

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

**SERVICIO NACIONAL DE AGUAS SUBTERRÁNEAS, RIEGO Y AVENAMIENTO
(SENARA)
REPUBLIC OF COSTA RICA**

**THE STUDY ON
RURAL DEVELOPMENT PROJECT FOR
THE MIDDLE BASIN OF TEMPISQUE**

FINAL REPORT

**VOLUME 1
MAIN REPORT**

SEPTEMBER 2002

**PACIFIC CONSULTANTS INTERNATIONAL
NAIGAI ENGINEERING CO., LTD.**

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PREFACE

In response to a request from the Government of the Republic of Costa Rica, the Government of Japan decided to conduct the Study on the Rural Development Project for the Middle Basin of Tempisque River and entrusted the study to Japan International Cooperation Agency (JICA).

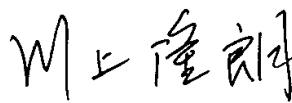
JICA sent to the Republic of Costa Rica, a study team headed by Mr. Yujiro ITAKURA, Pacific Consultants International, four (4) times between November 2000 and September 2002.

The team held discussions with the officials concerned of the Government of the Republic of Costa Rica, and conducted field survey at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Costa Rica for their close cooperation extended to the team.

September 2002



Takao Kawakami
President

Japan International Cooperation Agency

September 2002

Mr. Takao KAWAKAMI
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the Final Report of "The Study on Rural Development Project for the Middle Basin of Tempisque River in the Republic of Costa Rica".

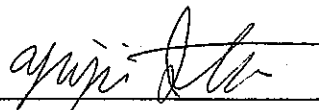
This report compiles the results of the study which was undertaken in the Republic of Costa Rica from November 2000 to September 2002 by the Study Team organized jointly by Pacific Consultants International and Naigai Engineering Co. Ltd. under the contract with the JICA.

The Study team formulated the integrated rural development plan including irrigation/drainage plan, flood protection plan, environmental conservation plan and agricultural supporting strengthening plan in order to achieve the sustainable agricultural development for small and medium scale farmers in the middle basin of the Tempisque river, based on the present conditions of the Costa Rica and the future vision of agriculture in the area.

For the obtaining these results, we would like to express our sincere gratitude and appreciation to all the officials of your agency, the JICA advisory Committee, Japanese Embassy of the Costa Rica and JICA/JOCV Costa Rica Office. We also would like to send our great appreciation to all governmental staff concerned especially the National Service of Ground Water, Irrigation and Drainage (SENARA) and other related institutions. Furthermore, we would like to express again our gratitude for the working jointly of Costa Rican counterpart personnel through the all field survey period.

We hope that the report will be able to contribute significantly to agricultural development on Costa Rica.

Very truly yours,



Yujiro ITAKURA

Team leader

The Study Team for The Study on Rural Development
Project for the Middle Basin of Tempisque River in the
Republic of Costa Rica

INTRODUCTION

This is the main report of the Final Report of “The Study on Rural Development Project for the Middle Basin of Tempisque River”. This study was conducted as a joint effort of the JICA Study Team and Cost Rican counterpart personnel, for technical cooperation between the Japan International Cooperation Agency (JICA) and Servicio Nacional de Aguas Subterráneas, Riego y Avenamiento (SENARA), over the period from November 2000 to September 2002.

The Final Report is comprised of the following volumes:

