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Water Supply and Sanitation Activities

Cooperative Agreement No. #511-A-00-08-00124-00

September 2009

This publication was produced for review by the United States Agency for International Development. It was prepared by ACDI/VOCA under the contract referenced above.

Gobierno del Estado Plurinacional de Bolivia

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USAID/Bolivia Cooperative Agreement #511-A-00-08-00124-00

FINAL REPORT

September 30th, 2009

ACDI VOCA

Expanding Opportunities Worldwide

SUMMARY

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Program Title:	**Water Supply and Sanitation Activities (WSSA)**
Cooperative Agreement No:	511-A-00-08-00124-00
Country/Region:	Bolivia, Latin America
Time Period covered by this report:	September 2008 - June 2009

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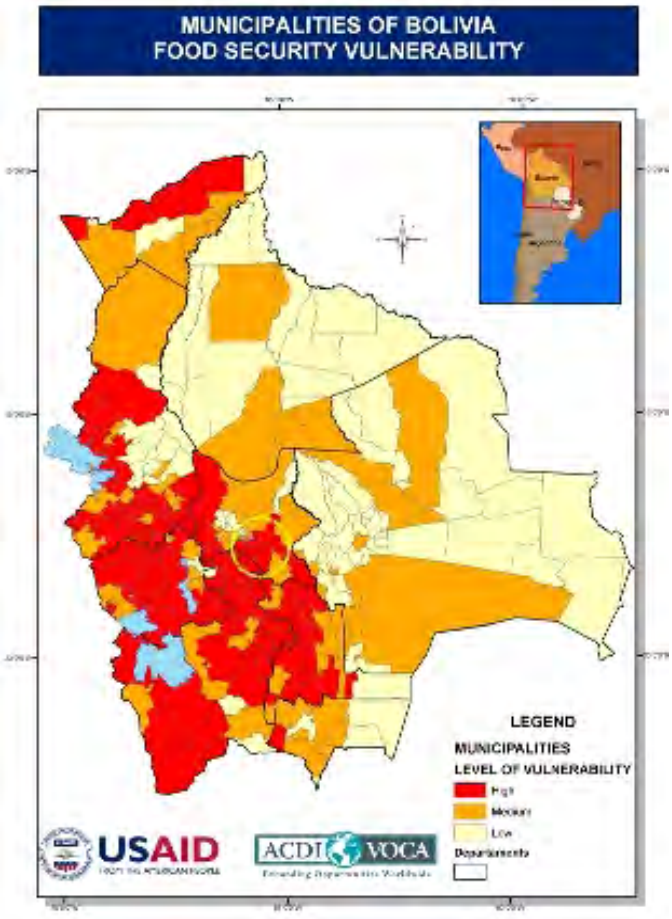
Acronym List

ADDs	ACUTE DIARHETIC DISEASES
AMDECO	ASSOCIATION OF COCHABAMBA MUNICIPALITIES
ASAR	ASOCIATION OF ARTISINAL AND RURAL SERVICES
CA	COORPERATIVE AGREEMENT
DESCOM	COMMUNITY DEVELOPMENT
DRNMA	DEPARTMENT OF NATURAL RESOURCES AND THE ENVIRONMENT
FS	FOOD SECURITY
HDI	HUMAN DEVELOPMENT INDEX
IEE	INITIAL ENVIRONMENTAL EXAMINATION
IR	INTERMEDIATE RESULT
MDGs	MILLENNIUM DEVELOPMENT GOALS
PPM	PREVENTION AND MITIGATION PROGRAM
CAPYS	POTABLE WATER AND SANITATION COMMITTEES (*Comités de Agua Potable y Saneamiento* – CAPYS in Spanish)
SO	STRATEGIC OBJECTIVE
UDAPE	SOCIAL AND ECONOMIC POLICY ANALYSIS UNIT
WSSA	WATER SUPPLY AND SANITATION ACTIVITIES
WFP	WORLD FOOD PROGRAMME

I. PROJECT BACKGROUND

Bolivia has been making important advances towards achieving its Millennium Development Goals (MDGs). A report issued by the Social and Economic Policy Analysis Unit ("*Unidad de Análisis de Políticas Sociales y Económicas*" or UDAPE in Spanish) indicates that Bolivia will be able to reduce its 1990 poverty level of 48 percent down to 22 percent by 2015.[1] Nevertheless, the report also highlights that these achievements are not being reached uniformly and equitably. There are considerable disparities between departments such as Santa Cruz and Potosí, but there are also alarming differences between municipalities within individual departments. For example, in the department of Cochabamba, the Human Development Index (HDI) rating in the municipality of Cercado is the highest in the country at 0.741, similar to countries such as Thailand and Colombia. However, in other regions of Cochabamba, levels are closer to those of extremely poor countries such as Ethiopia or Malawi. This is the case for the municipalities of Alalay and Vacas, which have HDIs of 0.400 and 0.441 respectively.[2]

In 2003, the World Food Programme (WFP) conducted a nationwide study to assess the degree of food insecurity within each of the 328 municipalities of Bolivia.[3] The distinction among municipalities offers insight not only into the disparaging levels of poverty and vulnerability within individual departments, but it also highlights the areas that have been historically neglected in Bolivia. Such is the case for the rural municipalities of Cochabamba, which stand out in particular (see map "Municipalities of Bolivia Food Security Vulnerabilty"). The municipalities of Vacas and Alalay report vulnerability levels similar to those of the destitute municipalities in northern Potosí.



Source[4]

In the underserved areas of Bolivia, improving living conditions and the quality of life first requires an acknowledgement of and response to basic needs that are not being addressed. Without this, longer-term goals such as improved education, economic progress and good governance are difficult to achieve, as families continue to dedicate a disproportionate amount of time and resources providing for their day-to-day essential needs. One of the most commonly identified priorities for impoverished rural communities in Bolivia within this context is access to potable water and basic sanitation.

1 UDAPE 2006. Fourth report on the progress in achieving the MDGs

2 United Nations Development Program, UNDP. 2004 Index of Human Development by Municipality

3 World Food Program. 2003. Food Security vulnerability map.

4 Map developed by ACDI/VOCA: based on '*Atlas Estadístico de Municipios*, 2005' a study conducted by the National Institute of Statistics (INE in Spanish)

This Final Report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of ACDI/VOCA and do not necessarily reflect the views of USAID or the United States Government.

In preparation for implementing the Water Supply and Sanitation Activities (WSSA) project, ACDI/VOCA worked closely with the Association of Cochabamba Municipalities (AMDECO) and the Commonwealth of Municipalities of the Southern Cone (*Cono Sur)* of Cochabamba to identify historically neglected population groups with the highest levels of poverty and vulnerability. A number of communities within the municipalities of Alalay and Vacas were identified as having historic, unaddressed demands for potable water and basic sanitation. The municipalities of Alalay and Vacas are located in the southern section of Cochabamba, known as the *Cono Sur*. Alalay is in the Third Section of Mizque province and Vacas is in the Second Section of Arani province (See Appendix A for maps of the project areas).

