- ETAP -
Escuela Técnica de Agua Potable

Program of Agua Para La Vida

- November 2011 -

CONTENT

I - ORGANIZATION INFORMATION

1.1 Information

AGUA PARA LA VIDA www.aplv.org
aplv@aplv.org

1.2 Contact Information

1.2.1 United States

Charlie Huizenga
2311 Webster Street
Berkeley, CA 94705

charlie@aplv.org
510-914-1988

1.2.2 Nicaragua

Carmen González, Nacional Coordinador, Managua
carmen@aplv.org
(505) 89 01 60 77

Cecilia Santonja and Denis Barea, ETAP Teachers and Principals, Río Blanco
etap@aplv.org
(505) 84 95 35 35

II - CONTEXT

In Nicaragua, the coverage level of potable water and sanitation services is low: it is estimated that 52% of the rural population live without access to clean water or adequate sanitation. This situation is even more acute in indigenous communities, where 80% of the population lacks basic services.

This situation impacts directly on the health of the population - nearly 80% of health problems (diarrhea, parasites, conjunctivitis, and skin disease, among others) in the rural population can be attributed to lack of access to safe water. Moreover, the task of carrying water from the source to the house falls on women and children and often requires several hours per day.

The ability of the Nicaraguan government and its citizens to meet the demand for drinking water and sanitation is limited not only by a lack of financial resources but also a lack of Nicaraguan professionals able to design and build such systems. That knowledge might in principle be provided by local engineers but they are costly, too few and in any case the planning, design and building supervision needed for these village systems turns out to require a mix of technical training and familiarity with farmers and more generally rural life.

For these reasons, in addition to its own drinking water projects, the NGO Agua Para La Vida (APLV) has created a Drinking Water Technical School called **ETAP - Escuela Técnica de Agua Potable -** with the goal of teaching young people from rural areas how to design, build and maintain rural drinking water and sanitation projects. Graduates from the school receive a nationally accredited degree as *Technicians in Design and Management of Rural Drinking water and Sanitation Systems*.

This training is completely free for students, enables them to improve their economic status and gives them the skills necessary to be involved in the development of their own country.

III - DESCRIPTION OF AGUA PARA LA VIDA

3.1 APLV: Mission and achievements

Agua Para La Vida is an international non-profit organization founded in 1987 with the aim of improving the living standards of rural communities in Nicaragua.

The organization has a 24 year history of successful integrated projects of gravity-flow drinking water systems, sanitation, health education and environmental management for rural communities exclusively in Nicaragua.

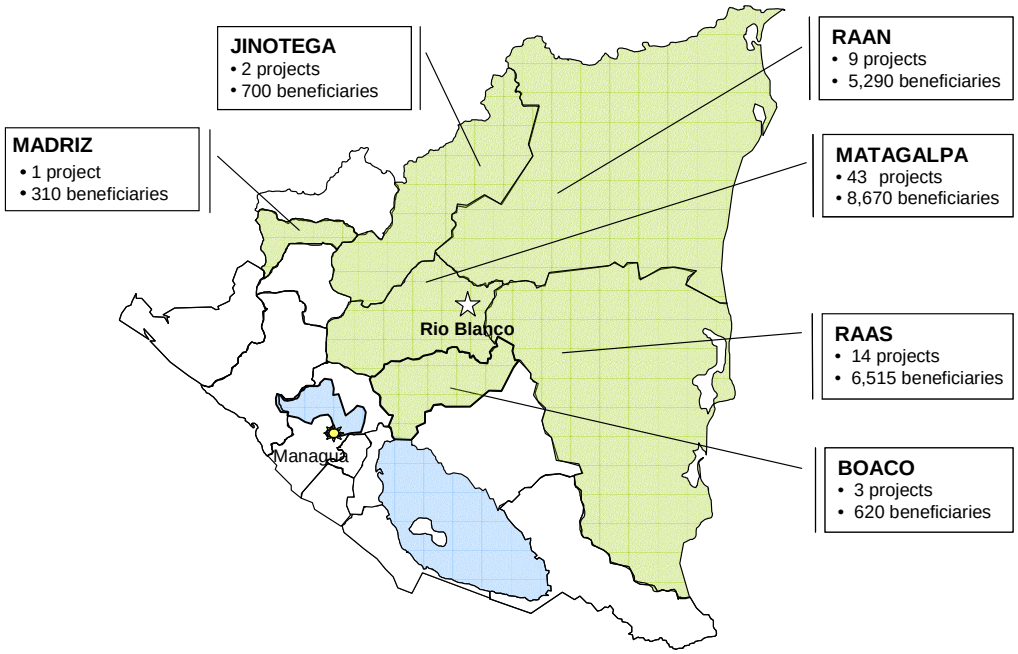
To date, APLV has designed and installed 72 projects that serve more than 20,000 people with clean drinking water.