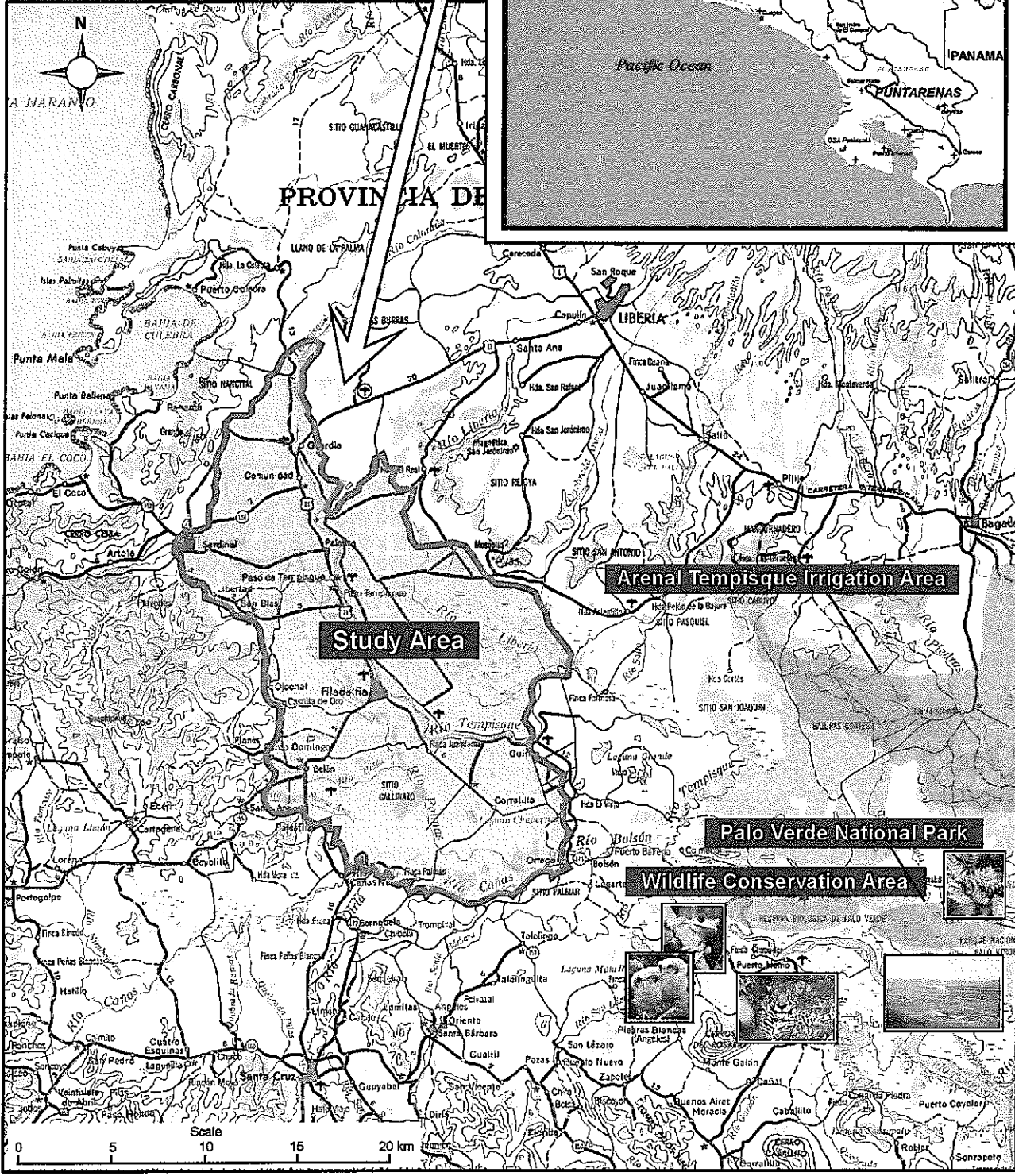
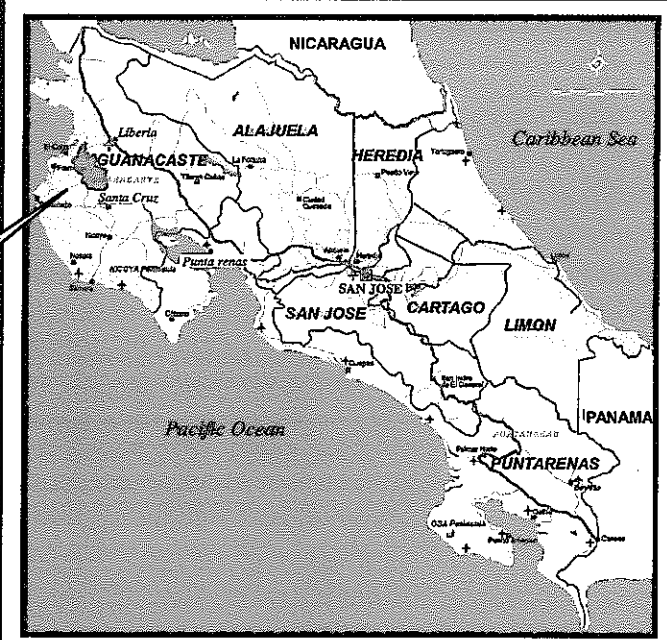
Volume 1: Summary and Main (English, Spanish, Japanese)

