemical run offs, and sewerage from the cities. These not only fill the lakes and rivers, destroying their capacity as reservoirs, but also contribute to the growth of Jacinto de Agua, a water plant that clogs streams and lakes, depriving the water of light which, in turn, reduces the decomposition of organic matter.

Another source of concern is the expansion of cities. As more land is put under pavement, and as cities grow in size without adequate sewerage systems, the discharge of untreated wastes, the dumping of rubbish and soil into the water system makes the problem even worse. In short, deforestation is the first step in accelerating the movement of the soil into the rivers and lakes; and urbanization augments the problem. The implications are that the working life of the lakes created for power generation are being reduced considerably, water quality is diminishing and the quantity of water available is being reduced.

(3) Pollution

The extent of industrial pollution is still relatively small in El Salvador. This is due to the low level of industrialization in El Salvador and not to any recognition of the need for legal and technical mechanisms to control industrial pollution or to the enforcement of those regulations. However, three serious sources of pollution do exist:

- the burgeoning quantity of human, commercial and industrial wastes that is generated in the cities
- the pollution caused by industrial, gasoline and diesel engine emissions into the atmosphere
- the indiscriminate use of chemicals for agricultural production.

Population growth, economic development and the increase in non-biodegradable disposable products are combining to create one half of a serious ecological problem in El Salvador. The absence of educational programs to create public awareness of environmental concerns, problems and potential solutions, the lack of waste management programs, and governmental indifference constitute the other half of the problem. The result is an increase in sewerage and trash with no management or facilities, no programs for recycling, no short- or long-term planning being done in the area, and no public or political support for corrective measures.

El Salvador provides a market for agricultural chemicals that are either restricted or forbidden in much of the world. Chemical contamination from the indiscriminate use of herbicides, insecticides, rodenticides and fungicides poses a serious health threat to those who must apply them, those who live in surrounding areas, (especially when they are applied from the air) and to those whose water supply is polluted by the chemical run off.

Further, the impact on wildlife cannot be estimated. People are only now becoming aware of the fact that many species of benevolent insects and birds have disappeared from the countryside, and aquatic life is diminishing in streams polluted with chemical poisons. People who use these streams for bathing or drinking water will also suffer ill effects.

Contamination of groundwater is expected as the chemicals are leached into the aquifers. When this occurs, the wells and water systems of villages and towns will become poisoned. Also, as these streams reach the oceans, a serious impact on coastal sea life can be expected.

The problem of vehicular and industrial emissions has been totally ignored. There are currently no emissions standards for autos, buses or industrial sites and today San Salvador suffers from occasional smog. Legislative concern for gaseous and noise emissions is lacking.

2. Population

a. Population Data and Projections

The last population census in El Salvador was conducted in 1971. All demographic work for the past eighteen years has been based on this information. Two reports were used to generate the demographic data on which the ISA is based. The first was the "Anuario Estadístico 1984, Tomo II" produced by the Ministry of Economy. It provides population distribution by department, gender, and urban/rural. It was also the source for much of the data on birth, mortality, and morbidity rates. The second, "Estimaciones y Proyecciones de Población, 1950-2025," produced in 1986, provided population estimates. Growth rates were independently estimated for this assessment by the Consultants in a manner entirely consistent with existing projections.

Rural-urban migration is rooted in rural poverty and accelerated by the war. This mass emigration has led to distortions in the population distribution of El Salvador. Urban centers have grown at a rapid but unmeasured rate. Many have sought refuge in other countries without papers, and have remain unaccounted for. Therefore, the numbers utilized in these estimates are to be viewed in very general terms. San Salvador, for instance, has grown at a pace much greater than the estimates indicate.

The urban/rural data provided by department in the "Anuario Estadístico" is for the years 1980-1984 and is unadjusted for migration. This adjustment was made annually for the National estimates while the estimates by department are not corrected. Nor do the official projections available to ISA Consultants break down population in each department into rural and urban groups. Therefore, the following steps were used in generating the population estimates:

-
- Emigration estimates were distributed proportionately across the urban/rural sub-groups for all departments (there was no basis available for allocating differently).
 - The new urban/rural sub-groups were converted to percentages of the total net population.
 - The percentages were then applied to the population estimates in "Estimaciones y Proyecciones de Poblacion" to generate urban/rural estimates for the years 1980-2000.
 - Rural to urban migration from 1985-1990 was factored in at a cumulative rate of 1.5 percent per year. That is, 1.5 percent of the 1985 rural population was shifted to the urban group; three percent in 1986, etc. This process was carried out through 1990. At that point, the relative populations were assumed to be constant and the proportions for 1990 were used to produce the urban/rural calculations through 2000.
 - The estimate for the year 2010 generated by compounding the rate of change from 1999 to 2000 out to 2010. In the year 2010 a gross adjustment for the migration during that decade was made by moving 10 percent of the rural population to the urban group (while this allocation was somewhat arbitrary, there has been no accurate source since the 1971 census to provide better guidance).

The demographic projections for El Salvador by department and urban/rural location are shown in Appendix I.B.1. Table I.B.2 contains the estimates for the years 1988, 2000 and 2010. The total annual population projections by department are entirely consistent with official projections.

b. Education Levels and Employment Rates

(1) Education Levels

Education in El Salvador experiences the same disruptions as the country does. Having never enjoyed a high priority with the government, it has suffered even more due to the war. With the establishment of free and compulsory primary education in 1968, enrollment expanded slowly to include 79 percent of the elementary-school age population by 1979. Rural areas still lacked facilities, enrolling only 53 percent of their children, while urban areas showed an enrollment in excess of 100 percent. With the advent of the civil war, total enrollment plunged to 61 percent nationwide in 1981. Eight hundred schools were abandoned and 2,000 more were closed. Since 1983 enrollment has risen rapidly. This is due in part to the rural-urban migration, making education facilities available to a greater portion of the population, and to a concomitant expansion in private-sector education facilities.

At this time, the demand for education services exceeds the supply. The following tables show the population of school age people by age group and the number of students enrolled for the corresponding years. A comparison of the total columns provide an immediate picture of the inadequate educational opportunities.

TABLE 1.B.2

POPULATION ESTIMATES
(By department and area)

PROVINCE	1988			2000			2010		
	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL
AHAUACHAPAN	67,792	186,997	254,789	101,041	240,230	341,271	160,247	277,032	437,279
SANTA ANA	217,760	242,865	460,626	310,183	306,790	616,974	436,748	353,796	790,544
SONSONATE	141,534	199,612	341,147	203,283	253,657	456,940	292,974	292,515	585,489
CHALATENANGO	86,811	161,056	247,867	126,237	205,762	332,000	188,120	237,280	425,400
LA LIBERTAD	167,815	244,247	412,063	241,334	310,593	551,928	349,033	358,165	707,198
SAN SALVADOR	861,868	164,368	1,026,237	1,195,645	178,922	1,374,567	1,554,935	206,333	1,761,268
CUSCATLAN	70,593	138,644	209,238	102,962	177,296	280,258	154,639	204,463	359,102
LA PAZ	93,177	168,135	261,312	135,303	214,704	350,008	199,086	231,388	430,474
CABANAS	43,259	143,522	186,782	65,448	184,732	250,180	107,526	213,036	320,562
SAN VICENTE	71,399	136,430	207,830	103,985	174,387	278,373	155,770	201,096	356,866
USulután	139,598	271,699	411,298	203,508	347,394	550,903	305,273	400,613	705,886
SAN MIGUEL	175,283	276,525	451,808	252,933	352,230	605,163	369,227	406,186	775,413
MORAZAN	53,469	149,189	202,658	79,760	191,684	271,445	126,746	221,045	347,791
LA UNION	90,693	234,298	324,992	134,534	300,767	435,302	210,901	346,804	557,705
TOTAL	2,281,058	2,717,594	4,998,653	3,256,164	3,439,155	6,695,319	4,611,225	3,949,752	8,560,977

**El Salvador
School Age Population
(in thousands)**

Ages Year	Total				
	(5-24)	5-6	7-15	16-18	19-24
1983	2,276	300	1,178	316	482
1984	2,308	305	1,198	322	488
1985	2,346	307	1,218	329	491
1896	2,391	308	1,240	337	506
1987	2,441	308	1,261	345	526
1988	2,493	307	1,282	354	549

**Number of Students
1983-1987**

Year	Total	Pre . %		Grade . %		Second . %		Univer- sities %	
		School		School		School			
1983	1,103	61.3	20.4	852.5	72.4	82.6	26.1	64.4	13.4
1984	1,157	61.8	20.3	884.1	73.8	85.9	26.6	74.1	10.1
1985	1,319	63.2	20.5	940.9	77.2	90.3	27.4	93.9	19.1
1986	1,419	72.4	23.5	993.8	80.2	90.9	27.1	91.3	18.1
1987	1,438	69.1	22.4	1,013.0	80.3	99.3	26.7	92.5	17.6

Source: Ministerio de Educacion, Direccion General de Administracion (DIIE), Memoria de Labores 1986-1987, San Salvador, 1987.

From the above tables it is evident that a large number of school age children are enrolled in school. However, the different data sources and reporting systems make comparisons difficult.

On a rural/urban basis, information was only available for 1987 and 1988. The indications were that only 10.5 percent of enrolled grade school children were from rural areas. Long-run implications encompass continued high levels of illiteracy in the countryside, limited skill development and resulting social problems.

The Ministry of Planning estimates illiteracy at 25 percent of the economically active population. As would be expected, the rural population has the highest rate with 38 percent being illiterate; 43 percent, of the farm workers are illiterate. The economically inactive population is estimated to be 43 percent illiterate, with 43 percent of the homemakers not being able to read or write. Rural homemakers suffer an illiteracy rate of 52 percent.

(2) Employment Rates

In 1986, MIPLAN conducted a household labor force survey in the San Salvador metropolitan area. A national survey of the same type was conducted the following year. The survey results were analyzed by Peter Gregory of the University of New Mexico. Two of Mr. Gregory's reports are the source for all of the estimates of

employment, occupation distribution and literacy levels discussed below. They are the "Analysis of El Salvador's Household Employment Survey, Final Report", April 13, 1988, and the "Analysis of El Salvador's Household Employment Survey of 1986".

The reports were couched in terms of percent of the labor force of El Salvador without giving the survey population. Therefore, only percentage indicators are presented below.

The table below shows the employment status of El Salvador's labor force by sex, age and rural or urban location. The overall unemployment rate is estimated at 16.6 percent. However, as of June, 1989, urban unemployment was estimated at 9.3 percent.