The organization is registered as an NGO in the US, Nicaragua and France and receives funding from foundations and individuals.

El Carrizal Project - 2010

APLV's operational office is located in the small town of Río Blanco, department of Matagalpa in the center of the country. APLV has carried out projects in six different departments of the country. The whole team is nicaragayan.

APLV's Projects Map



3.2 APLV's Sustainable Approach

3.2.1 Objectives

MAIN GOAL

► Increase, in a sustainable way, the number of people with access to safe drinking water and adequate sanitation in rural communities of Nicaragua.

SPECIFIC OBJECTIVES

- ► Help communities build and maintain their own drinking water system and adequate sanitation
- ► Improve water quality and increase water quantity used by the beneficiaries
- ► Promote the adoption of good hygiene practices in order to improve the health of the community
- ► Protect the springs and the watersheds from long-term environmental degradation
- ► Help communities achieve local autonomy and sustainability in all aspects of construction, administration and maintenance of their project

3.2.2 Six integrated components

To reach those objectives, APLV developed a special approach based on 6 integrated components:

- **Social development**: Preparation, organization and continued support of the entire community to implement the integrated project; specific training of the CAPS (Water and Sanitation Committee) to insure the future maintenance.
- **Drinking Water**: Design and construction of potable water gravity-fed system with public or individual waterstands,
- **Sanitation**: Help in building VIP (Ventilated Improved Pit) latrines for families with inadequate sanitation services.
- **Hygiene and Health Education**: Community diagnosis and organization of workshops and household visits to promote health and hygiene.
- **Environment**: Identification and conservation of the spring and the watershed through reforestation and environmental education.
- **Operation & Maintenance**: Follow-up of past projects, support to communities with technical or social difficulties, resolution of technical problems, systems extensions.

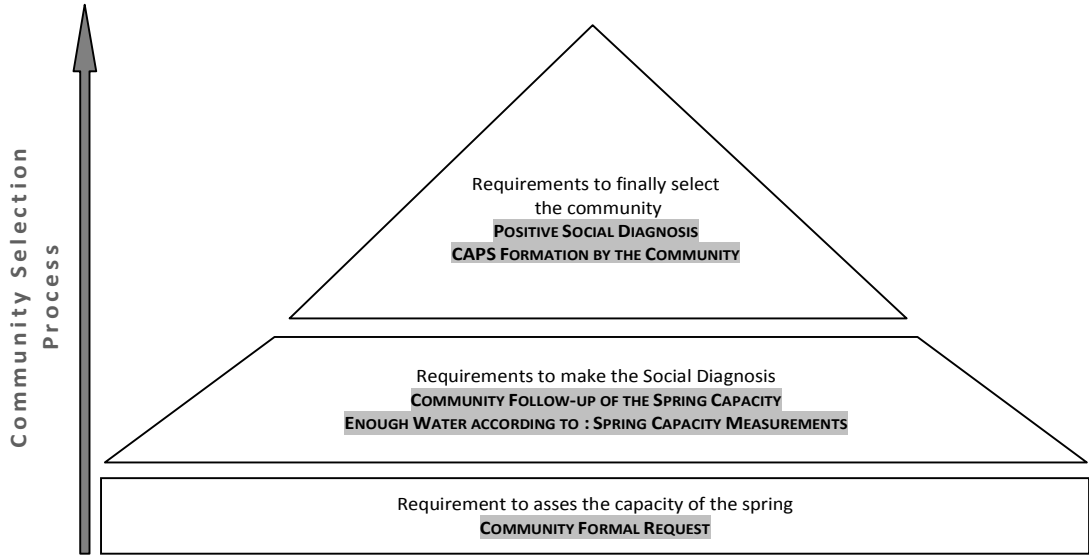
The technical aspects of each project (drinking water and sanitation) are undertaken by a team of technicians, all graduates of our school, as well as experienced masons. Education and training are handled by our experienced social, hygiene & health and environment promoters.