The general characteristics of both municipalities are very similar. Household economies are based on subsistence agriculture. Production is destined for family consumption, and what is left over is sold at local markets. Principal crops include potatoes, maize, *oca*, *papaliza*, wheat, barley and oats. Families also raise pigs, cows, sheep, goats, guinea pigs and poultry. Family roles are relatively well defined. The daily routine for women begins at six o'clock and their responsibilities include food preparation, caring for younger children, carrying water for household use and, in some cases, the production of textiles. Children older than 10 years old work in the fields and pastures and do other odd jobs. The adult men prepare the fields and are responsible for all tasks associated with farming and breeding.

Photo: Daily life in the countryside

ACDI/VOCA's WSSA project was designed to assist the residents of these two extremely food insecure municipalities where poverty levels are highest, employment is scarce, and water and sanitation infrastructure has been either inadequate or poorly maintained. Through WSSA, ACDI/VOCA has provided and/or improved the access to potable water and basic sanitation to population groups with some of the highest infant mortality and other health concerns that can be directly improved through this access. The project worked at the household and community level and with schools, focusing on women and children in particular; normally women and children are the most vulnerable to waterborne illness. They are also the most effective change agents.

II. Program Goals and Objectives

1. INTRODUCTION

During recent years, Bolivian governmental institutions oriented towards the attainment of the MDGs have made the greatest contribution to poverty reduction, especially in municipalities with high vulnerability to food insecurity. One of the most important initiatives has been to improve access to potable water and sanitation systems in a sustainable manner, especially in sparsely populated communities with 50 to 2,000 residents.

Family access to sustainable, community-administered potable water and sanitation systems is considered a priority in terms of poverty reduction, as it is a way to positively affect health determinants, especially in the prevention of acute diarrheic diseases (ADDs). Access to sanitation systems is important for many reasons including:

- Proper utilization of potable water increases food security.[5]
- Reduction of ADDs in children under five through greater access to sanitation systems contributes to a better municipal health index.[6]
- ADDs are the cause of death for 36 percent of children under the age of five.[7]
- Access to potable water in an equitable and sustainable manner improves overall MDG indicators.[8]

As is evident, a direct relationship exists between a community's access to basic sanitation, food security and the health and the poverty level of its residents. Also improvement in access to basic sanitation systems can improve inhabitants' living conditions, decrease the level of poverty and support the attainment of the MDGs and international public policy objectives.

2. OBJECTIVES

Through Cooperative Agreement (CA) No. 511-A-00-08-00124-00, ACDI/VOCA was awarded the sum of US $300,000 by USAID/Bolivia to implement the WSSA project for a period of eight months. This agreement began on September 5, 2008. In Modification one of the CA, USAID/Bolivia approved an unfunded extension for the WSSA project through June 2009. The total duration of the project was extended to 10 months. In that time period all project objectives were met.

The primary objective of WSSA was to:

> ***"Provide and/or improve access to potable water and basic sanitation, build local capacity and improve hygiene practices in impoverished communities of high vulnerability to food insecurity in the municipalities of Vacas and Alalay in the Department of Cochabamba."***

The implementation of the WSSA project was consistent with the National Development Plan "To Live Well" ("*Plan Nacional de Desarrollo 'Para Vivir Bien'*") and conformed to USAID/Bolivia's overall mission objectives. The project directly contributed to the food security (FS) office's strategic objective (SO) to "improve economic sustainability in areas of food insecurity," and specifically to "provide improved access to potable water systems."

The WSSA project objectives were to:

- Provide and/or improve the access to potable water and basic sanitation to population groups with high vulnerability to food insecurity.

- Build capacity and knowledge within the target population in the administration of basic water and sanitation systems, human and solid-waste management, personal hygiene, food management and other topics related to food security.

5 World Food Programme. 2003. Food Security vulnerability map.

6 Municipal Health Index, Bolivia 2005. UMSA, OPS/OMS López C, Calvo A.

7 A Profile of Health Systems in Bolivia (*Perfil de los sistemas de salud en Bolivia* in Spanish), 2007. Ministry of Health and Sports - OPS

8 National Plan "*Agua para todos*" (Water for Everyone). Bolivia 2007. Ministry of Water of Bolivia – UDAPE Report on the MDGs. Fourth Report 2006.

III. ACHIEVEMENTS

1. OVERVIEW

ACDI/VOCA achieved the WSSA objectives and target results through the implementation of the following activities:

- Construction of potable water systems and individual household latrines for the community of Villa Evita and three communities in the *Cental* Yanagaga.
- Improvement and rehabilitation of the potable water system in Pajcha Baja and the expansion of the water system in the town of Alalay in the Municipality of Alalay through the provision of additional pipe and construction of a water storage tank.
- Improvements to three potable water systems (Chapikollo, Pedregal Alto and Cochapimpa) in the municipality of Vacas. Activities included rehabilitation of existing shallow wells, provision and installation of submersible pumps and replacement of sections of deteriorated water lines.
- Trainings conducted in 43 communities in the municipalities of Alalay and Vacas in basic sanitation, selected environmental topics, and operation and maintenance of water systems and dry latrines.
- Facilitation and support for the establishment of Potable Water and Sanitation Committees (*Comités de Agua Potable y Saneamiento* - CAPYS – in Spanish) in Villa Evita and Yanagaga.
- Institutional strengthening of existing water and sanitation committees in 43 communities in the municipalities of Vacas and Alalay.

Benefits provided by the WSSA project included:

- 101 household water connections for individual families.
- 62 household toilets/dry latrines for 127 families in Yanagaga.
- 34 household dry latrines for 34 families in Villa Evita.
- 160 additional families with rehabilitated water supply systems and new water pumps.
- 587 families with improved hygiene habits as a result of effective training.
- 127 children trained in proper hygiene habits and with backpacks containing hygiene kits.

Photo: Highlands of the department of Cochabamba. Latrines provided by WSSA in the village of Villa Evita.

Additional details on the two potable water projects are provided below:

Yanagaga Potable Water Project:
Installation or provision of the following:

- Water source infrastructure.
- Two pump houses, each with their respective pumps.
- Two elevated storage tanks with capacities of 14,000 and 12,000 liters and one ground tank with a 2,000-liter capacity for the community of Chunchani.
- Water supply distribution line network, consisting of 14,747 meters of piping.
- 30 household water connections.
- 37 public standpipes, including 11 in the community of Chunchani (supply capacity increase 20 percent greater than initially predicted).
- Material and labor for the expansion of additional water supply distribution line networks in Yanagaga and Pajcha Baja.