Unemployment Rates by Sex, Age, and Residence
(percent)

Age Groups	MEN			WOMEN		
	Urban	Rural	Total	Urban	Rural	Total
14-19	37.0	17.1	24.2	43.3	47.0	45.0
20-24	20.8	13.4	17.0	35.3	37.9	36.1
25-55	8.9	8.3	8.6	15.7	22.0	17.6
TOTAL	13.4	10.8	12.1	21.8	28.8	24.1

The table shows that older workers have had the opportunity to develop skills and work habits needed in the labor market and enjoy the highest rate of employment. The significantly lower rate of unemployment for rural youths possibly reflects the use of child labor in agricultural work. There is, therefore, greater need of employment opportunities for workers of this age. Note that rural unemployment for mature males is lower than for their urban counterparts. This may be due to the extreme rural-urban migration brought on by the war. Apparently, greater employment opportunities for women as office and sales clerks is matched by the opportunities for women to work as farm laborers, yielding roughly equivalent levels of unemployment in the first two age groups. Then, however, the greater employment opportunities in the urban centers is asserted in the 25-55 age bracket where rural women experience a 25 percent higher rate of unemployment.

While the scope of work for this project called for background information on the distribution of occupations among population groups, the information was not available in this format. Therefore two indirect indications of occupations and skills are used. First, the table below shows the percent of the labor force with experience in each sector of the economy. This shows the sectors in which people have found work and can be taken as a general indicator of the occupational skills possessed by the labor force by area.

**Distribution of the Experienced Labor Force
(by Sector of Employment)**

SECTOR	MEN			WOMEN			GRAND TOTAL%
	Urban%	Rural%	Total%	Urban%	Rural%	Total%	
Agriculture	14.1	73.4	45.2	2.6	34.9	13.0	33.6
Mining	0.2	*	0.1	0.0	0.0	0.0	0.1
Industry	22.4	7.9	14.8	22.3	17.0	20.6	16.9
Electricity	1.1	0.5	0.8	0.1	*	0.1	0.5
Construction	8.8	4.1	6.3	0.5	0.2	0.4	4.2
Commerce	14.4	3.4	8.6	37.0	22.5	32.3	17.2
Transport/ Communication	8.4	2.5	5.3	0.4	0.1	0.3	3.5
Finances	3.7	0.8	2.2	3.5	0.2	2.5	2.3
Services	26.9	7.3	16.6	33.5	24.9	30.8	21.7
TOTAL	100.0	99.0	99.0	99.0	99.8	100.0	100.0

NB : * less than .01%

Source : Analysis of El Salvador's Household Employment Survey, 1988 prepared by Peter Gregory for USAID/San Salvador

This table shows a labor force with experience commensurate with those of other countries at a similar stage of development. Agriculture has provided more people with work experience than any other sector.

The second indirect indicator of the distribution of occupations by the rural/urban dichotomy is the distribution of labor force by occupational group and gender, shown in the table below. Because of the severely skewed distribution of education and employment opportunities toward the urban sector, one cannot extrapolate the information in this table to rural/urban estimates.

**Distribution of Labor Force by
Occupational Group (percent), 1986**

Occupational Group	Men	Women	Total
Professional/Technical	5.5	6.8	6.0
Public Sector Management	0.3	*	0.2
Administration/ Clerical	5.0	7.1	5.8
Sales	7.9	30.5	16.0
Service	5.2	22.9	11.6
Agricultural Workers	44.8	13.0	33.3
Non-Agricultural Workers	30.9	19.3	26.7
Inadequately Specified	0.4	0.4	0.4
TOTALS	100.0	100.0	100.0

NB: * less than .01%.

Two aspects of this Table are:

- 1) While 21.7 percent of the labor force has experience in the service sector only 11.6 percent is currently employed in it.

2) An important group that was apparently omitted from the survey was "private sector management".

c. National Policies

As indicated in the Terms of Reference the public health situation is presented in Volume III - Water Supply, while health policy is covered here.

The proposed GOES health and population policy objectives for 1989-1994 are summarized below:

- Develop programs aimed at high risk groups, emphasizing prevention activities, and promoting health education.
- Improve the response capability of all three levels of the health care system with emphasis on the impoverished population.
- Implement measures to strengthen the Ministry of Health and Social Services.
- Support the regional health activities and initiate an "Integrated Health System".
- Initiate staffing adjustments to priority areas and improve incentives to professionals.
- Rationalize the use of financial resources.
- Rationalize the purchase, storage, maintenance and use of the available material resources.
- Provide overall coordination of health care activities
- Coordinate with other social agencies to develop and implement a national population strategy.
- Cooperate with external agencies to incorporate their services in support of national health objectives.

3. Macroeconomic Aspects

a. The Salvadoran Economy Today

Today's Salvadoran economy condition results from the widespread crisis this country has been suffering since 1980. To understand today's economic situation, it is necessary to analyze economic indicators in the context of the political, military and social problems which have had a marked influence on the economic development of the country. We have taken into account natural disasters, displaced persons, the war and its effects in the preparation of this report. These factors will frequently emerge as explanations for various economic indicators in this document.

However, El Salvador's poor economic performance can partially be traced to policy factors such as:

- negative interest rates
- overvalued exchange rate
- trade tariff and non-tariff barriers
- price controls in the public and private sectors

The government has announced drastic policy changes which follow guidelines preferred by institutions such as the IMF, IBRD and USAID. Provided a social fabric of society can be preserved through the accompanying Emergency Social Program, these new policies should lead to a continued improvement in the economic performance of the country. The objective of this section is primarily to explain the development of key macroeconomic indicators. It also reviews the role that the Government has played in the development of the Salvadoran economy over the last five years. Conclusions are drawn as to the future performance of the economy and of the government in the infrastructure sector. A statistical description of the economy may be found in Appendix I.B.2.

(1) Recent Trends

Table I.B.3 presents the major developments and key macroeconomic indicators during the 1980s. These indicators are classified in three groups with major emphasis placed on the infrastructure sector.

As shown in the table, the GDP decreased by fourteen percent in real terms since 1979. In other words, El Salvador was substantially impoverished during the last decade. Taking into account that a large part of expenditures, whether public or private, have been devoted to security, standards of living may have declined by as much as one half during this period. The decreasing trend in real GDP has reversed since 1984 and GDP per capita is now stationary (from 626 Colones/capita at 1962 prices in 1984 to 621 Colones/capita in 1988).

What has occurred in the economy is reflected in the public sector. Revenue and expenditures have decreased since 1980 and government expenditures per capita are currently around 60 percent of what they were in 1980. Hardest hit, of course, are capital expenditures which today stand at 30 percent of what they were in 1980. Note that a large part of the reduction in the government deficit, one percent of GDP for 1988, is due to the parallel increase in foreign grants (mostly US) and to a drastic decrease in public investment.

GOES will not be able to return to its pre-war expenditure level for quite some time. In other words, it is clear that the government's ability to finance the necessary upkeep and development of infrastructure will remain severely limited in the coming decade. Sectors where the collection of user fees is difficult, namely water and road transport will be affected the most.

Trade figures point to the Salvadoran foreign aid dependence. Official grants, mostly of US origin, account for between five to ten percent of GDP.

The above indicators clearly show that development and upkeep of the infrastructure in El Salvador is utterly dependent upon foreign financing. In the coming years, the pace of expansion and rehabilitation of infrastructure will be dictated by the willingness of multinational and bilateral donors to subscribe to it. Until the trend in GDP/capita is reversed for a significant period of time, donor agencies will need to include maintenance components in their infrastructure development programs to ensure the preservation of invested capital.

TABLE 1.B.3

MACROECONOMIC INDICATORS
(in 1962 Colones)

	UNITS	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
DOMESTIC PRODUCT											
Gross Domestic Product	millions	3,602	3,289	3,017	2,848	2,870	2,936	2,994	3,013	3,094	3,108
Population	thousands	4,409	4,525	4,583	4,625	4,663	4,688	4,736	4,814	4,902	4,999
Gross Domestic Product/Capita	Colones/Capita	817	727	658	616	616	626	632	626	631	622
GOVERNMENT BUDGET											
Government Revenue	millions		731	873	966	966	907	781	764	772	658
Government Expenditures	millions		1,069	1,231	1,138	1,138	957	818	790	793	724
Government Expenditure/Capita	Colones/Capita		236	269	244	244	204	173	164	162	145
Government Deficit (% GDP)	%		10	12	6	6	2	1	1	1	2
TRADE AND DEBT											
Current Account (w/o AID)	millions						<230>	<264>	<107>	<239>	<191>
Official Grants	millions		32	17	116	166	177	207	224	379	285
External Debt	millions		1,176	1,471	1,710	1,890	1,950	1,930	1,964	1,967	1,736

NB : 1988 Current Account includes all non US grant.
1988 official grants US Assistance only

Source : Banco Central De Reserva of El Salvador, prepared by ISA Consultants

(2) The Economy in 1988

Table I.B.4 on the following page compares all the major macroeconomic indicators for 1987 and 1988. Further analysis of each indicator is described below.

(a) GDP

In 1988, the Gross Domestic Product grew to 27,200 million colones, a real growth of 0.5 percent, a decline from the 2.7 percent growth of the previous year. The main reasons for the decrease are a decline in export production and public sector construction.

Total export of goods and services declined by 4.7 percent. This decline is mostly due to the decrease in volume of coffee and cotton exports, although its negative effect is somewhat compensated by the increase in other exported goods.

Agricultural and livestock production dropped 3.8 percent largely due to the decline in the following:

- coffee -18.7%
- cotton - 9.6%
- Sugar Cane - 1.6%

Coffee production was affected by a drought in 1987-88, by strong winds, and by inadequate attention to crops and harvest. Cotton and sugar cane production declined due to a reduction in planted areas. Sugar cane yields fell due to the lack of rain. Basic grain production, on the other hand, increased by 22.6 percent in comparison to a decline of 0.5 percent in 1987. They were affected by neither rains nor floods, as crops had already been harvested.

Construction was up in 1987 by 11.5 percent, but dropped 8.4 percent in 1988, due mainly to the decrease in public construction. Central Government delays in awarding and executing projects caused a drop in public investment. Delays were also due, in part, to difficulties in the supply of materials, changes in resource allocation, project deficiencies, and failure on the part of contractors to fulfill their obligations. As a result, public investment decreased 15.9 percent.

(b) Inflation

The rate of inflation declined from 24 percent in 1987 to 19.8 percent. The major factors determining the slowing of inflation were:

- clothing and housing prices
- internal demand constraints and
- better supply of staple goods.

(c) Income

In 1988, the gross domestic product per capita was C5,406. In real terms, it has remained stationary for the last five years.