Volume 2: Appendixes (Spanish)

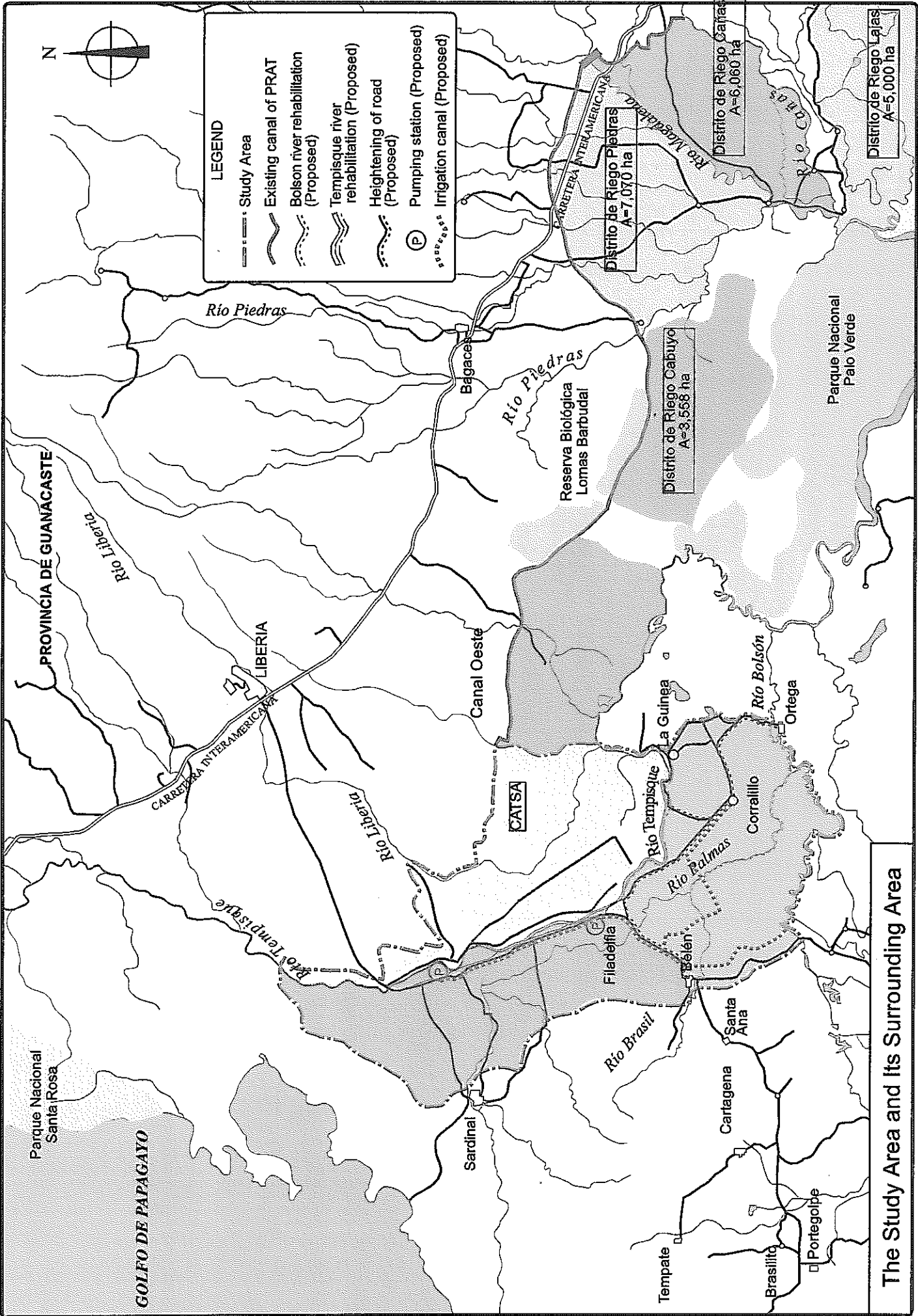
Volume 3: Plans (Spanish)

