

**Team learning projects as a strategy to contribute to the  
sustainability of water supply and sanitation services**

by

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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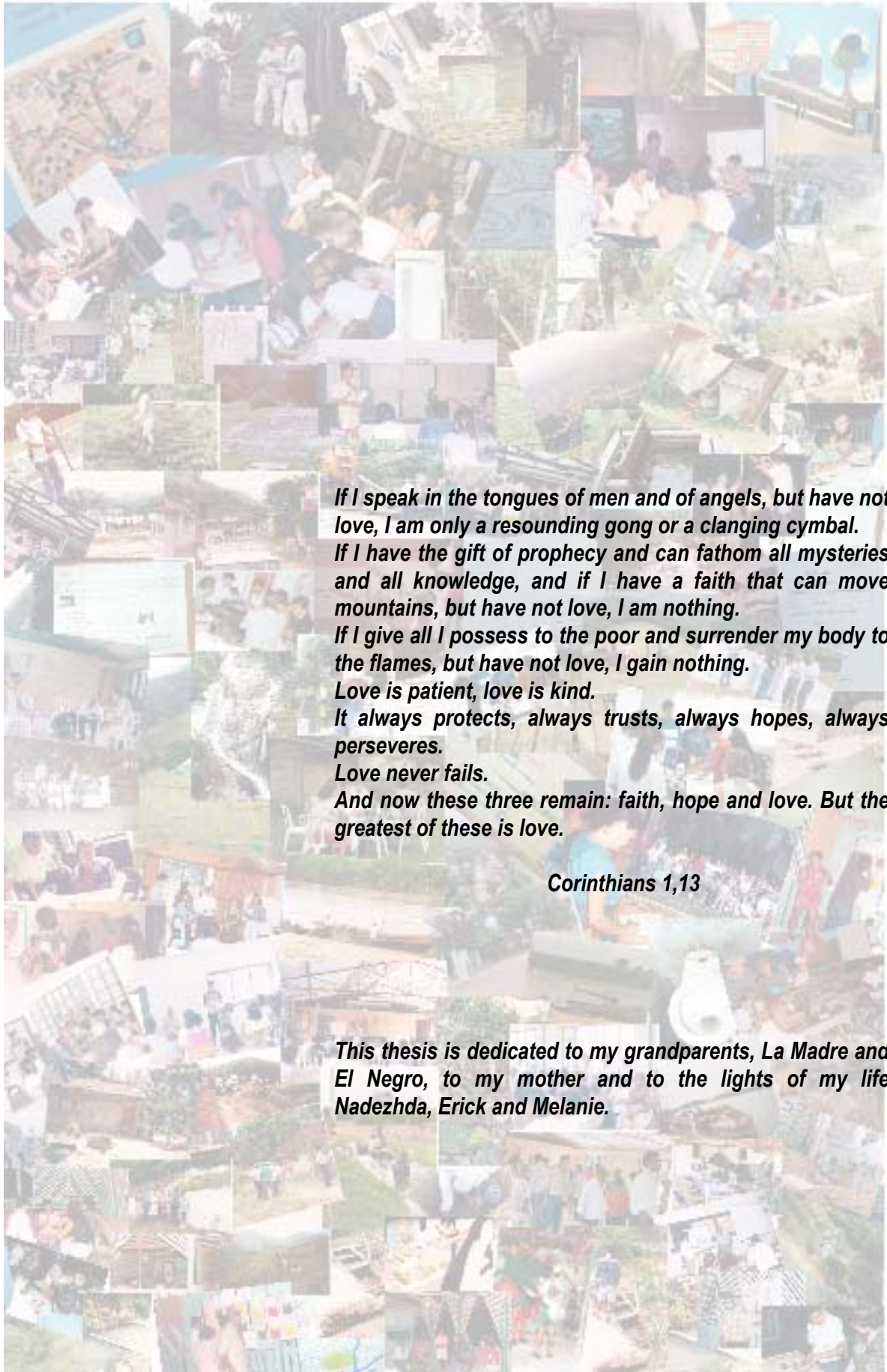
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## ABSTRACT

This research aims to help to answer the question: Why do water supply and sanitation projects fail? Its goal was to generate the conceptual frameworks and tools needed to improve the performance of water supply and sanitation (WSS) projects in small settlements.

As part of the project the sustainability framework developed by the Colombian research institute CINARA (Instituto de Investigación y Desarrollo en Agua Potable, Saneamiento Básico y Conservación del Recurso Hídrico/Universidad del Valle; the Research and Development Institute of Water Supply, Sanitation, and Water Resources Conservation/University of Valle) was applied and improved. In addition, new models and concepts were also proposed. These included Team Learning Projects (TLPs) and a new model for technology transfer, known as the *knowledge dialogue* model.

During the course of this study, the project cycle followed by institutions was analysed through the Colombian National Programme for the Sustainability of Water Supply and Sanitation Systems, and a new cycle was suggested. The TLPs were used to take into account the local social, economic and environmental conditions along with the existing technological options, including the technology available to the community being studied. This made it possible to analyse WSS projects holistically. The results demonstrate how TLPs can link research and development at any level and thus prove to be a useful tool for strengthening the capacities of institutions and communities involved in WSS projects. The proposals put forward in this research have been validated in several CINARA projects.