TABLE I.B.4
CHANGES IN MACROECONOMIC INDICATORS
(1987-88)

Indicators -----	1987	1988
GDP growth	2.7%	0.5%
Inflation rate	24.9%	19.8%
Money supply	7.6%	11.7%
Credit/invest. Through banking system	8.4%	11.8%
Credit/invest. Through bcr	12.4%	12.7%
Net international reserves	\$ 51 m	<64> m
Balance of trade	\$ <403> m	\$ <417> m
External debt/gdp	41.9%	30.6%
Total govt revenue/gdp	24.6%	21.2%
Total govt expenditure/gdp	26.1%	23.3%
Govt/global deficit (incl assist.)Gdp	1.0%	1.5%
Medium & long term external debt (million colones)	1967.2	1735.9
Change in external debt	-19.8%	-11.8%

NB: Table based on data from the Central Reserve Bank, El Salvador.

The real minimum wage in the agricultural and livestock sector has declined in the last five years according to the following breakdown:

- general rates	28.8%
- coffee crop harvest rates and	57.7%
- industry, trade and service rates	39.2%

Available income distributions indicators point to a slight decrease in inequality since 1985; but the situation remains worse than in 1977.

According to the Ministry of Planning 1985-1988 Multi-Purpose Household Survey for San Salvador, 40 percent of the 1985 population with the lowest income received 12.4 percent of income. This is increased to 17.3 percent in 1988; in 1987, the figure was 18.1 percent. The 40 percent of the population in the middle income stratum received 36.3 percent of income in 1985 and 39.7 percent in 1988. In 1985, the 20 percent of the population in the highest stratum received 51.3 percent of income and 43 percent in 1988. In 1977, this figure was 41.7 percent.

Please note that the situation of the extremely impoverished is very difficult. The 1988 figures indicate that 10 percent of San Salvador lives in condition of extreme poverty and receives only around 1.5 percent of total income.

(d) Central Government - Fiscal Results

Central Government revenues have not kept up with inflation. In 1988, revenues were C 2,918 million, an increase of 167 million over 1987. This was due mainly to increases in the sale of fiscal stamps and income tax totalling C 750 million and 600 million respectively.

Tax on coffee reached C 454 million, 22 million more than the previous year. Note that the tax rate was reduced to 9.8 percent in 1988 from 10.9 percent in 1987.

Capital income, which is mostly made up of transfers from abroad, was C 418 million less than in 1987. These funds were assigned to such programs as agrarian reform, economic reactivation, and infrastructure maintenance.

As in the case of revenue, government expenditure has not kept up with inflation. Current expenditures were C 3,105 million, C 343 million more than in 1987. These include consumption expenditure and transfers to private and public enterprises. Finance charges were similar to those in 1986 and 1987. Capital expenditures were C 520 million, C 183 million lower than the previous year, due to delays in execution of several investment projects.

The loans granted amounted to C 131 million, which is similar to 1987. There was a shift in orientation as a greater proportion was assigned to the private sector through subsidiary loan agreements with the BCR. Resources provided by European countries were used to open credit for small rural businesses, lower housing construction and informal sectors.

In 1988, the current deficit was C 187 million and the global deficit C 419 million. This represents 1.5 percent of the GDP or 3.1 percent when excluding foreign grants. Deficit financing came mainly from the external sector and amounted to C 247 million. Debts to banks dropped by C 92 million due to debt redemption at maturity. The governments financial position also improved through an increase in deposits.

(e) Other Public Sector Organizations

In 1988, the income of public enterprises increased to C 2,816 million, up C 146 million from 1987. Although this was mainly due to tariff adjustments during the last quarter of 1987, these were not enough to compensate for inflation. Current expenditure was mainly spent on community, social and economic services, as well as increased operating costs due to the damage caused by guerrilla groups. In 1988 current expenditure reached C2,343 million, C106 million higher than 1987. In 1988, this resulted in a net saving of C 473 million. Capital income of autonomous official institutions was due to transfers from the Central Government, reaching C 125 million. This is lower than the previous year because of the reduced level of implementation of investment projects financed by the above resources. Capital expenditures were mostly directed toward energy, potable water supply, expansion of water and sewerage systems, telecommunication services, and rehabilitation of damaged infrastructure caused by the 1986 earthquake.

In 1988, capital expenditure reached C 296 million which is lower than in 1987. However, less funds were used to purchase existing assets, so that real investment increased in 1988.

Loans, mostly financial assistance to the private sector, reached C 486 million, or an increase of C 107 million, which was adequate for financial institutions and credit activities.

The financial results of the rest of the public sector showed a deficit of C 184 million, and was greater than in 1987. It was financed with internal resources.

(f) Consolidated Public Sector

The consolidated income of the public sector reached C 5,756 million. Expenditures were placed at C 6,340 million, a deficit of C 584 million, financed by internal resources. Taxation provided the main source of income, representing 50.5 percent, along with social security contributions, the sale of goods and services by public enterprises and private sector loan recoveries.

Current expenditures, made up of salaries of civil service personnel and the procurement of goods and services for public activities, reached C 5,019 million. Capital expenditures were C 724 million, C 612 million of which were real investment.

(g) Money Supply

Up to December 31, 1988, money supply (capital resources and quasi money) had a balance of C 8,586.2 million, C 900.8 million more than in 1987. This is equivalent to an increase of 11.7 percent, higher than the 7.6 percent increase posted in the previous year.

Money in circulation (cash in public hands and demand deposits) showed a balance of C 3,033.1 million on December 31, 1988, C 220.8 million higher than the balance on December 31, 1987, representing an increase of 7.9 percent at December 31, 1988. Of this, 43.7 percent was cash resources in public hands and 56.3 percent demand deposits, a growth of 2.2 percent and 12.7 percent respectively in 1988.

Other deposits of the Private Sector (savings, fixed-term deposits, and hard currency, which constitute the definition of quasi money) reported a balance as of December 31, 1988 of C 680 million, higher than in 1987, equivalent to an increase of 13.9 percent. This was the main cause of the expansion in the money supply. Fixed-term deposits increased by C 210.2 million (19.2 percent); hard currency deposits increased by C21 million during the period.

(h) Bank Credit Situation

In 1988, the banking systems credit and investment portfolio reported a balance of C 10,463.6 million, C 1,099.8 million higher than the 1987 balance. This is equivalent to an 11.8 percent increase. Of this increase, 81 percent was loaned to the private sector, equivalent to C 891 million. The Central Government and the Official Autonomous Institutions received C 122.4 million and C86.4 million respectively.

Note that the drop in international reserves, the overvalued exchange rate and undervalued interest rates combines to affect liquidity seriously, and that many approved credits were not disbursed.

(i) Credit Granted by the Central Bank (BCR)

On December 31, 1988, the credit and investment portfolio of the BCR reached a balance of C 5,201.5 million, an amount greater by C 587.2 million than the 1987 balance, representing an annual increase of 12.7 percent.

The increase in funds loaned by the BCR was distributed as follows: C 163.5 million to Commercial Banks and the Banco Hipotecario, C 201.1 million to Official Credit Institutions, C 35.9 million to the Official Autonomous Institutions, C 214.3 million to the Central Government. Funds to Private Financial Institutions, decreased by C27.5 million.

Increases in credit to the banking system were mainly for coffee financing (C 75.1 million), sugar cane (C 4.4 million) and pre-exports and exports (C 51.0 million).

Long-term credit lines, mainly those for agriculture, livestock, and industrial activities, increased by C 102.5 million. The sources of this growth were: Foreign assistance (C 69.2 million) and Economic Development Fund resources (C 33.3 million). Loans to the Instituto Nacional del Cafe (INCAFE) of C 206.3 million for advances to coffee growers was a major item for official financial institutions.

(j) Foreign Exchange Situation

During 1988 there was an imbalance between foreign exchange earnings and expenditures. This was due to losses incurred in coffee and cotton exports and a decline in hard currency transfers. The most significant expenditures included: travel expenses, interest payments, dividends, loan amortization, and the import of intermediary and final goods.

The average exchange rate in the unofficial market for purchases during 1988 was C5.33/\$1 and C5.42/\$1 for sales. The official rate of exchange was stable at C5/\$1.

(k) Foreign Debt

Foreign debt reached C 1,906.6 million at the end of 1988, a very small reduction from 1987. The debt service/goods and services exports ratio was reduced from 41.9 percent in 1987 to 30.6 percent in 1988.

(l) International Financial Assistance

The following foreign assistance transactions took place in 1988:

- The Central American Monetary Stabilization Fund (FOCEM), granted a long-term credit of \$39 million as Balance of Payments Support.

-
- The Camara de Compensacion Centroamericana (CCC)
Credit granted by El Salvador C 24,031.4 million
Credit received by El Salvador C 981.8 million
 - The Central American Bank of Economic Integration (CABEI) granted six loans for a total of \$29.6 million, equivalent to C148.2 million. Total accumulated loans reached C356.6 million, of which 84 percent were for the Public Sector and 16 percent for the Private Sector.
 - Reciprocal Compensation and Credit Agreement, Panama - El Salvador.
El Salvador received a net credit of \$278,000.
 - Bilateral Agreement, Dominican Republic - El Salvador
Credit granted by El Salvador C 710.3 thousand
Credit granted by Dominican Rep. C 2.6 thousand
(Reflecting one-way trade)
 - Financial Agreement with Mexico
 - Trade Credit
Credit granted by El Salvador C 892.7 thousand
Credit granted by Mexico C 33.8 million
 - Credit Facility Agreement derived from the Central American and Caribbean Agreement on Energy Cooperation. Mexico granted \$6.5 million, equivalent to 20 percent of petroleum charges, with a total balance of \$24.3 million.
 - Trade Agreement, Colombia - El Salvador
Credit granted by El Salvador C 0.25 million
Credit received by El Salvador C 5.4 million
 - Investment Fund, Venezuela
In 1988, El Salvador's balance was \$13.4 million
 - Export Financing Fund, Venezuela reported a balance of \$2.2 million.
 - Financial Agreement, Argentina - El Salvador
The balance on December 31, 1988 was \$6.7 million
 - International Monetary Fund (IMF)
The IMF did not grant credits but amortized credits for previous years for a total of \$10.5 million. The contingency credit was cancelled and the fiduciary credit was reduced to a balance of \$10.7 million.
 - Inter-American Development Bank (IDB)
The BCR is managing the support funds for the private sector, having used \$8.7 million in 1988. It also granted \$21.7 million to the Public Sector.
 - International Bank for Reconstruction and Development (IBRD) and its affiliates. In 1988 IBRD granted \$3.4 million for education programs while \$6.96 million of previous IBRD and \$299,000 of IDA loans were amortized.