Villa Evita Potable Water Project:
Construction of the Villa Evita potable water system entailed:

- Drilling and completing the new 80-meter well.
- Constructing an elevated storage tank with a 20,000 liter capacity.
- Installing the 1,562-meter water distribution network.
- Connecting 646 meters of lateral line for household connections (an average of 19 meters per household).
- Installing 34 household water connections.
- Creating three overpasses to improve water distribution.
- Deep cleaning of three wells in existing systems in Pedregal Alto, Chapikollo and Cochachimpa.
- Improving pump line and providing eight pumps to improve existing pump systems. Community members were trained to operate the pumps and carry out simple maintenance tasks.

Participants' houses with latrines.

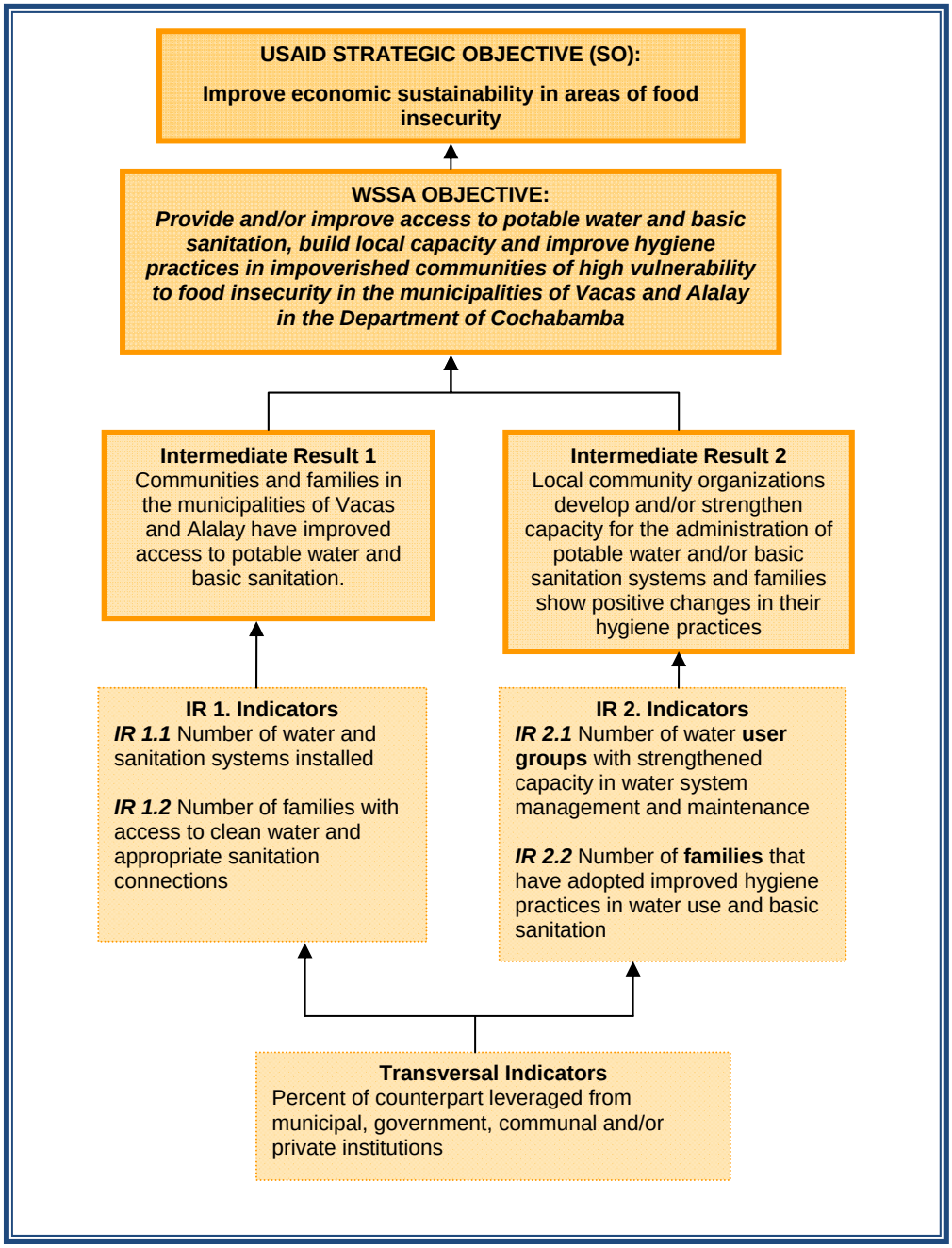
Lack of safe water and sanitation is the world's single largest cause of illness. According to UNICEF, the toll on children is especially high. About 4,500 children die each day from unsafe water and lack of basic sanitation facilities. Countless others suffer from poor health, diminished productivity and missed opportunities for education. The young and the old are particularly vulnerable.[9] The WSSA program benefited a total of 321 families in two municipalities. More than **600 children**[10] under the age of twelve in Yanagaga and Villa Evita have access to potable water and sanitation as a result of the WSSA program and therefore a better quality of life and improved outlook for their health in the future.

9 UNICEF, 2009 - http://www.unicef.org/wash/index_31600.html

10 Number based on interviews with beneficiaries, although the real number of children might be higher, due to the small scale of interviews held: Fertility rates in the rural area of Cochabamba are 6,6 on average INE, Bolivia, 2003 - http://www.ine.gov.bo/PDF/Fecundidad/Fecundidad2.pdf

2. RESULTS FRAMEWORK

As outlined in the approved WSSA Performance and Monitoring Plan[11], ACDI/VOCA tracked two intermediate results (IR) by way of direct and transversal indicators to measure project results. The following results framework demonstrates the relationships of causality among the indicators, the IRs, the objective of the project and the ultimate goal (contributing to the SO of USAID/Bolivia's FS office).



11 Performance and Monitoring Plan (PMP), Water Supply and Sanitation Activities, USAID/Bolivia RfA No. RFA-511-08-010 Sept 2008.

The following table outlines the performance indicator targets and their respective results. All indicator targets have been met or surpassed.

Table 1. Summary of Performance Indicator Targets

Indicator	Measurement Unit	LOP Target	Final Result
IR - 1.1 Number of water and sanitation systems installed	Number of infrastructures	4[12]	4
IR - 1.2 Number of families with access to clean water and appropriate sanitation connections	Number of families	127	161
IR – 2.1 Number of water user groups with strengthened capacity in water system management and maintenance	Water user group (CAPYS)	2	2
IR - 2.2 Number of families that have adopted improved practices in water use and basic sanitation systems	Number of families	527	578
TR. Leveraged counterpart by public and/or private institutions	% counterpart	19.73% of total CA	35% of total CA

Performance Indicator Results

IR 1: Communities and families in the municipalities of Vacas and Alalay have improved access to potable water and basic sanitation

IR - 1.1 Indicator: Number of water and sanitation systems installed
The LOP target of four for this indicator consists of two potable water systems and two dry latrine infrastructure projects. The following two potable water systems were completed; 1)Yanagaga with 67 connections in four communities (30 household connections and 37 public standpipes); and 2)Villa Evita with 34 household connections. The two dry latrine infrastructure projects were also concluded, with the completion and handover of 62 dry latrines in Yanagaga and 34 dry latrines in Villa Evita.