3.2.3 APLV's method

APLV works hand-in-hand with the community and provides support before, during and after completion of the project.

First Step: Comunity Selection

Projects are always initiated by the community, and the process beings when one or several leaders or community members come to APLV's office to present their request. The comunity has to give a formal request to APLV and must create a Water Project Committee. During dry season APLV tecnicians measure the spring capacity and ask to the community to continue this measurement once a week to get the lowest flow of the spring in order to ensure that there is sufficient capacity for the community all year long. As well as making a technical assessment of the project, we also assess the motivation of the entire community before moving the project forward.



Second Step: Proposal development and fundraising

After selecting the community, APLV carries out a study, which includes:

- a census and socio-economic assessment
- a sanitary survey to assess latrine conditions and to establish a hygiene baseline
- the procedures to legalize spring property and authorizations for pipeline and water tank easements
- a 'work commitment' signed by each family
- the topographic survey and the technical design of the project

Finally, the proposal is completed and the fundraising phase for this project starts.

Third Step: Project execution

Once the required funding has been secured, the execution phase of the project starts, and the following activities are carried on:

- working groups formation
- water system execution (spring catchment construction, excavation of trenches and pipes installation, water tank and tap stand construction)
- watershed management plan implementation including environmental education
- hygiene and health education sessions, monitoring and final hygiene survey
- technical training
- latrine construction demonstration (each family builds their own)
- project administration and maintenance capacity-building

This phase ends with the submission of all the project information and the formal transfer of responsibilities to the community.

Fourth Step: Monitoring and Maintance support

APLV monitors the project over a 6-month period; this monitoring includes:

- hygiene and health impacts
- water committee operation and proper system administration
- technical system evaluation
- reforestation

On a longer time scale, APLV supports the community, technically and financially if necessary, on:

- specific maintenance interventions (that can not be done by the community alone)
- systems extensions
- if necessary, water committee reinforcement or restructuring

APLV promotes the high participation of women in the water committee and in all project phases.

APLV projects involve the participation of many local actors:
-> the community through its high involvement: physical work, logistic support...
-> the municipality through its financial support or tools and materials donation
-> the health ministry (MINSA) and the education ministry (MINED)

APLV has developed a sustainable working methodology that achieves local autonomy and sustainability.

IV - DESCRIPTION OF THE PROJECT: ETAP

4.1 Project Overview

The Technical School of Water Supply was created in 1996 to train young technicians in all aspects of analysis, design, and implementation of projects related to gravity-fed drinking water systems for rural communities.

This school is unique in Nicaragua and has the following objectives:

- ► To make the students capable of designing and implementing drinking water supply and sanitation projects in rural communities
- ► To give young people from rural communities and with very limited resources the opportunity to continue their studies,
- ► To provide municipalities, communities, NGOs and of course Agua Para La Vida, trained and competent people for all kinds of work on water projects.

In order to produce highly trained technicians with the required amount of experience:

- the course lasts at least two years (full-time)
- the course includes both classroom study and practical training in the field

The student spends approximately 40% of the time on projects in the field and 60% in the classroom. During fieldwork the students are working on APLV projects where they are involved in all tasks necessary for the completion of a drinking water project. In this way the student can assimilate the information of the class with their experience in the field.

The number of students is limited to eight so that each student receives the attention they need and deserve.

To date, the school has graduated 4 classes, totaling 25 students who have received the title of Hydraulic Technician. All technicians employed by APLV are graduates of the ETAP.

The school is located in the same town as APLV, in Río Blanco in the Department of Matagalpa, in order to facilitate the exchanges with APLV's staff and logistics.

APLV is highly involved in gender and ethnic equality. It is therefore important for us to recruit women and indigenous students for the program.

The course is nationally accredited by **INATEC** (National Institute of Technology in Nicaragua).