- **Agency for International Development (AID)**
In 1988, AID granted \$244 million to solve Balance of Payment problems. The resources generated in local currency were used for economic and social development projects. Financial assistance to the Private Sector from these funds amounted to \$155.0 million, administered by the BCR through various credit lines. Loans amounted to \$55 million, of which \$34.5 million went to finance public sector investments: agricultural product procurement (PL 480), restoration of public services, support for the reformed agricultural sector, and strengthening of health services. The rest went to support the private sector.
- **Foreign Commercial Banks**
Commercial banks and the Hipotecario Bank contracted with the international banking system for short-term credit lines totalling \$101.4 million.

(3) Analysis of the Public sector

In addition to the review of the 1988 fiscal situation in the first part of this chapter, we examine in depth the public deficit during the last five years and the capacity of the Government Sector to carry out the public investment projects the country will require in the coming years.

During the 1980s, the fiscal deficit before outside assistance has been high and recurrent, both globally and for the Central Government. During the last years, the global deficit averaged C 313 million, representing 2.1 percent of the GDP. One of the reasons the deficit did not increase were the constraints on capital costs.

Public sector income and expenses have increased less than GDP during the 1980s. For the 1983/88 period, they only increased an annual average rate of 2.5 percent for the Central Government and 2.3 percent for the Consolidated Public Sector, way below inflation. Average inflation was 20.7 percent annually.

Revenue increased very little during the period, as did current revenues and specially tax revenue, largely due to the present socio-political situation. During the 1983-1988 period, fiscal revenue in current colones increased by an average of 14.4 percent per year, while GDP increased 20.3 percent per year. Public Sector revenues dropped from 33.7 percent of the GDP in 1983 to 21.3 percent in 1988.

Current public sector revenue increased only 12.9 percent, and for the Central Government only 17.5 percent, or less than GDP. Tax revenues increased 19.4 percent during the period and non-tax revenues only 7.1 percent. Capital revenue dropped from 1983 to 1985 and increased nominally only from 1985 to 1988. The income from public services has not increased as tariffs have not been updated.

Fiscal expenditures have tended to increase less than GDP and inflation. Total expenditures have increased during the 1983-1988 period at an annual average of 11.6 percent; and Central Government expenditures at an average of 12.3 percent. The lower increase in expenditures as compared to revenue has contributed to a reduced deficit.

Current public and capital expenditures increased due to: inflation, increased defense and security expenses, debt service, internal transfers (due to lack of public enterprise tariff updating), and maintenance repairs of sabotage damage.

Capital expenditures during 1983-88 dropped 2.3 percent per year for the consolidated sector and increased 2.5 percent for the Central Government at current prices. Public sector capital expenditures/GDP dropped from 12.4 percent in 1983 to 2.6 percent in 1988. It dropped for the Central Government from 6.7 percent to 1.9 percent.

The lower fiscal deficit has been achieved through reduced public investment. This is unsatisfactory. Some social programs have also been reduced, and there has been a tendency to increase current transfers. There have been some delays in the arrival of external funds for project financing.

The fiscal deficit has been financed mostly from external sources with some internal financing. External financing increased to C 309 million annually over the 1983-88 period, while internal financing was only C 7 million annually. The Central Government received C 265 million in external financing and internally financed C 60 million for projects.

Financing the deficit from external sources has the principal advantage of reducing inflationary pressure generated by internal financing. However, it has the disadvantage of increasing external dependence.

The tendency to rely on external financing has been magnified by the war situation, thereby critically reducing the Government's financial capacity to execute investment projects. The capacity to take on commercial foreign loans has also been restricted.

We conclude that any investment project must rely on external financing which should be appropriate to the country's circumstances, in terms of amortization, interest rates, and general terms and conditions.

b. Scenario for Economic Analysis

(1) Economic Trends

The scenario adopted in the economic analysis of the infrastructure sector projects is based upon AID's June 1989 Country Development Strategy Statement for Fiscal Years 1990-1994. This scenario considers the following:

- a gradual abatement in the level of conflict beginning in the second half of this period, making it possible once again to attract more foreign investment and stem capital flight
- USAID's continual assistance
- an enhanced role of the GOES, the private sector, the World Bank and other institutions as economic policy adjustments are implemented, allowing for a gradual reduction in USAID's contribution.

The specific policy changes expected are:

- higher real interest rates, rising to and increasing over the inflation rate
- elimination of overvalued exchange rate, making possible the reduction of import barriers
- price liberalization and utility rate adjustments
- government revenue enhancement and greater expenditure controls, thus reducing the public sector deficit
- better public sector and financial institution management
- reduced impediments to private sector investment.

As a result, by 1994, it is expected that there will be improved performance in the economy, most notably improvement of the coffee sector, and a growing participation of non-traditional exports.

Real Gross Domestic Product (GDP) is expected to grow four to five per cent annually, compared to the present rate of about one percent. The ISA assumes a constant growth rate of 4.5 percent per year beginning in calendar 1993 through 2010. Until then, while the adjustments take place, this study assumes that growth will continue at one percent per year.

There is a need for the Mission to further review this and alternative scenarios, in the light of the recent intensification of the conflict. Certainly one would expect that the rate of investment would not achieve the anticipated levels due to added risks. A revised scenario could possibly result in the rescheduling of some of the investments proposed in this study.

The Mission recognizes this as an ambitious scenario that will initially have a negative impact upon the urban poor and rural landless, aggravating their current difficulties. Thus, USAID projects seek to ease these adjustment shocks by reaching these groups through employment generation and direct assistance.

The ISA helps support this concern by measuring, wherever possible, the social impact of the projects considered for evaluation and by focusing on labor intensive design standards and implementation methods wherever possible.

(2) Shadow Prices

Efficient resource allocation requires the knowledge of the true costs of these resources. In El Salvador, as in most other countries, market prices (i.e. prices currently paid in the market) do not reflect the costs to the economy for the following reason :

- All prices include a tax/subsidy component. These are not a cost to the economy but transfers.
- The Colon is currently overvalued thereby making imports cheaper than their true costs and by making exports more expensive. See USAID's "El Salvador's Foreign Exchange Rate System: Problems, Alternatives and Recommendations", by Loehr, Protasi and Vogel for a more definitive expose on the subject.
- The existence of persistent unemployment indicates market wages are higher than the true cost of labor. Since unemployment primarily affects young unskilled labor, the distortion only applies to the latter category.

(a) Price Distortions

This section attempts to estimate the impact of price distortions on the costs of resources for those items that are relevant to the infrastructure sector. It should be emphasized that this exercise could justify a study in itself; what is presented here is only an approximation that is sufficient for the purpose of this study.

Infrastructure costs can be conveniently divided into equipment, materials, labor and mark-up.

Equipment includes operating costs of heavy equipment, trucks, asphalt plants, telephone exchanges, etc. All of them belong to the tradeable goods category, meaning that they can easily be imported, or could have been imported at user's discretion, if tariff or non-tariff barriers had not been in place.

Materials include gravel, sand, cement, steel, cables and wires, etc. Some are tradeable (asphalt, steel, cement, cables) others are nontradeable (gravel, sand).

Labor includes unskilled and skilled labor, the latter being further subdivided into local and foreign.

Mark-up costs include administrative costs, supervision and profits. The latter is included because it represents the risk-adjusted cost (or return) of an entrepreneur's immobilized capital.

Sections d) through g) present the conversion coefficients for the above categories. These conversion coefficients will be applied to market prices in order to calculate the shadow costs used in economic evaluation.

(b) Taxes and Subsidies

Taxes and subsidies are not uniformly paid in El Salvador, so it is very difficult to define accurately their impact. Moreover this study aggregates items which are subject to very different tax regimes.

German technical assistance (GTZ) to MIPLAN recently produced a "National Parameters" study ("Estudio sobre la Estimacion de los Parametros Nacionales en El Salvador", by GITEC). This study calculates conversion factors to adjust for taxation by applying the following formula:

$$SCF = \frac{\text{Border Price}}{\text{Market Price}}$$

A product with a Standard Conversion factor (SCF) under 1 has a real cost to the economy lower than what the market price indicates. This is true for all heavily-taxed imports and unskilled labor.

The analysis also accounted for import restrictions which are still applied in El Salvador, and which tend to lower the SCF. The following SCFs are used in this study:

ITEM	SCF
Capital Goods	0.85
Fuel (Gasoline and Diesel)	0.63
Other	0.93

(c) Exchange Rate

Both studies in this section reach the conclusion that even the black market rate of the Colon is overvalued in El Salvador.

The GTZ study has calculated a shadow rate of exchange (SRE). The USAID study estimated a Real Effective Exchange Rate Index (REER) is:

YEAR	1983	1984	1985	1986	1987	1988
SRE	2.64	2.88	2.80	4.85	5.88	6.18
REER	2.80	2.93	2.95	5.57	6.51	7.78

Both series are based on a comparative analysis of inflation in El Salvador, vis-a-vis its trading partners. The difference between the series lies in the year at which the authors assume the official exchange rate was real. GTZ analysts used 1980 while USAID used 1982 as a base year.

The first assumption can be supported by the fact that "massive grants" from AID only started in 1982 (see Table I.B.3). However, terms of trade were deteriorating from long before in El Salvador. This study will use a shadow rate of exchange of 7.8C/1\$ for December, 1988.

(d) Wages

The methodology used to calculate the shadow wage is complicated and subject to interpretation. Particularly, the estimation of the un- and sub-employment magnitude and impact is difficult to determine.

GTZ results propose a shadow wage coefficient of 0.57 in rural areas and 0.64 in urban areas, based on an unemployment estimate of 17 percent. This is deemed too low for this study since average urban unemployment is now less than 10 percent. A figure of 0.85 for unskilled labor will be used in the ISA.

According to GTZ's study, the standard conversion factor of 0.93 will be applied to skilled labor to reflect the opportunity cost of employed labor in society. Skilled labor is thus assumed to be fully employed.

Mark-up costs are assumed to be based on entirely skilled labor, for simplicity.

(e) Equipment

Equipment costs include the cost of buying, running and maintaining equipment. Based on a sample of machinery we estimate that equipment costs are 61 percent due to machinery and spare parts and 39 percent due to fuel. Maintenance labor is negligible. Given a real exchange rate of 7.8 Colones/US Dollars, we obtain the following conversion factor for equipment:

$$\begin{aligned} \text{CFE} &= (.61 \cdot .85 + .39 \cdot .63) \cdot 7.8/5 \\ &= 1.19 \sim 1.2 \end{aligned}$$

Equipment costs 20 percent more to the economy than what its market price indicates.