IR 1.2 Indicator: Number of families with access to clean water and appropriate sanitation connections
The results for this indicator exceeded the initial established target of 127 families by 34. The Yanagaga potable water system provides water and sanitation service to 67 affiliated families. In the municipality of Alalay, 60 families have improved access to clean water as a result of the improvement and rehabilitation of the Pajcha Baja system and the expansion of the Alalay water system through the provision of additional pipe and construction of a water storage tank. The Villa Evita potable water system has 34 affiliated families with both household water connections and dry latrines.
In addition, in the municipality of Vacas, the WSSA reestablished access to clean water for 160 additional families in the communities of Pedregal Alto, Chapikollo and Cochachimpa. The WSSA placed the existing, non-functioning water systems in these communities back in service through the provision or

12 All of the dry latrines constructed as the sanitation component to a potable water system will count as a single infrastructure for purposes of indicator targets. Thus, there will be two dry latrine infrastructures – one in Villa Evita and the other in Yanagaga.

replacement of well pumps and pump lines. It should be noted that these families were not counted in the results for this indicator as the assistance they received was relatively minor (provision of pumps) in comparison to the other WSSA beneficiary communities. In addition, families were not able to participate in the training and institutional strengthening activities.

IR 2: Local community organizations develop and/or strengthen capacity for the administration of potable water and/or basic sanitation systems and families show positive changes in their hygiene practices.

IR 2.1 Indicator: Number of water user groups with strengthened capacity in water system management and maintenance

Water user groups in the form of CAPYS were established with WSSA assistance in both Yanagaga and Villa Evita. The committees were then strengthened by affiliating water users as members, drafting and approving CAPYS statutes and regulations, democratic election of a rotating three-to-four person water board, establishing and holding periodic member meetings, and other activities. The successful implementation of these activities indicates that, at present, both CAPYS are consolidated and functioning. Additionally, both CAPYS currently administer water service and operate the water system and are capable of performing preventative and corrective maintenance as required. Timely payment of established obligatory water user fees support associated expenses and is an important part of the process towards a sustainable future.

IR 2.2 Indicator: Number of families that have adopted improved hygiene practices in water use and basic sanitation systems

A total of 578 families in the municipalities of Vacas and Alalay received training and outreach in sanitation education, hygiene and environmental themes as a fundamental part of reducing water-borne disease, surpassing the target of 527. Families also received training in how to properly use and operate dry latrines and instruction on the importance of conservation and wise use of water.

A total of 1,514 trainings (approximately two hours each) were held on the following topics: health, hygiene and sanitation education, importance and wise use of water, prevention of acute diarrheal disease and preservation of the environment. In addition, specific trainings were held covering maintenance, operation and administration of potable water systems. The existing water user groups were strengthened and families gained knowledge and skills in best practices in hygiene as a solid base for continued impact. The community development component was implemented through courses and workshops held in various communities identified and prioritized from an initial baseline survey conducted by Association of Artisanal and Rural Services (ASAR in Spanish). Training events were targeted to as many representative family groups as possible, including: children and teenagers in school with the participation of teachers and health services representatives; and parents and heads of household through household visits.

TR 1.1 Transversal indicators: Percent of counterpart leveraged from public and/or private institutions

The municipalities of Yangaga and Villa Evita complied with 100 percent of their cash counterpart commitment for the infrastructure projects. ASAR and SOBOCE fulfilled the agreed upon in-kind counterpart contributions, and the families benefited successfully contributed through excavation and other activities. According to the CA, the WSSA cost-share commitment was 19.73 percent of total USAID funds. Significantly surpassing the target, the estimated percentage of cost-share achieved was 35 percent.

3. FAMILIES BENEFITED

> .....We always talked about having a potable water system, but the mayor's office told us next year, next year. At last we have clean and healthy water to drink… The children say now they're not going to get sick as much as before from diarrhea because the water is better....
>
> *Testimony of a beneficiary from a Quechua-speaking community*

Before the WSSA project, the residents of the municipalities of Villa Evita and Yanagaga suffered because they lacked access to potable water. At times, they had to walk more than one hour in order to obtain water; water was scarce during the dry season, which caused serious problems for the population. **The WSSA project reached almost 900 families (see Table 2) through the implementation of potable water and sanitation systems and/or intensive training in operation and maintenance, water use and good hygiene practices.** All of those families now have improved access to potable water and sanitation and increased knowledge of water usage and better hygiene habits.

The preliminary number of connections for Yanagaga and Villa Evita outlined in the work plan was based on the initial draft construction design provided by each municipality. After ACDI/VOCA was awarded the WSSA project, a full investigation of the work zones indicated that fewer household connections were needed. The target proposed at the beginning of the project was thus adjusted based on real demand and the actual number of families currently living in the village. As the number of household connections to be installed was reduced, the construction price based on the final design was lower, and there were funds available for reallocation. In consensus with project beneficiaries a decision was made to use the balance to increase the capacity of the potable water systems in Pedregal Alto, Cochachimpa and Chapikollo—communities that were not originally included.

Table 2. Total number of families benefited

Type of beneficiaries	Type of support received	Number of families
Direct beneficiaries	Potable water and/ or latrines and trainings	161
Additional beneficiaries	Rehabilitation of dysfunctional potable water systems	160
Indirect beneficiaries	Trainings for residents of communities with access to potable water systems	578
Total		899

The established targets for **families benefited have been surpassed**. This can be attributed to the effective joint management by the WSSA team, municipal governments and families of both areas.

Table 3. Number of Potable Water Connections[13]

No. Syst.	System	No. Connections		No. Families		No. Communities	
		Target	Achieved	Target	Achieved	Target	Achieved
1	Yanagaga	59	67	85	127	3	6
2	Villa Evita Mariscal	41	34	42	34	3	3
TOTAL		**100**	**111**	**127**	**161**	**6**	**9**

Table 4. Number of Sanitation System Connections (Dry Latrines)

No. Syst.	System	No. Latrines		No. Families		No. Communities	
		Target	Achieved	Target	Achieved	Target	Achieved
1	Yanagaga	85	62	85	62	3	3
2	Villa Evita Mariscal	41	34	41	34	1	1
TOTAL		**126**	**96**	**126**	**96**	**4**	**4**

Families access the potable water system of Villa Evita and Yanagaga by way of household connections. Water is supplied to them continuously in the necessary, established amounts (forty liters per person per day in Yanagaga and sixty liters per person per day in Villa Evita). Families have access to sanitation systems for the elimination of human waste by the proper use of dry latrines, preventing ADDs and favoring better food security through the use of water for food handling and preparation. Additionally, the families of Yanagaga (populated center) and Pajcha Baja can once again access the newly rehabilitated potable water systems.