4.2 General skills acquired

The general skills acquired with this course are:

- ► To learn, develop and implement current techniques in formulation, planning, surveying, design, construction, and management of drinking water and rural sanitation projects
- ► To identify, analyze, and propose solutions to problems with existing drinking water systems
- ► To develop general skills in mathematics, computers, oral and written communication as part of a comprehensive education
- ► To communicate and work effectively with project stakeholders: government officials, water committees, communities, skilled labor, and others

4.3 Selection process

Student recruitment is done through an initial selection according to the following required documents: letter of application, letter of recommendation, and proof of economic status. Then, the shortlisted candidates come to Rio Blanco to participate to an exam and a personal interview with APLV and ETAP staff. The exam evaluates candidate's logic, mathematical level and writing skills.

The requirements to participate in the exam are:

- To be Nicaraguan,
- To come from rural communities,
- To be of low income,
- To be between 17 and 30 years old,
- To be disposed to work with communities of extreme poverty,
- To have time and attitude necessary to meet the schedule, examinations and field work.

4.4 Education Methodology & Syllabus

4.4.1 ETAP's approach

The training must face squarely the reality of public rural education in the primary and secondary schools of impoverished countries: a very elementary academic level.

As a result the training period needs to be fairly long (two and half to three years), much individual attention needs to be allowed for (small classes) but above all, the tools for the transfer of technological proficiency must be thought anew.

The creation of programs and their assimilation by ETAP students is one of the specialties of APLV and ETAP. They are made freely available to one and all either. This is a way by which APLV facilitates the duplication of centers of development of potable water systems.
There are of course other areas of training that are handled by more conventional means.

This course is taught by various instructors. Among these, we include technicians who are working with APLV and people from others programs of APLV (hygiene promotion, reforestation, finance and administration, social organization). The main courses are taught by the school principal who is an engineer.

The program and the didactic material were designed by Gilles Corcos, UC Berkeley Professor of Mechanical Engineering who is of international fame.

The main part of the course is dedicated to the technical aspects. However, the curriculum has an integral approach (like in APLV projects) with the main objective of executing high quality projects with good coordination with all project components.

4.4.2 Curriculum

The education curriculum is described on the following page, and includes:

- 5 main skills areas
- 14 modules

The modules are separated in different skill fields. Each skill field represents a 'professional profile'. Mathematics is a base for the entire course; Computing and Technical communication are modules taught throughout the whole program.

Requierements

- Mathematics 350 hours
- Computing 300 hours
- Technical Comunication 160 hours

- Land-Surveying and Mapping 260 hours
  - → **Topographer**
- Materials 80 hours
- Physics and Hidraulics 300 hours
- Technical Drawing 50 hours
- Design of water Catchment 150 hours
- Design of water Supply systems 400 hours
  - → **Designer Technician of drinking water rural systems**
- Operation Diagnosis & Maintenance 50 hours
- Field Practices 900 hours
  - → **Field Technician of drinking water rural systems**
- Rural Sanitation 80 hours
  - → **Rural Sanitation Technician**
- Project Development 120 hours
- Others components of Integral Project 50 hours
  - → **Formulation and Coordination Technician of Integral drinking water and sanitation project**
- **Profesional Training** 640 hours

→ **Technician of Design and Management of water supply and rural sanitation systems**

3890 hours

4.4.3 Module Skills and Content

The skills acquired as well as the content summary for each module are described in the following table.

MODULES	SKILLS	CONTENT
Mathematics	➔ MASTER BASIC MATHEMATICS TOOLS	I. Mathematics definitions, sets and numbers II. Measurements units III. Basic algebra IV. Calculation methods V. Fractions VI. Basic geometry VII. Perimeters, Areas, Volumes VIII. Equations IX. Proportionality X. Powers XI. Pythagoras y Trigonometry XII. Graphics XIII. Statistics XIV. Errors
Computing	➔ USE OF A COMPUTER AND TRAINING WITH THE PROGRAMS NECESSARY TO DESIGN AND EXECUTE A PROJECT	I. Computer tools to present data (Excel, Word, PowerPoint) II. Computer tools to draw and document water systems (AutoCAD, ErViewer, MapSource…) III. Computer tools to design water systems (Aire en Tuberías, Neatwork, aBridge) IV. Computer tools to look for information (Internet)
Tecnical Comunication	➔ TECNICAL COMUNICATION METHODS AND TOOLS	I. Understanding the communication process II. Reaching a high level of written and oral communication III. Knowing how to write a technical report and how to make an oral presentation IV. Understanding professional communication