(f) Materials

Locally produced materials consist of 90 percent equipment cost and 10 percent labor cost. This would result in conversion factor:

$$\text{CFM (local)} = .90 \cdot 1.19 + .1 \cdot .85 = 1.16$$

Tradable material is considered a capital good, resulting in the following conversion factor:

$$\text{CFM (tradeable)} = .85 \cdot 7.8/5 = 1.33$$

To simplify our calculations, a combined rate of 1.2 will also be used for materials.

(g) Fuel

The table below presents the 1988 average price components for gasoline and diesel. As can be seen taxes amount to an average of 15 percent of the price at the refinery. Because of its size, distribution cost in the country is not very important and the price of oil at the refinery is a good approximation of its economic cost.

	MARKET PRICE (C/barrel)	CF	PRICE (w/out taxes) (\$/barrel)
Crude CIF Acajutla	89.0	1.00	89.0
Tax Paid by CEL	17.1	0.00	0.0
Paid by RASA	106.1	0.84	89.0
Operating Cost RASA	10.2	0.93	9.5
Profit after Overhead RASA	10.0	0.93	9.3
Average Selling Price	126.3	0.85	107.8

1 barrel = 42 gallons

SOURCE: GTZ

Other factors should be considered when estimating a CFF. The price of oil in El Salvador is affected by the following problems:

- CEL's monopoly of the import of crude oil and its derivatives
- a foreign monopoly of refining crude oil and its derivative products
- an agreement (San Jose Agreement) signed between El Salvador, Mexico and Venezuela giving these countries a de-facto monopoly of oil supply.

CEL has a monopoly over imports of crude oil. Oil is delivered directly to the RASA refinery. The price structure is such that CEL sells the crude oil to the refinery at a price higher than world price. The difference between the sale price to RASA and the purchase of crude oil theoretically goes to the state. In fact, it remains with CEL which has financial problems due to low electricity prices.

RASA has a monopoly over oil refining in the country. The company works on a "cost plus" basis, which means it does not incur losses. Its operation costs are US\$2/barrel which is, according to CEL experts, higher than that of other refineries in the area. Its margin is also US\$2/barrel, which is also high.

To take into account these issues and based on recent world prices, the GTZ analysts estimated the conversion factor (CFF) as .63 (presented in (b) above). The economic price of fuel would then be:

$$126.3 * .63 * 7.8/5 = 124.1C/b$$

Fuel really costs approximately 98 percent of its current market price to the economy. This assumes that the government would liberate the petroleum trade and that world prices would remain at their current level. Since the second assumption is quite questionable in the long term, sensitivity analyses have been conducted in the power sector where fuel prices are particularly relevant.

4. INSTITUTIONAL ASPECTS

a. Organizational Aspects

The various infrastructure-related functions are under the responsibility of the Central Government's Executive Branch as well as a number of autonomous agencies. The Government is currently undergoing an administrative reform. Its organization, which was voted by the Legislative Assembly on August 31, 1989 is presented in Figure I.B.3.

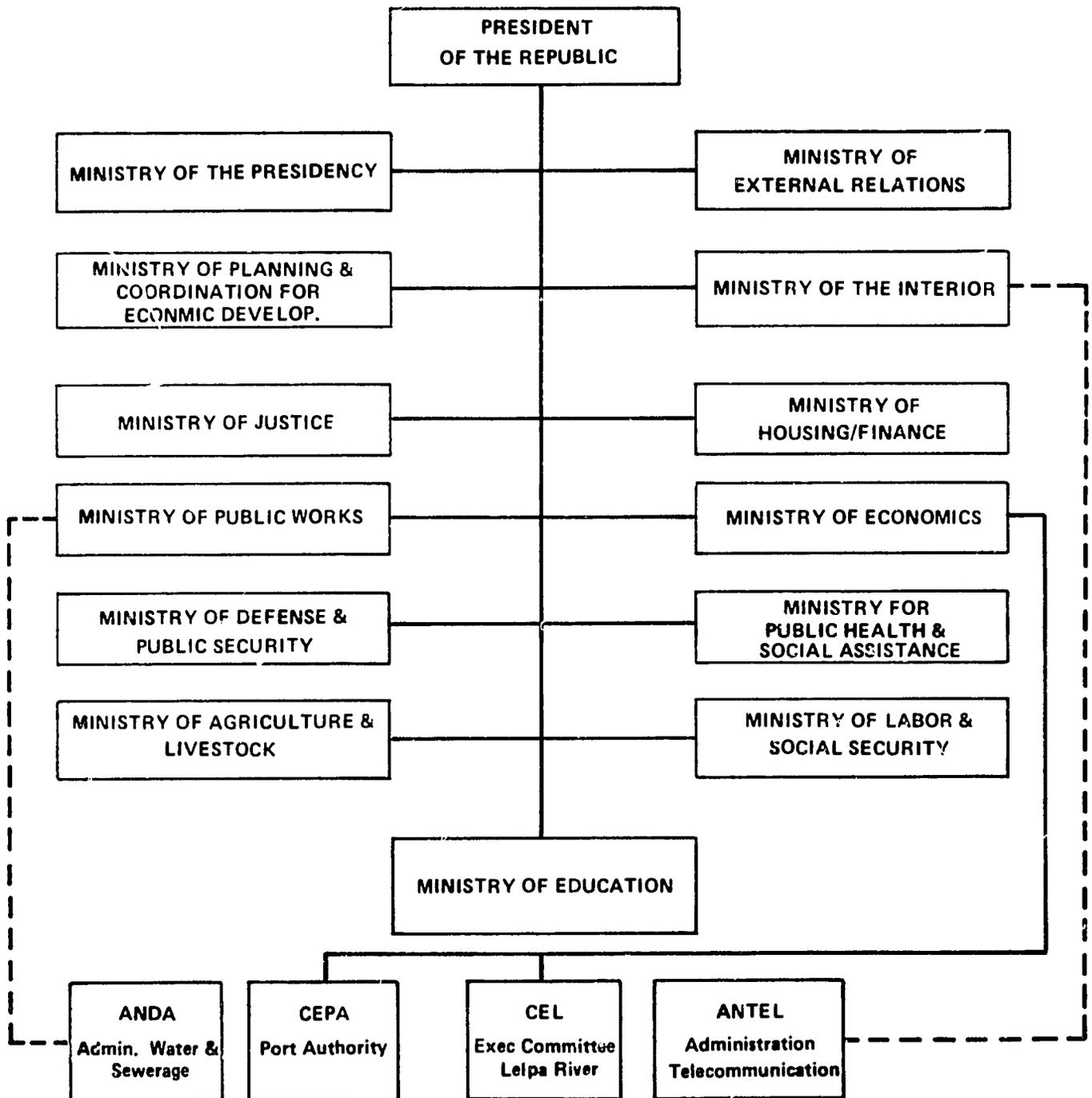
Aside from the Presidency, the agencies which most affect the infrastructure sector include the following:

- Ministry of Public Works (MOP)
- Ministry of Public Health & Social Assistance
or Ministry of Health (MSPAS or MOH)
- Ministry of the Economy (ME)
- Ministry of Planning and Coordination
for Economic and Social Development (MIPLAN)
- Ministry of Finance (MH)
- Ministry of the Interior (MI)
- Administration of Water and Sewage (ANDA)
- Autonomous Executive Port Commission (CEPA)
- Executive Committee of Hydroelectric Power
for the Lempa River (CEL)
- National Administration for Telecommunications (ANTEL)

- The Ministry of the Presidency is responsible for coordinating the activities of all Ministers, the Secretary of the Presidency, all autonomous agencies and other state bodies.
- The responsibilities of the Ministry of Planning and Coordination include helping the President, the Council of Ministers and other public sector bodies with policy matters, strategy, plans, projects and programs for economic, social and institutional development. The Ministry also makes global, sectorial, urban and regional plans, which are forwarded to the relevant Ministries. It administers programs and investment projects and co-ordinates with the relevant bodies to make periodic revisions and adjustments to plan implementation for Ministries and other public sector bodies. It also administers internal and external resources for studying future projects anticipated by state bodies.
- The Finance Ministry shares responsibility with the Planning Ministry for developing public expenditure policy. It proposes to the Planning Ministry the assignment of funds to the various public sector projects and programs.
- The duties of the Ministry of Health include analyzing actions and updating and presenting resolutions, both general and specific, to conserve and improve the environment. The Ministry participates in large public-works projects such as dams, airports, sugar mills, highways and water-supply works. PLANSABAR, within the Ministry of Health, has been responsible for water supply and sewerage for villages between 400 and 2,000 inhabitants.

figure 1.B.3

EXECUTIVE BRANCH ORGANIZATION (provisional)



- Planning, coordination and implementation of urban and regional development plans fall under the jurisdiction of the Ministry of Public Works. This Ministry also plans, controls and evaluates road infrastructure, and implements its projects in accordance with national and regional development plans. The Ministry is also responsible, through ANDA, of water supply and sewerage services. Finally, it supervises public works undertaken by the Central Government, other public sector authorities, and municipalities.
- The Ministry of the Interior provides public communications services, promoting and developing them at the same time. It is responsible for running the postal service, and for coordinating the telecommunications service (ANTEL).
- The Ministry of the Economy is responsible for setting and controlling the application of prices and tariffs. The Ministry is responsible for transport coordination through its "Direccion General de Transportes" and CEPA. The Ministry is in charge of CEL and regulates standards in the electrical sector. Finally the Ministry shares responsibility over Civil Aviation with MOP.
- In addition the Court of Accounts is responsible for approving and auditing the operations of all governmental institutions.

Of major importance in this sector are autonomous organizations. Each of these, though functionally under the charge of various Ministries, is responsible for the planning, budgeting, operation, construction, regulation, and pricing within its sector. Authority is vested in these organizations by decree rather than by contractual agreement. As a result, autonomous organizations often have to negotiate directly with the Presidency, Council of Ministers, the Economic Committee and foreign donor organizations. The scope of their mandate and the means at their disposal are not clearly defined.

Autonomous institutions in the infrastructure sector include:

- ANDA/PLANSABAR for water & sewage
- CEL for electric power and energy planning
- CEPA for ports, airports and the railroad
- ANTEL for telecommunications

Table I.B.5 indicates the matrix of agencies responsible for the various functions within the infrastructure sector. This matrix helps to identify the main institutional problems affecting the various sectors. Generally speaking, as more organizations are responsible for a given function within a sector, the more chances of friction, duplication of effort, unnecessary bureaucracy, and unfulfilled needs.