During the execution of the Study, so much collaboration was obtained from counterpart personnel of relative institutions such SENARA, MAG, IDA, CNE, MOPT, MINAE, OTS and others and they cooperated not only to supply of information/data but also to participate into the necessary survey and the discussion for formulation of plan. Furthermore, many of farmers participated to public hearing, workshops and other socio-rural surveys and precious opinions could be obtained through earnest discussion with them. We wood like to express our gratitude for them, and, also to inform that the ideas shown in this report are not planed by only Japanese Study Team.

September 2002, Tokyo



Study Area



The Study Area and its Surrounding Area

**THE STUDY ON RURAL DEVELOPMENT PROJECT
FOR THE MIDDLE BASIN OF TEMPISQUE RIVER**

FINAL REPORT

**MAIN REPORT
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Annex A: Minutes of Meeting

Annex B: Reference

Appendixes:

- A: Socio-Economy
- B: Hydrometeorology
- C: Geology, hydrogeology
- D: Environment
- E: Agriculture
- F: Rural Society
- G: Irrigation and Drainage
- H: Prevention of Inundation
- I: Design and Cost Estimation
- J: PCM Workshop Report
- K: Reference Information: Analysis of Future Plan
- L: Farm Management Analysis

Abbreviation

Abbreviation	Spanish	English
AC (CA)	Area de Conservación	Conservation Area
ALCORSA	Algodones de Costa Rica	Association of cotton of Costa Rica
ARCOSAN	Complejo Hidroeléctrico Arenal - Corobici - Sandillal	Arenal-Corobici Hydro-electric Power Station
ASA	Agencia del Sector Agropecuario	Agency of Agriculture and livestock
AyA	Acueductos y Alcantarillado	Water Supply and Sewerage Division
BID (IDB)	Banco Interamericano de Desarrollo	Inter-American Development Bank
CATSA	Central Azucarera Tempisque S.A.	Tempisque Central Sugar Co.,Ltd.
CCE	Comisión Central de Emergencias	Central Commission of Emergencies
CCT	Centro Científico Tropical	Tropical Science Center
CEMPA	Cementos del Pacífico	Pacific Cement Co., Ltd.
CLE	Comisión Local de Emergencias	Local Commission of Emergencies
CNE	Comisión Nacional de Emergencias	National Commission of Emergencies
CNP	Consejo Nacional de Producción	National Council of Production
CODESA	Corporación de Desarrollo Sociedad Anónima	Public Corporation of Society Development
CRE	Comisión Regional de Emergencias	Regional Commission of Emergencies
DRAT	Distrito de Riego Arenal Tempisque	Arenal Tempisque Irrigation District
EBAIS	Equipo Básico de Atención Integral en Salud	Teams of Basic Integrated Medical Service
EE.UU. (USA)	Estados Unidos de América	United States of America
E/F (F/S)	Estudio de Factibilidad	Feasibility Study
FEAP	Formulario de Evaluación Ambiental Preliminar	Form of Preliminary Environmental Evaluation
ICE	Instituto Costarricense de Electricidad	Institute of Costa Rican Electricity
IDA	Instituto de Desarrollo Agrario	Institute of Agrarian Development