MODULES	SKILLS	CONTENT
Land-Surveying and Mapping	SURVEYING, PROCESSING TOPOGRAPHICAL DATA AND MAPPING TOOLS FOR READING AND MAKING MAPS	I. Theoretical Land-Surveying II. Practical Land-Surveying III. Mapping
Materiales	MATERIALS AND THEIR CHARACTERISTICS	I. Materials used in water and sanitation project II. Concrete use in water and sanitation works
Physics & Hidraulics	PHYSICS OF FLUIDS AND SOLIDS BEHAVIOR	I. Speed y acceleration II. Forces, moments and statics III. Work, Energy and Power IV. Hydrostatics V. Hydrodynamics
Tecnical Drawing	TECHNICAL DRAWING AS A TOOL FOR DESIGN	I. Drawing standards II. General or collection drawing III. Dihedral system
Design of water Catchment	WATER CATCHMENT DESIGN	I. Knowing the different types of water sources, their advantages, drawbacks and vulnerability II. Water quality parameters and water treatment solutions III. Spring catchment method IV. Subterranean water catchment methods V. River catchment methods
Design of water supply systems	WATER DISTRIBUTION SYSTEM DESIGN	I. Design of the main pipeline for a gravity flow water system (before the water tank) II. Design of the distribution network for a gravity flow water system (after the water tank) III. Design of the water tank and other components of the systems IV. How to cross obstacles V. INAA standards (Nicaragua) for water systems

MODULES	SKILLS	CONTENT
Operation Diagnosis & Maintenance	OPERATIONAL DIAGNOSIS, PROBLEMS RESOLUTION AND PREVENTIVE ACTIONS	I. Technical diagnosis of system efficiency II. Problems resolution III. Preventive actions
Field Practices	PRACTICAL MASTERY OF ALL THE STEPS OF THE PROJECT EXECUTION PHASE	I. Practic of all activities directly under the water and sanitation technician responsibility II. Practice in activities that are part of other components of a water and sanitation project: hygiene & health, environment, community organization. III. Complementary technical practices (treatment plants and especial projects outings)
Rural Sanitation	RURALS SANITATION	I. Introduction to sanitation II. Diseases linked to water and sanitation: transmission and prevention III. Adequate human feces disposal: rural latrines IV. Grey water and solid waste disposal : rural adapted solutions
Project Development	PROJECT DEVELOPMENT	I. Accountability II. Writing project proposals
Others components of Integral Project	COORDINATION OF ALL COMPONENTS OF AN INTEGRAL WATER AND SANITATION PROJECT	I. Objectives and tasks of a social promoter II. Objectives and tasks of an hygiene and health promoter III. Objectives and tasks of an environmental promoter IV. Importance and key points of a good coordination with the others components of an integral project
Profesional Training	EXPERIENCE AND RESPONSABILITY	I. Full time four months experience in the field on implementing projects

4.5 Beneficiaries

The direct beneficiaries of ETAP are of course the students receiving the course. They are a maximum of 8 every 2 ½ years. But obviously, the beneficiaries of ETAP project are much more than these students.