The potable water systems are currently in full operation, supplying water to households and families by way of public standpipes and household connections. Water is supplied continuously, 24-hours a day, and safely (appropriate for human consumption according to laboratory analysis) to the 161 families.

4. Training in Administration and Operation of Potable Water Systems

> ....They have taught us to organize so that the water committee can fix things if something breaks, also we know to charge the associates so that our system is always working, and also we have to pay for the electricity. ELFEC is going to hook up a meter....
>
> *Testimony of a beneficiary*

Basic sanitation systems continue to function over time only if they are administered, operated and maintained by a group of people who have been trained and properly equipped to provide a quality service that users feel merit payment. For these reasons, and in agreement with the original plan, community development activities such as training, hygiene education, behavior change communication and institutional strengthening were undertaken with the families that directly benefited from the coverage offered by infrastructure projects and with other communities that already had access to water and/or sanitation systems in the municipalities of Vacas and Alalay.

13 In the results table the families of the three communities benefited by the provision of equipment, materials and cleaning projects are not included.

According to the guidelines established in the Community Development Handbook of the Bolivian Vice Ministry for Basic Services (*Viceministerio de Servicios Básicos* in Spanish), community development as part of water and sanitation interventions aims to:[14]

- Increase **civil society's capacity** to proactively respond to the challenges of the expansion and improvement of potable water and sanitation services.
- Encourage the **proactive participation** of civil society in participation processes in the search for new options in service delivery, focusing particularly on options that support changes to existing service delivery conditions.
- Work towards motivating civil society actors to **come to agreements** within a balanced framework between conflicting interests that may arise in the course of achieving sustainable services.

Taking the GPSB's guidelines into consideration and building on ACDI/VOCA's considerable, time-tested experience in managing community development programs, ACDI/VOCA formulated the WSSA's training component to achieve long-term sustainability and positively affect hygiene habits. The overarching intention was that activities be people-centered, integrated and consider the environment. The WSSA project ensured that community development activities contributed to the sustainability of investments as they drew on and developed local capacities for positive impact on the health of target populations, and preservation of the environment.

Through a competitive bid process, ACDI/VOCA selected and contracted the Bolivian non-profit ASAR in Spanish for the implementation of the community development training and institutional strengthening component. ASAR proved to be an organization with extensive experience, capacity and knowledge of the work area. ASAR completed the following activities:

- Supported and facilitated the establishment of CAPYS in Villa Evita and Yanagaga.
- Performed institutional strengthening of existing water and sanitation committees in 43 communities in the municipalities of Vacas and Alalay.
- Conducted training in the 43 beneficiary communities in the municipalities of Alalay and Vacas on the following: a) basic sanitation and selected environmental topics; b) operation and maintenance of water systems and dry latrines.

A total of two CAPYS with the following characteristics were formed:

- The Yanagaga committee has 67 affiliates, statutes and regulations and elects the members of a rotating four-person water board.
- The Villa Evita committee has 34 affiliates, statutes and regulations, and elects the members of a rotating three-person water board.

The committees were formed according to the individual characteristics of each system and the norms found in the Vice Ministry for Basic Services' community development implementation handbook. During implementation, different actions were undertaken such as meetings with social leaders, dialogue with participants and those benefited, audiovisual presentations, fieldwork and the distribution of material, equipment, tools and training instruments. In total, eight training events specifically addressing administration, operation and maintenance were conducted, four in each committee.

14 revised Community Development handbook 2008 – Vice Ministry for Basic Services.

To encourage attendance, invitations to CAPYS training events were delivered personally and broadcast on local radio stations. In addition, an incentive was introduced, consisting of a set of tools (for use in water system and latrine maintenance) for the families who attended all the training events.

Photo: Women participating in a CAPYS operation and maintenance training

The attendance rate (number of families that attended out of the total number of families benefited) was equal for the Villa Evita and Yanagaga committees; a similar percentage of women participated in each system. The methodology utilized and the distribution of equipment and material was the same for both systems.

The committees are responsible for the administration and operation of the sanitation systems and for the staff trained to perform system maintenance. The committees' primary functions are to administer water service, operate the water system and perform preventative and corrective maintenance as required. The committees also collect timely payment of established obligatory water-user fees to support associated expenses. The target has been met and the foundation has been laid for a technically, socially and institutionally sustainable future for the committees and their systems.

Photo: Women learning to use maintenance tools in a CAPYS operation and maintenance training

In accordance with the original plan, the strengthening of other sanitation systems in the municipality identified by the base-line study was also undertaken. Families using other sanitation systems received the same training as the Yanagaga and Villa Evita systems but in less depth, specifically in regards to committee formation which was not necessary for other communities.

A total of 206 participants with an average attendance rate of five participants per community was achieved; for each training there was an average of 29 participants. Women made up 22 percent of all participants.

5. HYGIENE AND SANITATION EDUCATION

> ....We have to use the latrines, you know, it was very funny, they made each of us sit in the latrines so we know how to go…they say it doesn't smell but we are going to find out. ...They surveyed us each of us, they came to our homes to see how we live, later in the training they taught us how to store food, cover the water, clean, all that. ...
>
> *Testimonv of a Beneficiarv*

The original WSSA workplan focused on supporting civil society in gaining a comprehensive understanding of the issues around water resource exploitation and conservation. The plan also

highlighted an integrated technical, economic and ecological vision rooted in education and training. Throughout the WSSA project the project team consistently applied this philosophy in all aspects of its implementation.

Experience has shown that the educational component of a water and sanitation development project is of equal or greater importance than the addition of infrastructure in improving health conditions in rural communities. In order for projects to be sustainable it is crucial that their respective communities have the capacity to operate, maintain and administer their systems. To this end, ASAR developed a series of training events (apart from the training events for the CAPYS) to induce the benefiting population to modify their personal hygiene habits and practices as part of an effort to prevent water-born illnesses. In addition, these trainings encouraged the proper use and care of water, the dry latrines and the environment.

The program entailed a process of information, education, and training whereby practical information was distributed and diffused in a manner that was meaningful to the system's beneficiaries, both adults and children. The two primary goals of the education program were to:

- Provide the necessary information, education, training and follow-up so that the system's beneficiaries are able to receive potable water on a continuous basis that meets appropriate water-quality standards for the entire designed life of the system.
- Establish and reinforce healthy habits within the community in relation to general hygiene practices and water management.

The achievement of these goals was challenging. Changing people's habits is difficult and requires understanding on both a physical and emotional level. The technical and administrative knowledge required to understand how a potable water system works and how it should be managed has to be presented in a very basic and clear manner. This is, in part, due to the fact that many rural community members have little or no formal education.