***If I speak in the tongues of men and of angels, but have not love, I am only a resounding gong or a clanging cymbal. If I have the gift of prophecy and can fathom all mysteries and all knowledge, and if I have a faith that can move mountains, but have not love, I am nothing. If I give all I possess to the poor and surrender my body to the flames, but have not love, I gain nothing. Love is patient, love is kind. It always protects, always trusts, always hopes, always perseveres. Love never fails. And now these three remain: faith, hope and love. But the greatest of these is love.***

**Corinthians 1,13**

***This thesis is dedicated to my grandparents, La Madre and El Negro, to my mother and to the lights of my life Nadezhda, Erick and Melanie.***

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**ABBREVIATIONS**

AOISPEN	Programme for Self-construction of Sanitary Infrastructure (Programa de Autoconstrucción de Infraestructura Sanitaria con Entrega de Materiales)
ASAS	Settled sewerage (Alcantarillado sin Arrastre de Sólidos)
ASOHORMIGUERO	Users Association of El Hormiguero (Asociación de Usuarios de El Hormiguero)
ASOMONDOMO	Users Association of Mondomo (Asociación de Usuarios de Mondomo)
ASOVORAGINE	Users Association of La Vorágine (Asociación de Usuarios de La Vorágine)
BID	Inter-american Development Bank (Banco Interamericano de Desarrollo)
BOD	Biological Oxygen Demand
CAI	Community Nursery (Centros de Atención Infantil)
CAP	Water Committee in Nicaragua (Comité de Agua Potable)
CARDER	Environmental Authority of Risaralda Department (Corporación Autónoma Regional de Risaralda)
CINARA	Research and Development Institute of Water Supply, Sanitation, and Water Resources Conservation (Instituto de Investigación y Desarrollo en Agua Potable, Saneamiento Básico y Conservación del Recurso Hídrico)
CARE	International NGO CARE INTERNATIONAL
COLPOZOS	Private construction company

CorpoChivor	Private company in charge of the Chivor dam in the Department of Boyacá
CRC	Environmental Authority in the Department of Cauca (Corporación Autónoma Regional del Cauca)
CRQ	Environmental Authority in the Department of Quindío (Corporación Autónoma Regional del Quindío)
CVC	Environmental Authority in the Department of Valle del Cauca (Corporación Autónoma del Valle del Cauca)
DAGMA	Administrative Department for Environmental Management (Departamento Administrativo de Gestión Ambiental)
DALYS	Disability-Adjusted Life Years
EDAR	Wastewater Treatment Management Institution (Empresa de Aguas Residuales de Armenia)
EEP	Environmental Educational Project
EMCALI	Municipality Service Agency (Empresas Municipales de Cali)
EMPATIA	Public service institution in the municipality of El Patía (Empresas Públicas de El Patía)
EMSIRVA	Municipality Solid Waste Management Agency (Empresa de Servicios Varios)
ENACAL-GAR	Nicaraguan Water Supply and Sewerage Institution - Department of Rural WSS (Empresa de Acueducto y Alcantarillado de Nicaragua - División de Acueductos Rurales)

EPA	Public Institution for Service Delivery in Armenia (Empresas Públicas de Armenia)
ESAP	High School of Public Administration (Escuela Superior de Administración Pública)
ESP	Public Service Organisation (Empresa de Servicios Públicos)
ETAPA	Public Agency of Telephone, Drinking Water and Sewerage (Empresa Pública Municipal de Teléfonos, Agua Potable y Alcantarillado)
FINDETER	Regional Development Agency (Financiera de Desarrollo Territorial)
FIU	Urban Infrastructure Fund (Fondo de Infraestructura Urbana)
FOREC	Fund for the Re-construction of the Coffee Region (Fondo para la Reconstrucción del Eje Cafetero)
GARNET	Global Applied Research Network
HRI	Health Risk Index
ICBF	National Institute of Family Welfare (Instituto Colombiano de Bienestar Familiar)
ID	Institutional Development
IDEAM	Institute of Meteorology, Hydrology and Environmental Studies (Instituto de Hidrología, Meteorología y Estudios Ambientales)
IHE	International Institute for Infrastructure, Hydraulic and Environmental Engineering
IRC	International Water and Sanitation Centre



IS	Information System
JAL	Local Administrative Committee (Junta Administradora Local)
JAC	Community Action Committee (Junta de Acción Comunal)
Lpd	litres per person per day
MSF	Multi-stage Filtration
NGO	Non-governmental Organisation
NRC	National Research Council
O&M	Operation and maintenance
POA	Annual Operation Plan (Plan Operativo Anual)
PAS	Water Supply and Sanitation Programme (Programa de Agua y Saneamiento)
PDAR	Plan for Decontaminate Wastewater in Armenia (Plan para la Descontaminación de las Aguas Residuales de Armenia)
PEC	Primary Environmental Care
PROCUENCAS	Foundation for the Protection of Cali's Watersheds (Fundación Protectora de la Cuencas de Cali)
SENA	National Training Institute (Servicio Nacional de Aprendizaje)
SSA	Sub-secretary of Environmental Sanitation (Subsecretaría de Saneamiento Ambiental)

SSF	Slow Sand Filtration
SSM	Soft Systems Methodology
TLP	Team Learning Project
TRANSCOL	Technology Transfer Programme on Water Supply Treatment in Colombia (Programa de Transferencia Organizada de Tecnología para Colombia)
TSS	Total Suspended Solids
UASB	Upflow Anaerobic Sludge Blanket system
UMATA	Municipal Unit for Agriculture Technical Service (Unidades Municipales de Asistencia Técnica Agropecuaria)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNOM	O&M Unit (Unidad de Operación y Mantenimiento)
UniValle	University of Valley (Universidad del Valle)
USA	United States of America
VIP	Ventilated Improved Pit latrine
WB	World Bank
WS	Water supply

WSP-WB      Water and Sanitation Programme – World Bank

WSS          Water supply and sanitation