Water supply and sanitation in El Salvador is the responsibility of three main governmental organizations (ANDA, PLANSABAR, and the Municipalities), and a number of smaller groups (CONARA, CARE, etc.). These organizations sometimes compete for the same projects (duplication of effort), or assume that some functions are handled by others thereby leaving gaps in service coverage. Note that the division of responsibilities between agencies is often static. For instance, PLANSABAR is responsible for towns between 400 and 2,000 inhabitants. Such a definition is not adapted to local realities where a small town's population can change very fast due to the war or rapid development. Discontinuities in institutional coverage are thus bound to occur.

Both budgeting and pricing are the responsibility of too many institutions. Responsibilities for preparing the ordinary and extraordinary budgets are slowed by the Ministry of Planning and the Ministry of Finance. The division of these responsibilities is described in the next section. Though the system appears to be clear, the net result is that there is no real budget authority in El Salvador, and the budget is at best a forecasting tool instead of a policy instrument. This problem, however, is not specific to the infrastructure sector.

Pricing goes hand in hand with taxation. The former is the responsibility of the Ministry of the Economy while the latter depends upon the Ministry of Finance. As described below, pricing is a highly political matter, and the decision-making process takes place at cabinet level, specifically the Economic Committee (CE).

The use of pricing instead of budgeting as a policy instrument has negative effect on the economic growth of the country. In the infrastructure sector, its most damaging impact is that it leads to major investment decisions which are not economically efficient. For example, low tariffs increase demand. The system is then unable to satisfy this demand and major capital expansion and infrastructure improvements are undertaken. These would not all be necessary if tariffs affected the actual cost of infrastructure. What is at stake are millions of dollars, which the country lacks.

This problem cannot be solved immediately. The current government is engaged in an administrative and economic reform process which addresses this concern. ISA should contribute to this effort by pointing out how the infrastructure sector can play a role in the reform process.

b. Financial Management

(1) The Budgeting Process

Financial Management of government institutions is divided into two distinct budgeting cycles:

- the ordinary budget
- the extraordinary budget

The ordinary budget incorporates the administration of local funds raised through taxes, tariffs and other GOES revenue sources, and it is the responsibility of the Ministry of Finance. The extraordinary budget administers funds received from USAID and other development agencies. This budget is the responsibility of the Ministry of Planning. Generally speaking, the former is the current- expenditure budget while the latter is the development budget. In recent years, the development budget mostly supported repair and rehabilitation of infrastructure damaged by the guerilla and the earthquake.

The Budget Bureau (Direccion General de Presupuesto) is responsible for the overall preparation of the above. Its Director consults with the principal officials of government agencies and autonomous institutions and answers their questions regarding budgetary procedures.

The heads of each institution must present preliminary, ordinary and extraordinary budgets to their respective Ministries so that they can make modifications and pass them on to the Budget Bureau on a date predetermined by the Ministry of Finance. If this procedure is not completed on time, the institution is assigned the same budget as the previous year.

Once the Budget Bureau has made its deliberations, and has consulted with the Ministry of Finance, it recommends an amount to be assigned for each body's programs.

The Budget Bureau then draws up the preliminary Budgets, bearing in mind recommendations from the Ministry of Planning with respect to the implementation of investment programs in the subsequent fiscal year. The Budget Bureau then presents the most deserving preliminary budgets to the Ministry of Finance along with a report containing its opinion about the measures to be taken.

TABLE I.B.5

FUNCTIONAL RESPONSIBILITIES OF - AUTONOMOUS BODIES

SECTOR	ROADS	OTHER	WATER	POWER	TELECOM
FUNCTION					
PLANNING	MOP	CEPA	PLANSABAR ANDA MI OTHERS	CEL	ANTEL
BUDGETING	MIPLAN MH MOP	MIPLAN MH CEPA	MIPLAN MH ANDA PLANSABAR	MIPLAN MH CEL	MIPLAN MH ANTEL
OPERATION	PRIV. SECTOR	CEPA MOP	ANDA PLANSABAR MI	CEL	ANTEL
INVESTMENT	MOP ME - DGT POLICE	CEPA MOP	ANDA PLANSABAR MI MOP OTHERS	CEL	ANTEL
REGULATION/ CONTROL	MOP	CEPA MOP ME	ANDA PLANSABAR	CEL ME	ANTEL
PRICING	PRIV. SECTOR MOP ME MH CE	CEPA ME MH CE	ME MH CE	CEL ME MH CE	ANTEL ME MH CE

After adjustments have been made, the Ministry of Finance refers the prospective Budget Law to the Council of Ministers for approval and subsequent presentation to the Legislative Assembly.

When projects tie up funds for future fiscal years, they need legislative approval. Once approved by the Assembly, the amounts are included in annual budgets so that commitments under the contracts can be met each year.

(2) Budgets of Autonomous Bodies

With the exception of the National Telecommunications Administration (ANTEL), none of the autonomous institutions listed above are currently self-financing. However, the Executive Port Commission (CEPA), the Executive Hydroelectric Commission of the River Lempa (CEL) and the National Administration of Water and Sewage (ANDA) are treated as self-financing for budgetary purposes.

(3) Pricing and Tariff Policies

The agencies responsible for the operation of the sector generally prepare their request for tariff adjustments. These are submitted to the Ministry in charge (see Figure I.B.3).

User charges and tariffs are then decided upon by the Economic Committee (Comite Economico), following a recommendation from the Ministry of the Economy.

The Economic Committee is a top level committee constituted by the following:

- Ministry of Planning (President)
- Central Reserve Bank (Secretary)
- Ministry of the Economy
- Ministry of Finance
- Ministry of Agriculture

After user charge and/or tariff changes have been approved by the Economic Committee, a decree dictating the new tariffs is then made by the Ministry of the Economy.

The result of this process is that more time is spent on the political aspects of tariffs than on the economical. This is true to such an extent that autonomous agencies often include other institutions and ministries in the early preparation of their tariff adjustment requests in order to prevent later frictions.

Consequently, at no stage during the process is a true economic document prepared, and high level authorities are never aware of the financial or economic implications of the tariffs they eventually decide upon.

As stated earlier, unadjusted tariff rates create important, diseconomies at the national level. Moreover, low tariffs do not benefit most their intended target groups. Those who effectively benefit are those whose consumption is measured by a meter, generally the wealthier and larger consumers (industrialists, large agricultural landowners). Since the current tariff policy results from social considerations, a study should be undertaken to devise other ways to reach the target population.

A last argument in favor of an improved tariff adjustment system is that they offer a condition precedent to multinational donor bank loans, in particular the World Bank's. IBRD's Eighth Energy Sector Loan was dropped from the lending program because of inadequate tariffs. As demonstrated in the macroeconomic section, El Salvador will require further lending at advantageous terms in order to develop its infrastructure in the short to medium term.

Among the institutional aspects of the infrastructure, the question of tariffs requires the most urgent attention.

c. Exchange Rate Policy

Exchange rate policy is under the responsibility of the Central Bank. This policy is currently evolving from one of fixed exchange rate and import controls to a floating rate without import restrictions. When this change is complete it will prove positive for the infrastructure sector. Under the previous policy, the competition for foreign exchange was very keen and autonomous institutions in need of spare parts sometimes were not able to purchase them because of lack of foreign exchange.

Under the new policy spare parts will be more expensive, but this increase should be small in comparison with the cost of the machinery standing idle for lack of spare parts, or with the cost of continuous breakdowns due to makeshift repairs.

One drawback of this new policy is that public agencies should have to manage an across-the-board exchange liberalization which would further revalue their outstanding debt.

d. Staffing and Equipment

As in the case of most developing countries, public institutions in El Salvador are overstaffed and lack the equipment and qualified personnel necessary to carry out their tasks effectively.

There are a number of causes to the overstaffing dilemma the most important of which is that the Government has historically conducted a social policy of giving out government jobs. For example, job creation is one of the explicit functions of the Ministry of Public Works. This creates a situation which seriously affects the infrastructure sector in a number of ways.

- Sector salaries must be kept at a low level to accommodate the large payroll, meaning that qualified workers will transfer to better paying private sector jobs.
- The payroll comprises almost the entire ordinary budget, leaving equipment and materials unfunded. Maintenance is delayed until infrastructure reaches such a state that it needs rehabilitation. The latter is then carried out under the extraordinary budget.
- Budget cuts are very difficult to make since they immediately entail salary cuts or firings. As a result, budget cuts invariably affect investments and maintenance first.
- Large staff numbers create bureaucratic processes. El Salvador is currently suffering from too much red tape which seriously affects efficiency.

The staffing problem affects the Ministry of Public Works more than any other public sector institution. It has become so pervasive as to put the overall efficiency of the ministry in serious jeopardy. Because of the large number of employees involved and potential social tensions, a careful solution to this problem must be addressed. The ISA has identified a large number of feasible projects in the country, and the government can thus couple the release of employees (or at least freeze hiring) with the undertaking of contracted development, diminishing possible negative effects of this necessary measure.

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APPENDICES

APPENDIX I.A.1 CONSUMER SURPLUS

Infrastructure investments will help increase incomes and productivity and decrease costs in their zone of influence. In addition, they will benefit the consumer directly. For example:

- Highways will lower the costs of shipping inputs and consumer products into an area as well as transporting products to the markets.
- A power project will permit the use of power tools, and increase labor productivity.
- Additional phone lines will strengthen the linkages between businesses and markets, increasing profit opportunities.
- And a village water pump will decrease the cost of potable water and/or the time it takes to get it.

These changes in costs and revenues will allow increases in consumption and/or production, i.e. economic development. Since water is presently cheaper, villagers can consume more of it within the same budget. In turn, artisans using power tools will be able to produce more every day.

Measuring every single effect of an investment project over an entire community would be, if at all possible, a gigantic task. Economic theory demonstrates, however, that all these benefits are reflected in the consumption of the service or good provided by the infrastructure and its variable unit cost (marginal cost). In the simple example of water the relationship is straightforward, the economic cost of providing water is now the operating and maintenance cost of the pump, presumably much smaller than the previous cost of trucking it in. The additional quantity consumed can be measured. In the more intricate example of the crafts workshop, it can be demonstrated that, under perfect market conditions, the additional production can be measured indirectly, through the consumption and the cost of electricity to the workshop. This measure of economic benefit is called consumer surplus. It is presented in Figure A.I.A.1.

Let D be the demand curve for a given service. The demand curve indicates various levels of consumption by the community for a given service. If the price is high, for example P_0 , only a small quantity will be consumed (Q_0). Once the price decreases to P_1 , quantity consumed will increase to Q_1 .