To determine a starting point, ASAR elaborated a baseline survey of basic sanitation conditions, hygiene knowledge and practices, sanitation-education level, and population tendencies in the care and preservation of water and the environment. The survey was given to a sample of families from both municipalities, including both those that benefited by the basic sanitation systems in Yanagaga (29) and Villa Evita (21), and those that previously had systems in the municipality of Alalay (224) and Vacas (158).

Educational materials prepared at the start of the project (booklets, flipcharts, etc.) were used for the training workshops, and a PowerPoint presentation on health and hygiene was also prepared. A new set of booklets had to be printed because the first set was quickly depleted. These materials were widely used and disseminated at all the training events.

During the practice sessions on the use of dry latrines, participants were first reminded of how latrines work so that they could ask questions and clear up any doubts they had. The proper use of latrines was demonstrated, as were maintenance and cleaning practices to prevent problems of environmental pollution and the spread of diseases as a result of contact with human waste.

A total of 14 training events on sanitation education including field visits, demonstrations and technical presentations were conducted for both basic sanitation systems with a total of 705 participants. Forty-six percent of participants were women, ostensibly because the themes covered held more interest for mothers and women heads of households.

In order to complement the trainings, additional events were conducted with change agents. Boys and girls from primary schools from both municipalities were given lessens in hygiene, sanitation education and the environment. The rationale was to strategically work towards creating healthy habits in children, as this is known to have a multiplying effect within their families. To reinforce the topics explained, all school-aged children were given a backpack filled with personal hygiene materials. The topics covered in schools with the participation of educators were:

- Hygiene practices for children.
- The benefits of potable water in the household.
- Primary causes of childhood illnesses.
- Proper hygienic practices for food preparation.
- The importance of avoiding water contamination.

Photo: School children with WSSA-supplied backpacks filled with personal hygiene packets.

A total number of 176 children and educators participated (30 from Alalay and 146 from Vacas). Hygiene materials given out in each backpack were: a toothbrush, toothpaste, soap, a washcloth and comb.

Students practiced using the washing and hygiene items that were provided in the "hygiene packets" that they received as part of the WSSA training program. They were given demonstrations of personal-hygiene habits, with an emphasis on the correct way to wash their hands and face, brush their teeth, etc. The children then practiced these techniques, following the instructions given by the trainers.

As 578 families have adopted better hygiene practices through the use of water and sanitation systems, the target for both municipalities has been surpassed by 10 percent. This is one of the most important results because it provides a base for a sustainable future for the basic sanitation systems users, and is one of the best ways to prevent diarrheic diseases and improve the population's health and food security.

6. COST SHARING

The municipalities of Vacas and Alalay deposited 100 percent of the required municipal cash counterpart for the infrastructure projects. Additionally, the municipalities provided staff for the follow-up and supervision of the baseline survey in 29 communities in the municipality of Alalay and 59 communities in the municipality of Vacas. In total, the municipalities' cost share was equivalent to 21 percent of the total CA.

In addition to the cash counterpart contribution deposited by the municipal governments of Alalay and Vacas, in-kind contributions were registered by different actors during the implementation of the project. The details of the in-kind cost sharing for each counterpart can be found below.

Cost Share of Families Benefited
According to the project design, the families benefited were expected to contribute in the form of labor during the construction of the systems. These in-kind contributions were provided in accordance with requirements presented by the construction firms and coordinated with the community. The main tasks performed by the beneficiaries were manual excavation and backfill of trenches, forest plantings, carrying and stockpiling materials, and support during concrete pouring work.

Photo: Community members attending a training session in Vacas.

In Yanagaga, the families contributed a total of 1,300 workdays and Villa Evita families contributed 422 workdays. In summary, both communities combined contributed 1,722 workdays equal to approximately six percent of the total CA. The average contribution by family benefited was 10 workdays. However, more important than the total value of the in-kind counterpart provided, is the fact that this cost share represents a display of strong commitment on the part of the users to work for infrastructure that improves their living condition. It also illustrates the project implementers' capacity to mobilize and involve many actors and participants.

SOBOCE's Cost Share
Over the years, ACDI/VOCA has developed an extensive network of partners that share its deep sense of social responsibility. These partners are in the public and private, including nonprofit and for-profit sectors. For this project, ACDI/VOCA secured the support of SOBOCE, the largest cement company in Bolivia. SOBOCE contributed bags of cement for the construction of both potable water and sanitation systems. This cost share was equivalent to approximately one percent of the total CA and allowed the WSSA project to expand its coverage.

ASAR's Cost-share
As part of its agreement, ASAR fulfilled its counterpart contribution. ASAR's contribution involved providing transport equipment (two trucks and one motorcycle), office space in Alalay, as well as construction materials (PVC material and accessories), tool sets (30 wrench sets and accessories) for preventative maintenance and 7,000 forest seedlings to protect water sources. The total value of ASAR's cost share is equivalent to seven percent of the total CA.

7. Environmental Considerations

Environmental considerations were an integral part of the design and implementation of the WSSA. All activities were implemented in accordance with USAID Environmental Procedures (Reg. 216) and Bolivian Environmental Law 1333.

ACDI/VOCA environmental staff prepared and submitted an Initial Environmental Examination (IEE) to USAID in an approved format. The IEE requested a "Negative Determination with Conditions" for the implementation of the potable water systems and latrines due to the relatively small-scale nature of the projects, as well as the very limited environmental impacts that were anticipated. The IEE document included recommended environmental mitigation measures for WSSA activities.

In order to comply with Bolivian environmental regulations, *Ficha Ambientales* (environmental evaluation forms) were prepared for the proposed potable water systems and sanitation infrastructure. The *Ficha Ambiental* was prepared in a format provided by the Bolivian Department of Natural Resources and Environment (*DRNMA* in Spanish) in the department of Cochabamba and required that the applicant identify negative and positive environmental impacts and propose appropriate mitigation measures. The *Fichas Ambientales* were submitted to the *DRNMA* for review and assignment to a category (Category 3). Based on this categorization, and in order to receive the corresponding environmental licenses from the *DRNMA*, ACDI/VOCA was required to present environmental management plans (*Programa de Prevención y Mitigación – Plan de Aplicación y Seguimiento Ambiental* [*PPM –PASA*] in Spanish). ACDI/VOCA prepared and submitted the plans and was granted the environmental licenses.

An environmental specialist from ACDI/VOCA's regional office in Cochabamba was assigned to the WSSA project and thus responsible for ensuring environmental compliance. He conducted site visits for environmental follow-up and control of the two potable water projects during implementation and provided support to ASAR in training beneficiaries in the use and maintenance of the dry latrines.

As part of the environmental mitigation measures, the immediate area around the Yanagaga and Villa Evita water sources was protected. Over the life of the project, 7,000 trees were planted in coordination with community members to protect the micro-watershed and safeguard local water resources.