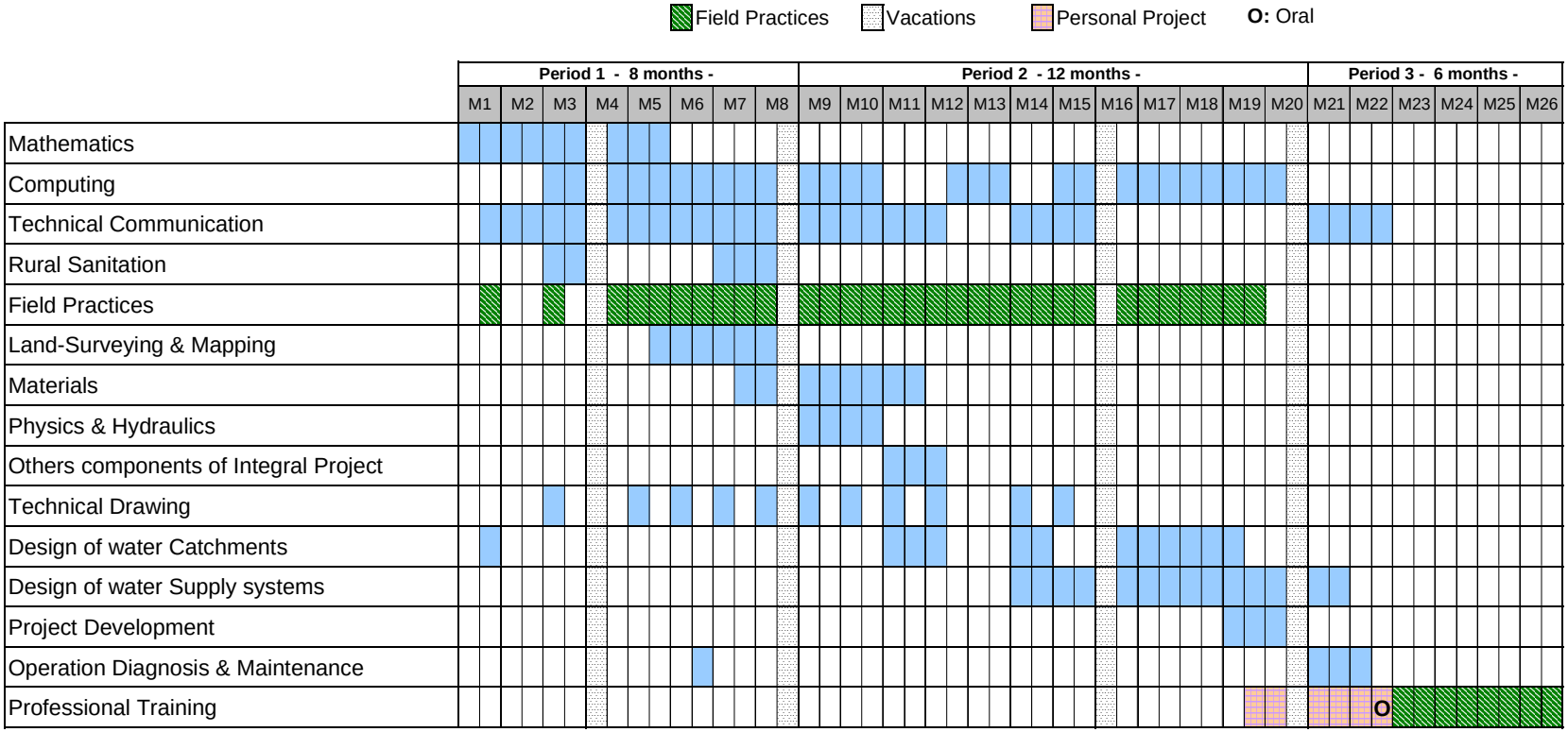
ETAP is an APLV innovation: a school which teaches young farmers to become technicians who are capable of carrying out by themselves all phases of the conception and creation of a sophisticated water delivery system. We have demonstrated that after two to three years of training the graduating technicians can be entrusted with the design and execution of a complete project and rarely require any help. This is how we see the logical transfer of technical competence.

As a result, the beneficiaries of ETAP project are all the people who will in the future benefit from a water and sanitation project carried out by ETAP graduates.

ETAP allows young people without economic resources to study. However, the students, entering with a very low academic level, need to make a lot of effort to complete the course. After all, the benefit they will give to their country is much more valuable.

4.6 Planning

ETAP PLANNING



4.7 Budget

Expenses sections	Description	Amount
Teachers	Salaries, administration, travel allowance	28,262 U$
Students	Food, travel allowance, fees	22,360 U$
Training material	Stationery, materials for projects, photocopies, books	2,456 U$
School building expenses	Water, gas, electricity, internet, security	3,918 U$
Operating budget	Equipment maintenance, school maintenance	2,944 U$
Equipment	Equipment investment	3,500 U$
Others	Next graduating class recruitement, fundraising	400 U$
	TOTAL	63,840 U$
	TOTAL PER STUDENT	7980 U$

A full scholarship for one student is worth 7,980 U$ and covers all expenses.

Field Practice

Spring water flow mesurement, Land-Surveying, bridge column construction, assembling meters, pipe connection, assembling suspension pipe bridge

Catchment construction, tank construction

ETAP has a proven track record of successfully training water technicians and enabling sustainable development in an impoverished country.

Thank you and we remain of course available for any questions.

ETAP needs and deserves your support as a pioneering experiment in technological transfer