The change in consumer surplus, which represents the direct economic benefits to the consumer is indicated by the dark area indicated in the above diagram. As can be seen, consumers which were previously consuming quantity Q_0 were paying P_0 for it. They are now only paying P_1 representing a benefit of:

$$(P_0 - P_1) * Q_0$$

For the additional quantity consumed ($Q_1 - Q_0$) the benefit is the difference between the price consumers would have been prepared to pay (indicated by the demand curve) and the price they actually pay (P_1). This is the area inside the triangle under the demand curve:

$$(P_0 - P_1) * (Q_1 - Q_0) / 2$$

The total benefit to the consumer can thus be calculated as:

$$(P_0 - P_1) * (Q_1 + Q_0) / 2$$

APPENDIX I.A.2 SOCIO-ECONOMIC IMPACTS

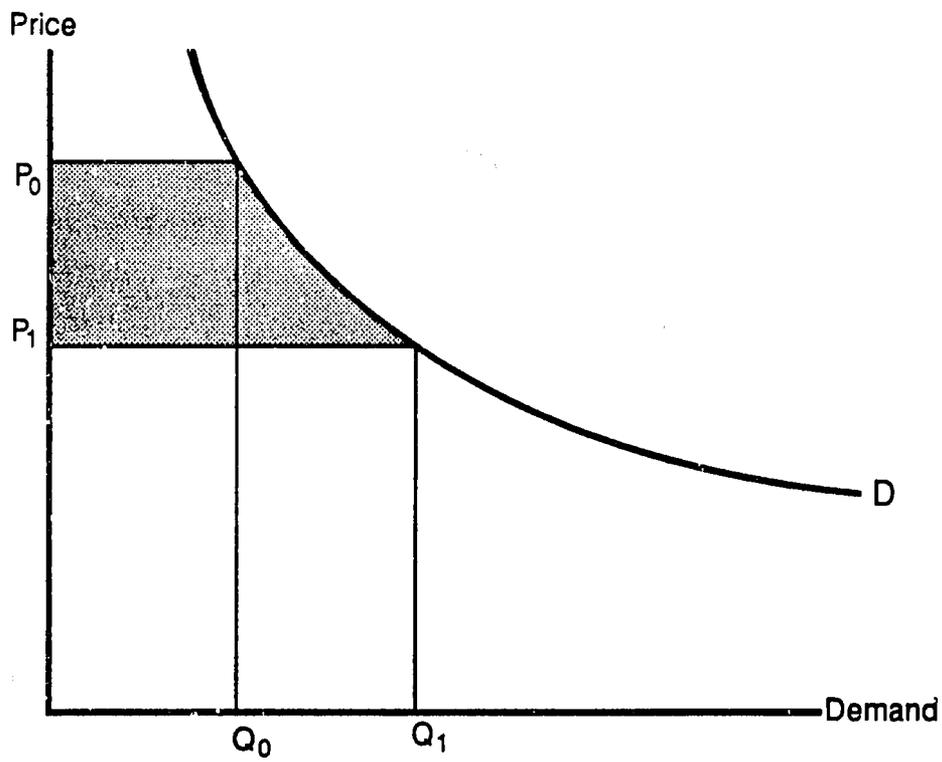
The anticipated benefits of infrastructure, listed below, will be sorted and evaluated in one of the following ways:

1. Those quantifiable impacts of programs in transportation, telecommunications, power and water supply and sanitation, will be estimated on a sectorial and inter-sectoral basis. The method used in calculating these benefits will be consumer surplus using economic prices. Economic internal rates of return will be generated for the proposed projects in each sector, and priorities developed on this basis. In addition, in the water sector, public health benefits will be estimated in two ways:
 - First, those benefits to which monetary value can be assigned will be estimated and internal rates of return will be calculated.
 - Second, a ranking system of primary or local health care facilities will be developed and will reflect the following:
 - the cost-effectiveness of projects in improving public health indicators, and
 - the impact of infrastructure on the quality of health care offered.

Inputs into the ranking will include but not be limited to:

 - cost per person served
 - time and distance clients must travel to the center
 - availability of potable water and source, electrical hookups and installed refrigeration, telephone connections with physicians for teleconsultations.
2. Employment and income impacts will be estimated in the following ways:
 - First, the number of jobs created, by skill level and duration, will be identified for completed or ongoing projects, wage rates established and the amount of income generated estimated.
 - Second, similar estimates will be generated for planned projects and for new project recommended by the ISA team.
 - Third, a ranking of projects based on employment and income generation will be developed with departmental and urban/rural breakdowns.
3. Other considerations will include but not be limited to national developmental goals, environmental impacts and risks, and shifts in the El Salvador's position in the international economy.

Figure A.1.A.1
Consumer Surplus Theory



APPENDIX I.A.3 ECONOMIC EVALUATION INDICATORS

1. PRESENT WORTH

Each of the present worth methodologies include certain procedures and steps that are common to all techniques. Each is based on a comparison of the discounted present value of the stream of costs and benefits. Present worth of benefits "B" and costs "C" can be stated in the following way:

$$B = \sum_{i=1}^n \frac{b_i}{(1+r)^i}$$

$$C = \sum_{i=1}^n \frac{c_i}{(1+r)^i} - \frac{R}{(1+r)^n}$$

Where i = year of benefits or costs

n = number of years of life of the investment

R = residual value

b_i = benefits in year i

c_i = costs in year i

r = discount rate

2. NET BENEFITS/INVESTMENT (NB/I)

The net-benefit-over-investment ratio is a special case of the widely used benefit-cost ratio. It is calculated as follows:

$$NB/I = 1 + NPV/I$$

The advantage of this method over other benefit/cost ratios is that its result does not depend upon the definitions of costs and benefits used by an analyst. For example, one could consider savings in maintenance as an additional benefit while another could consider it as a decreased cost. In this manner, two ratios for the same project would be obtained, creating problems to project ranking.

The net benefit-investment ratio is simply the present worth of the net benefits divided by the present worth of the investment. Net benefits are the net present worth of the incremental net benefit stream in those years after the stream has turned positive, and investment is the present worth of the incremental net benefit stream in those early years of the project when the stream is negative.

Selecting independent projects in the order of their net benefits ratio maximizes the return per unit of available investments. This, in turn, maximizes the net present worth of the group of projects chosen, and thus maximizes the income stream that is the objective of the program of project investments.

3. INTERNAL RATE OF RETURN (IRR)

The IRR of a given project is defined as the rate of discount at which the present worth of the stream of benefits and costs are equated (i.e., the economic rate of return of a project, expressed as a rate of interest over a given time period).

The IRR approach is widely used by development agencies in evaluating investment decisions. The major difference between the IRR method and the B/C and NB/I approaches is that the IRR assumes no discount rate.

Two of the drawbacks of the IRR are:

- In the case where O & M costs are higher than benefits during specific years, as when expensive periodic maintenance takes place, the IRR has more than one solution, making the comparison impossible between projects. This change from positive to negative yearly cash flows at some point during the analysis period has been the case of several projects under analysis.
- Only in a general way will the internal rate of return tell us that one project is better than another, in the sense that it contributes more to national income relative to the resources used. For example, as long as a country's estimate of the opportunity cost of capital is 12 percent, we cannot know with certainty that a project with 120 percent rate of return (as is the case of some of our highway projects) contributes relatively more to national income than another with 80 percent return, and we cannot say with confidence that we should implement the project with 120 percent rate of return first. Later year benefits are severely discounted at a very high non-market-based rate, being only the first few year benefits actually considered.

Despite these drawbacks, in most cases ranking projects by means of decreasing IRRs or decreasing NB/I ratios give very similar results.

APPENDIX I.A.4

PRELIMINARY ANALYSIS OF LEMPA RIVER WATER USES

1. ELECTRICITY GENERATION

Since the country's large hydroelectric power stations are located along this river, it is obvious that the greatest use of Lempa River water is for electricity generation. The following table shows the average discharges from these power stations, including water used for generating units and overflows not used for generation.

POWER STATIONS	DISCHARGE M ³ /SEC		MILLIONS OF M ³ /YEAR	
	1988		1988	
-----	-----	-----	-----	-----
Gujoyo	19.43		612.7	
Cerron Grande	149.21		4,705.5	
5 Noviembre	181.34		5,718.7	
15 Septiembre	371.74		11,723.2	

Source: CEL - System Operation Statistics
CEL - Annual Report, 1988.

The 15 de Septiembre power station, which uses water from lower down the river, has a greater discharge than the others.

The required quantity of water would be approximately 200 m³/sec, equivalent to some 6,307.2 million m³/year. If discharge is determined using generating units, demand for 1990 has been estimated at 280 m³/sec, equivalent to some 8,830.1 million m³/year. This figure was determined for the purposes of this analysis, as total demand for this use, which does not generally compete with other uses.

2. DOMESTIC AND INDUSTRIAL

According to the data we have obtained, domestic and industrial uses reaches 14.34 m³/sec. The San Salvador metropolitan area uses 5.34 m³/sec - i.e., 37 percent of the total for the country.

The quantity of water required for ANDA's expansion plan program from the Lempa River, according to technical data from this project, is calculated at some 47.3 million m³ per year. In the future, this water will add to the quantity of water used in San Salvador. Water requirements for these purposes could be estimated at 6.84 m³/sec, or some 215.71 million m³/year. For 1990, water demand is estimated at 19.1 m³/sec of the available River Lempa flow, according to data from the Hydrological Service of the Ministry of Agriculture. On the other hand, considerably less waste water is returned.

3. IRRIGATION

According to the "Hydrological Resources Development and Exploitation Master Plan", 34,000 hectares are currently irrigated, using 34 m³/sec. However, according to the same document, land suitable for irrigation amounts to some 258,903 hectares.

For irrigation purposes, 45.9 m³/sec is taken as the water requirement for the next year, equivalent to 1,447.5 million m³. Most of this water eventually drains or recharges streams which return the water to the river.

4. NATURAL DILUTION

El Salvador is in the midst of a water pollution crisis, in the area of water-supply and waste water treatment. This situation requires large quantities of water for natural dilution of polluted rivers. The Lempa River is the worst affected in this way, since most human and industrial waste of the country is dumped into this river without treatment.

If urgent measures are not taken to reduce this pollution, the quantity of water required will constantly increase.

It has been estimated that for 1990, national water requirements will amount to 580 m³/sec. If flow of the Lempa River is 67.6 percent of the national total, it may be assumed that approximately 392.1 m³/sec of this is required for natural dilution of the Lempa River.

5. WATER BALANCE

Estimates for the different requirements for Lempa River water in 1990 have been shown. The following table gives a summary of this information, showing that the greatest need for water is for natural dilution of the river. Requirements for electricity generation and irrigation follow; these uses do not compete, however, with the others as all water used for electricity generation and most irrigation water is reused. Domestic and industrial use comes last in order of quantity demanded.