During the month of June, the environmental specialist prepared the final environmental monitoring and control report based on the environmental mitigation measures stipulated in the approved environmental licenses. The report indicates that the environmental recommendations were implemented satisfactorily and the WSSA project's overall social and environmental impact has been positive.

IV. BEST PRACTICES

> …A good year it has been, just recently the electrical systems came and now we have water, look at the posts now they have light bulbs and at night they light up. We're doing all right I'd say...
>
> *Testimony of a beneficiary*

The WSSA project drew upon ACDI/VOCA's 'best practices' in community development, developed over many years and in many parts of the world, making this program a great success. Most of these methodologies have been utilized by ACDI/VOCA in Bolivia over nearly a decade in the implementation of potable water and sanitation systems for rural communities. Highlights best practices include:

- When trying to improve access to potable water and sanitation, it is cost effective to invest in repairing or improving already existing systems and focus on training in operation and maintenance.
- Capacity strengthening in communities that already have potable water and sanitation systems is a valuable activity in and of itself. In many communities with water systems, community members do not know how to maintain their infrastructure and do not practice proper hygiene habits. Intensive training can effectively address those lacking abilities and practices.

- Working directly with municipal government agencies responsible for public works ensures greater counterpart cooperation and contributes to sustainability.
- To ensure ample participation in training activities, provide and publicize the provision of incentives to participants. To address common gender discrepancies in training participation, choose incentives that appeal to both men and women.
- Actions coordinated with local authorities and representative leaders are more accepted by the families to be benefited.
- Organizations with proven experience, including lingual and cultural fluency, and a presence in the work zone generally offer the best quality for social work.
- Offering trainings in the community's indigenous language is important.

Community members outside a WSSA latrine

- In order to ensure that families are sufficiently involved in the technical aspects of the project, community development activities such as training should begin before the infrastructure projects.
- Facilitating a continuous exchange of ideas with the community and its leaders is essential, as active participation validates to the community members that their opinions and needs are being heard and are understood.
- Having both male and female facilitators increases participation of both men and women in training events.

V. LESSONS LEARNED

During 37 years of successfully implementing development projects in Bolivia, ACDI/VOCA has obtained significant experience, especially in the (sub) tropical regions of the departments of La Paz and Cochabamba. Even though ACDI/VOCA has implemented many projects in the Bolivian highlands, working with potable water projects there was a new experience. The WSSA team anticipated that there would be certain challenges presented by the distinct geography and culture of the Vacas and Alalay communities and that there would be lessons learned. The following discusses these specific challenges that, though not a surprise to ACDI/VOCA, were areas that required extra attention.

One notable cultural and geographical aspect of working with potable water and sanitation in the highlands which is different than in the (sub) tropical regions of Bolivia is that people living in the highlands are accustomed to cold weather and therefore have different hygiene habits. There are several cultural aspects to bear in mind, such as that people have a fear of catching a cold and getting ill from being wet.

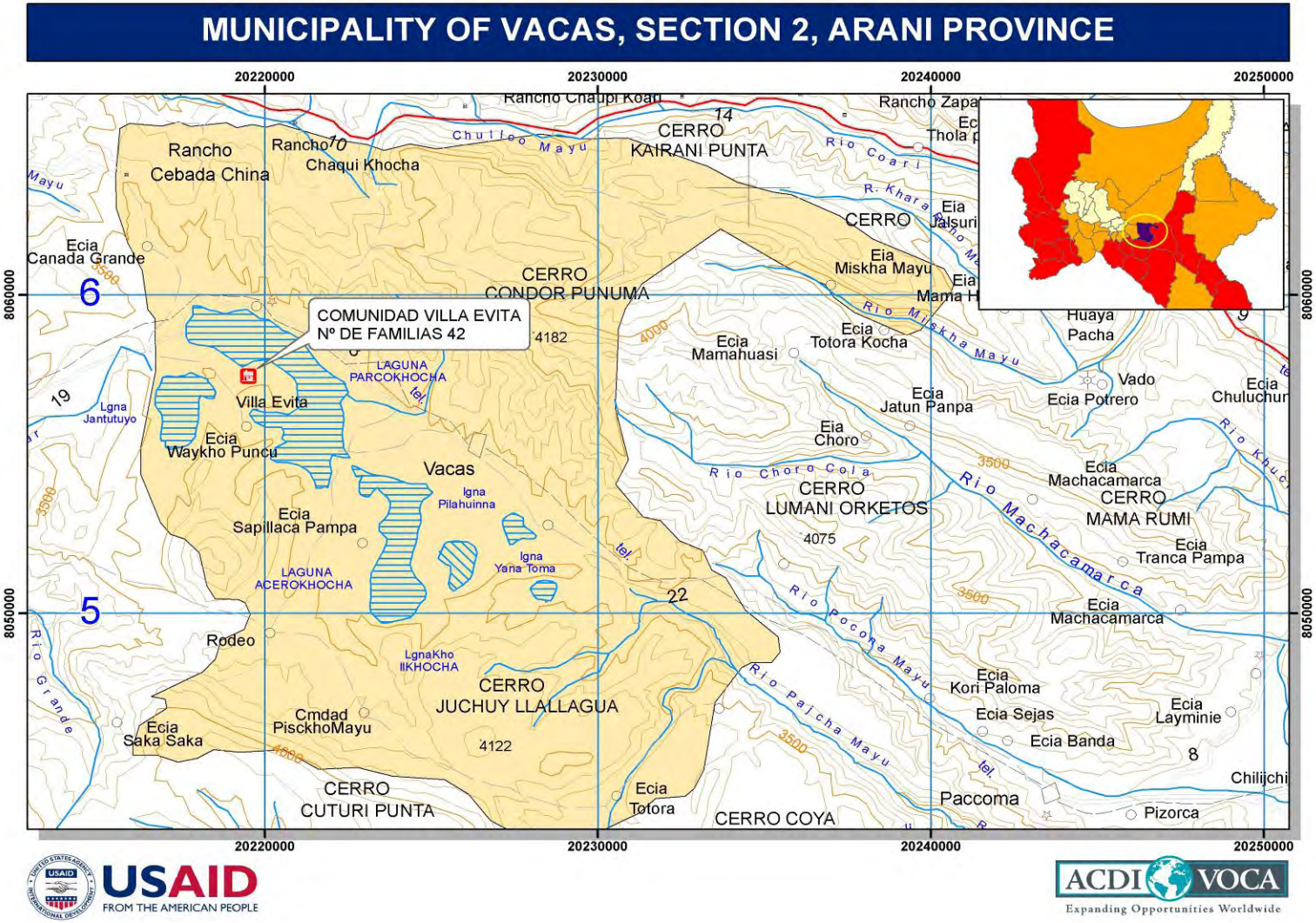
The high, cold geography of the work site also presented technical challenges that the WSSA team had to consider in the construction designs. For example, in order to avoid ruptured pipes resulting from the freezing temperatures common in the zone, dry latrines had to be utilized as opposed to toilets with running water.