IEE	Examen Ambiental Inicial	Initial Environmental Evaluation
IMAS	Instituto Mixto de Ayuda Social	Joint Institute of Social Support
IMN	Instituto Meteorológico Nacional	National Institute Meteorology
INA	Instituto Nacional de Aprendizaje	National Institute of Training
INCOPESCA	Instituto Costarricense de Pesca y Acuicultura	Costa Rican Institute of Fishing and Aquaculture
JICA	Agencia de Cooperación Internacional del Japón	Japan International Cooperation Agency
LAICA	Liga Agrícola Industrial de la Caña de Azúcar	Agro-industrial Union of Sugar Cane
MAG	Ministerio de Agricultura y Ganadería	Ministry of Agriculture and Livestock
MCCA (CACM)	Mercado Común Centroamericano	Central American Common Market
MINAE	Ministerio de Ambiente y Energía	Ministry of Environment and Energy
MOPT	Ministerio de Obras Publicas y Transporte	Ministry of Public Work and Transportation
OyM (O/M)	Operación y mantenimiento	Operation and maintenance
OET (OTS)	Organización de Estudios Tropicales	Organization of Tropical Study
OMS (WTO)	Organización Mundial de Salud	World Trading Organization
ONG (NGO)	Organización no gubernamental	Non Governmental Organization
PIB (GDP)	Producto Interno Bruto	Gross Domestic Production
PIMA	Programa Integral de Mercadeo Agropecuario	Integral Program of Agricultural Marketing
PIPA	Proyecto de Incremento de Producción Agropecuaria	Increase of Agricultural Production Project
PRAT	Proyecto de Riego Arenal Tempisque	Arenal Tempisque Irrigation Project
Pre-F/S	Estudio de prefactibilidad	Pre-feasibility Study
PRODAPEN (ADPNP)	Proyecto de Desarrollo Agrícola de la península de Nicoya	Agricultural Development Project of the Peninsula of the Nicoya
SENARA	Servicio Nacional de Aguas Subterráneas, Riego y Avenamiento	National Service of Ground Water, Irrigation and Drainage
SEPSA	Secretaría Ejectiva de Planificación Sectorial Agropecuaria	Executive Secretary of Agricultural Sector Plan
SETENA	Secretaría Técnica Nacional Ambiental	National Technical Secretary of Environment
SNE	Servicio Nacional de Electricidad	National Service of Electricity
SUA (WUA)	Sociedad de Usuarios de Agua	Water users association
TIRE (EIRR)	Tasa interna de retorno económica	Economic internal rate of return
TIRF (FIRR)	Tasa interna de retorno financiera	Financial internal rate of return
UCR (C.R.U.)	Universidad de Costa Rica	Costa Rica University
UNA	Universidad Nacional	National University of Costa Rica
ZCI (ITCZ)	Zona de Convergencia Intertropical	Inter-Tropical Convergence Zone
ha	Hectárea(s)	Hectare(s)
m	Metro(s)	Meter(s)
m ²	Metro(s) cuadrado(s)	Square meter(s)
m ³	Metro(s) cúbico(s)	Cubic meter(s)
t	Tonelada(s)	Ton(s)
kg	Kilogramo(s)	Kilogram(s)
m/s	Metro por segundo	Meter per second
m ³ /s	Metro cúbico por segundo	Cubic meter per second
l	Litro	Litter
MW	Megavatio	Mega Watt
MMC (MCM)	Millones de metros cúbicos	Million cubic meter(s)
M.s.n.m. (m.a.s.l)	Metros sobre nivel del mar	Meter(s) above sea level
US\$	Dólar(es) estadounidense(s)	US dollar(s)