 LEMPA RIVER WATER BALANCE
1990

USE	M3/SEC	MILLIONS M3/YEAR
Domestic & Industrial	19.1	602.3
Natural Dilution	392.1	12,365.3
Total	411.2	12,967.6
Average Available	457.7	14,434.9
Balance	46.5	1,467.3
Other Uses:		
Electricity Generation	280.0	8,830.1
Irrigation	45.9	1,447.5

From this very preliminary Lempa River water balance it can be stated that, in general, there are potential problems in the Lempa River's water balance. If necessary measures are not taken for adequate effluent treatment, pollution will continue to deteriorate the river, and more resources will be needed for natural dilution of the river. Therefore, waste water treatment and better agency coordination in the management and planning of water resources are necessary.

In the case of the Lempa River, as with the other rivers, there is an abundant rainy season and six months of dry season. There may be a need for: water-storage studies, such as small dams along the length of the river, which could have different uses throughout the year; as well as integrated land and water resource management.

APPENDIX I.B. I

POPULATION ESTIMATES BY DEPARTMENT AND AREA

PROVINCE	1,988			2,000			2,010		
	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL
AHAUACHAPAN	67,792	186,997	254,789	101,041	240,230	341,271	160,247	277,032	437,279
SANTA ANA	217,760	242,865	460,626	310,183	306,790	616,974	436,748	353,796	790,544
SONSCATE	141,534	199,612	341,147	203,283	253,657	456,940	292,974	292,515	585,489
CHALATENANGO	86,811	161,056	247,867	126,237	205,762	332,000	188,120	237,280	425,400
LA LIBERTAD	167,815	244,247	412,063	241,334	310,593	551,928	349,033	358,165	707,198
SAN SALVADOR	861,868	164,368	1,026,237	1,195,645	178,922	1,374,567	1,554,935	206,333	1,761,268
CUSCATLAN	70,593	138,644	209,238	102,962	177,296	280,258	154,639	204,463	359,102
LA PAZ	93,177	168,135	261,312	135,303	214,704	350,008	199,086	231,388	430,474
CABANAS	43,259	143,522	186,782	65,448	184,732	250,180	107,526	213,036	320,562
SAN VICENTE	71,399	136,430	207,830	103,985	174,387	278,373	155,770	201,096	356,866
USulután	139,590	271,699	411,298	203,508	347,394	550,903	305,273	400,613	705,886
SAN MIGUEL	175,283	276,525	451,808	252,933	352,230	605,163	369,227	406,186	775,413
MORAZAN	53,469	149,189	202,658	79,760	191,684	271,445	126,746	221,045	347,791
LA UNION	90,693	234,298	324,992	134,534	300,767	435,302	210,901	346,804	557,705
TOTAL	2,281,058	2,717,594	4,998,653	3,256,164	3,439,155	6,695,319	4,611,225	3,949,752	8,560,977

APPENDIX I.B.2

GLOBAL SUPPLY AND DEMAND AT CONSTANT 1962 PRICES
(in million Colones)

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PRODUCTS	1984		1985		1986		1987		1988	
	VALUE	VAR/YR %								
GLOBAL DEMAND	3,446.0	2.2	3,707.5	1.7	3,706.5	0.0	3,790.1	2.3	3,809.6	0.5
Consumption	2,636.3	4.0	2,742.8	4.0	2,755.5	0.5	2,775.1	0.7	2,793.9	0.7
- Private	2,175.3	3.8	2,250.6	3.5	2,244.9	-0.3	2,259.2	0.6	2,266.3	0.3
- Public	461.0	4.8	492.2	6.8	510.6	3.7	515.9	1.0	527.6	2.3
Gross Internal Investment	335.3	3.0	316.6	-5.6	384.6	21.5	378.4	-1.6	409.0	8.1
Fixed Capital Formation	320.8	2.3	353.6	10.2	380.1	7.5	414.7	9.1	403.5	-2.7
- Private	199.4	12.0	241.9	21.3	285.8	18.1	306.8	7.3	312.8	2.0
- Public	121.4	-10.4	111.7	-8.0	34.3	-15.6	107.9	14.4	90.7	-15.9
Inventory Variation	14.5		-37.0		4.5		-36.3		5.5	
Exports	674.4	-4.3	648.1	-3.9	566.4	-12.6	636.6	12.4	606.7	-4.7
GLOBAL SUPPLY	3,646.0	2.2	3,707.5	1.7	3,706.5	0.0	3,790.1	3.2	3,809.6	0.5
Imports	710.4	2.1	713.9	0.5	694.0	-2.8	696.6	0.4	702.0	0.8
Gross Domestic Product (GDP)	2,935.6	2.3	299.6	2.0	3,012.5	0.6	3,093.5	2.7	3,107.6	0.5
Agriculture & Livestock	750.9	3.3	742.8	-1.1	719.7	-3.1	734.7	2.1	706.7	3.8
Mining & Quarries	3.8	2.7	3.8	0.0	3.9	2.6	4.4	12.8	4.6	4.5
Manufacturing Industry	496.9	1.3	515.4	3.7	528.3	2.5	544.1	3.0	557.4	2.4
Construction	86.9	-5.7	90.9	4.6	93.3	2.6	104.0	11.5	95.3	-8.4
Electricity & Water	107.6	2.7	113.0	5.0	115.8	2.5	118.1	2.0	120.2	1.8
Transport/Storage/Telecom	175.6	2.8	178.8	1.8	179.7	0.5	183.0	1.8	185.4	1.3
Trade	487.1	1.9	489.5	0.5	491.0	0.3	497.9	1.4	503.6	1.1
Finance	99.7	1.0	102.7	3.0	104.2	1.5	106.7	2.4	109.0	2.2
Housing	142.3	1.6	144.4	1.5	144.8	0.3	148.5	2.6	155.1	4.4
Public Administration	384.5	5.0	411.6	7.0	430.1	4.5	447.4	4.0	462.6	3.4
Personal Services	200.3	1.0	200.7	0.2	201.7	0.5	204.7	1.5	207.7	1.5

Source : NATIONAL ACCOUNTS SECTION, BCR

APPENDIX I.B.2

ANNUAL AVERAGE INFLATION RATE
(1982-1988)

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YEAR	FOOD	CLOTHING & RELATED SERVICES	HOUSING	MISC.	GENERAL INDEX
1982	10.70	16.50	11.70	12.60	11.70
1983	13.40	13.00	15.00	9.90	13.10
1984	14.10	9.60	9.40	8.30	11.70
1985	18.90	24.40	32.60	18.30	22.30
1986	31.80	35.00	30.60	32.70	31.90
1987	25.30	17.30	24.70	27.60	24.90
1988	19.50	7.30	7.40	13.50	19.80

* (Based on General Consumer Price DEC. 1978=100)

APPENDIX I.B.2

SUMMARY OF PRICE INDICES
(BASE 1962)

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YEAR	IMPLICIT PRICES		'UNIT VALUE OF EXTERNAL TRADE - INDICES				CONSUMER PRICE INDEX BASE FOR DECEMBER, 1978		
	GDP		EXPORTS		IMPORTS		EXCHANGE TERMS		
	INDEX	% VARIATION	INDEX	% VARIATION	INDEX	% VARIATION	INDEX	INDEX	% VARIATION
1977	208.1	18.4	458.0	52.8	226.0	-2.1	202.7	87.3	15.0
1978	209.9	0.9	323.5	-29.4	249.1	10.2	129.9	100.0	14.5
1979	239.0	13.9	324.7	0.4	279.0	12.0	116.4	114.8	14.8
1980	271.1	13.4	363.7	12.0	337.4	20.9	107.8	136.2	18.6
1981	286.6	5.7	334.1	-8.1	369.6	9.5	90.4	152.0	11.6
1982	314.9	9.9	347.1	3.9	414.0	12.0	83.8	172.4	13.4
1983	353.7	12.3	352.6	1.6	436.4	5.4	80.8	197.9	14.8
1984	397.1	12.3	376.0	6.6	468.3	7.3	80.3	217.3	9.8
1985	478.7	20.6	493.6	31.3	599.9	28.1	82.3	286.7	31.9
1986	656.0	37.0	860.7	74.4	827.1	37.9	104.1	737.7	30.3
1987	748.0	14.0	690.3	-19.8	867.1	4.8	79.6	447.0	19.6
1988	875.3	17.0	734.8	6.4	897.2	3.5	81.9	528.5	18.2

APPENDIX I.B.2

CONSOLIDATED PUBLIC SECTOR OPERATIONS
(1983 - 1988)

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ECONOMIC CLASSIFICATION OF OPERATIONS	1983		1984		1985		1986		1987		1988	
	Central	Consolid										
	Govt	Pub.Sec.										
1. CURRENT REVENUES	1,256.5	2,843.4	1,537.5	3,181.4	1,918.7	3,566.3	2,845.9	4,663.5	2,826.0	5,143.0	2,918.0	5,305.0
- Tax	1,074.0	1,074.0	1,342.5	1,342.5	1,666.0	1,666.0	2,539.5	2,539.5	2,615.0	2,615.0	2,745.0	2,745.0
- Non Tax	182.0	1,769.4	175.0	1,838.7	252.7	1,900.3	306.4	2,124.0	211.0	2,528.0	174.0	2,561.0
2. CURRENT EXPENDITURE	1,507.0	2,721.6	1,770.4	3,012.4	1,908.9	3,194.1	2,507.2	3,945.9	2,762.0	4,645.0	3,105.0	5,019.0
3. CURRENT SAVINGS	-250.5	121.8	-232.9	169.0	9.8	372.2	278.7	717.6	64.0	497.0	-187.0	286.0
4. CAPITAL INCOME	556.1	574.2	384.0	421.0	150.8	172.6	314.2	351.6	546.0	632.0	418.0	451.0
5. CAPITAL EXPENDITURE	677.3	1,255.0	474.4	697.1	541.6	654.5	601.9	776.3	703.0	839.0	520.0	724.0
6. NET LOANS/GRANTS/BOND PROC.	-30.7	48.5	-21.6	89.0	6.2	68.5	269.2	463.2	128.0	398.0	131.0	597.0
7. GLOBAL DEFICIT/SURPLUS	-341.0	607.5	-301.3	-196.1	-387.2	-178.2	-278.2	-170.3	-221.0	-157.0	-419.0	-584.0
8. NET FINANCING	341.0	607.5	301.3	196.1	387.2	178.2	278.2	170.3	221.0	157.0	419.0	584.0
CURRENT GDP (million Colones)	10,151.8		11,657.2		14,330.8		19,762.9		23,140.6		27,200.0	

NB : The figures have been rounded for year 1987 & 1988.

Source : BCR Journal, and Economic Program