VI. CONCLUSIONS

The WSSA project achieved its objectives. Through the creation of two complete potable water systems in the villages of Yanagaga and Villa Evita Mariscal and the rehabilitation of systems in Pedregal Alto, Cochachimpa, Chapikollo and Pajcha Baja, the WSSA provided and improved access to potable water and basic sanitation to population groups with high vulnerability to food insecurity. The communities and municipalities benefited fulfilled the committed counterpart contributions. Through community development training throughout the municipalities of Vacas and Alalay, the objective to build capacity and knowledge within the target population in the administration of basic water and sanitation systems, human and solid-waste management, personal hygiene, food management and other topics related to food security has been achieved.

APPENDIX

A. MAPS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Nº DE FAMILIAS 42
CERRO KAIRANI PUNTA
CERRO CONDOR PUNUMA
CERRO LUMANI ORKETOS
CERRO MAMA RUMI
CERRO JUCHUY LLALLAGUA
CERRO CUTURI PUNTA
CERRO COYA
Rancho Cebada China
Rancho Chaqui Khocha
Ecia Canada Grande
Villa Evita
LAGUNA PARCOKHOCHA
LAGUNA ACEROKHOCHA
Lgna Jantutuyo
Ecia Waykho Puncu
Vacas
Lgna Pilahuinna
Lgna Yana Toma
Ecia Sapillaca Pampa
Rodeo
LgnaKho IIKHOCHA
Cmdad PisckhoMayu
Ecia Saka Saka
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Ecia Jatun Panpa
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Vado
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Ecia Sejas
Ecia Banda
Ecia Layminie
Chilijchi
Paccoma
Pizorca
Huaya Pacha
Ecia Chuluchur
Chullco Mayu
Río Coari
Río Miskha Mayu
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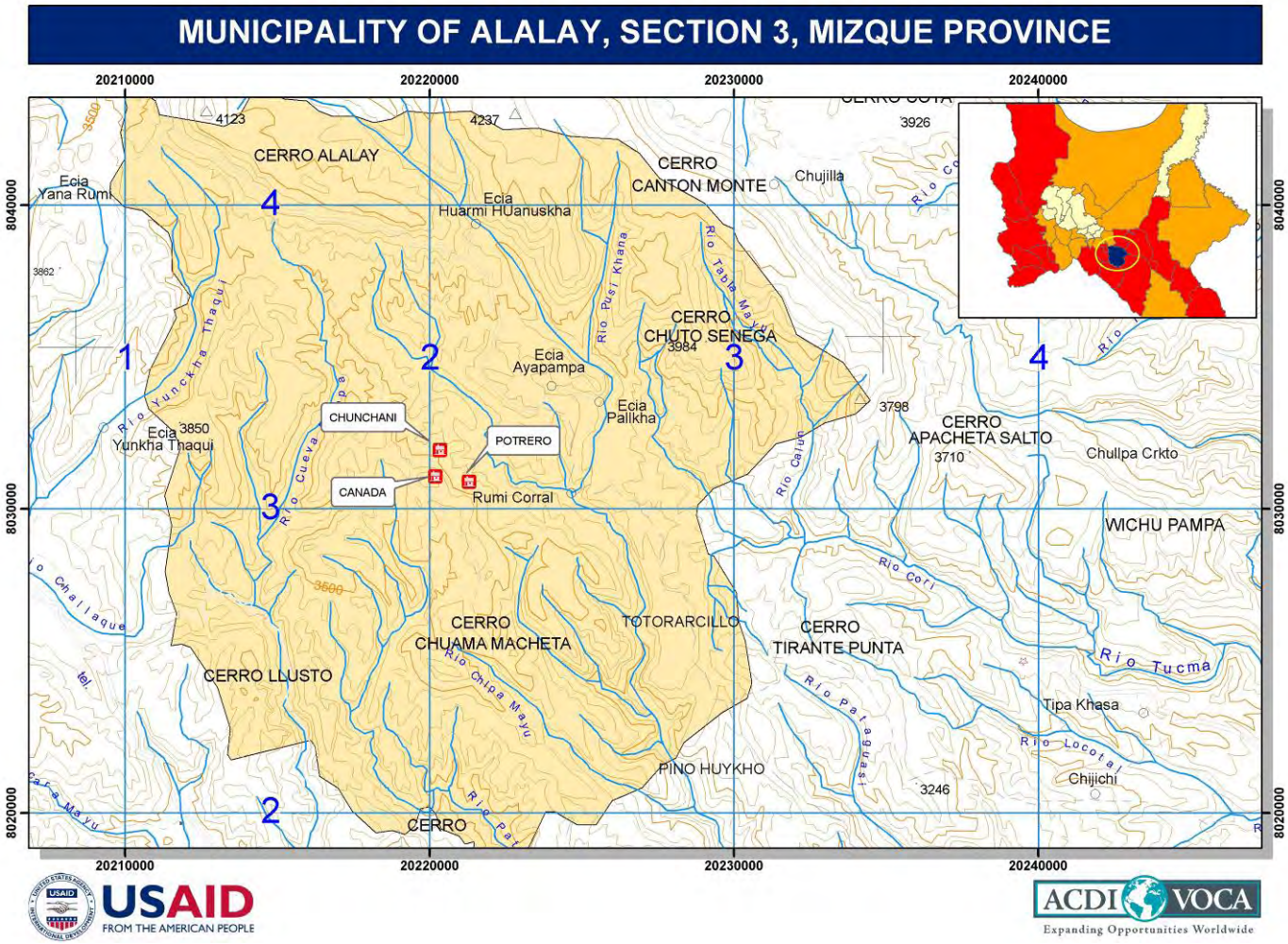
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CERRO ALALAY
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Ecia Huarmi HUanuskha
CERRO CANTON MONTE
Chujilla
CERRO CHUTO SENECA
3984
Ecia Ayapampa
Ecia Palikha
CHUNCHANI
POTRERO
CANADA
Rumi Corral
Ecia Yunkha Thaqui
3850
CERRO APACHETA SALTO
3710
Chullpa Crkto
WICHU PAMPA
CERRO CHUAMA MACHETA
TOTORARCILLO
CERRO TIRANTE PUNTA
CERRO LLUSTO
PINO HUYKHO
Tipa Khasa
Chijichi
3246
3798
3926
4123
4237
3862
Río Yunckha Thaqui
Río Cueva Pampa
Río Pusi Khana
Río Tabla Mayu
Río Challaque
Río Cori
Río Tucma
Río Patagüasi
Río Locotal
Río Chipa Mayu
Cara Mayu
1
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