



Toro Toro Project

Ecological Cookers for 11 Educational Units

in the rural Municipality of Toro Toro



“Healthy Schools Without Smoke”

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0. Introduction

Many different aspects and problems are required to be addressed to improve the current reality of the rural Bolivian sector, not only intended as the living conditions of current social groups but also as the perspective of future generations. Those aspects are related to political, social and environmental issues that impact the people's quality of life. One of those problems is the difficult access to energy. In fact, in many rural areas, even today the only viable option for cooking remains biomass (wood, dung, etc.).

In Bolivia, around 1 million families in the rural sector use wood as the main combustible to cook. The consequence is an elevated indoor pollution that represents a consistent threat to health. The WHO (World Health Organization) estimated that indoor pollution is the 4th cause of death in developing countries. The most affected by traditional wood-based cooking methods (like the K'oncha) are the women and children as they spend many hours collecting the biomass. They are also exposed for long periods of time to noxious gases in the kitchen.

Furthermore, the extensive use of biomass has a negative impact on the environment, not only related to the emission of greenhouse gases, but also to the deforestation consequences that further facilitate erosion, warming and desertification of the ground. The main obstacles are cultural resistance against alternative technologies and the scarce environmental education of the population.

The educational units in the rural areas are not exempt from these problems. Education is the base that leads a society to a healthy development, but unfortunately children are often drawn out of schools by the pressure of more essential agricultural activities.

Our project takes into account all of these elements in order to introduce new educational practices that aim to overcome the current environmental, health and social issues. This can be achieved by influencing the conscience of people, educating and equipping them with alternative clean tools that can help them break free from the cycle of poverty by making well-informed decisions.

Ecological cookers for 11 educational units in the rural Toro Toro municipality

1. Previous Cedesol Experience

The Cedesol Foundation is a non-profit NGO (non-governmental organization) that started its activities in 2003. The mission of the foundation is to empower the disempowered, improve living conditions of the underprivileged and safeguard the environment by supplying appropriate technologies and education while promoting sustainable development.

Cedesol's activities are conducted in favor of people in need. The solar cookers and ecological wood stoves (Rocket Stoves) are solutions that drastically reduce the problems related to the use of traditional cooking methods and protect the health of people while producing various benefits from social and environmental perspectives.

Through the Program "Ecological stoves for living well", Cedesol disseminated over 9000 efficient cookers. These cookers benefit the most vulnerable sectors in many different regions of rural Bolivian territory, from the Andean region to the most oriental areas.

One of the most recent projects successfully completed has been conducted during 3.5 years between 2011 and 2014 in the municipality of Yamparáez in the department (State) of Chuquisaca. Because the region of Yamparáez presents an extremely varied environment (from valleys to plateaus) the access to gas is considerably difficult and therefore wood is the main source of energy. Needless to say, the subsequent pressure on forest resources is unsustainable and thus the process of erosion remarkably fast.

During the project, Cedesol installed over 720 ecological cookers in houses and schools (mainly efficient Rocket Stoves, both standard and institutional) and educated the population through its effective Modular Environmental Training Program on the bases of nutrition, health, hygiene and environmental-friendly practices.

After the Yamparáez project, Cedesol joined forces with the Salvation Army to help the communities of Yaurichambi and Lacaya (on the La Paz plateau, near Lake Titicaca) which were both using excrements of sheep and lamas as main combustibles for cooking food, warming water for personal hygiene and warming their abodes in winter. Because of the

lack of combustibles like gas or wood in the region, for this project we opted to install solar cookers that only required the solar light to work.

The Cedesol Foundation visited the municipality of Toro Toro in 2004, invited by the then-municipal government to participate with an exposition of ecological stoves during an agricultural fair. Later, Cedesol was invited again in August 2012 by Phocos Organization, to perform a workshop on renewable energies for the rural teachers of Toro Toro. At the workshop, more than 120 teachers from different communities of the region explained the procedures used to prepare the school food program (mainly traditional open biomass fires) and the condition of environmental education in their respective schools.

Afterwards, two more visits to the Toro Toro municipality took place in different months. During these visits it was possible to observe and verify the information acquired earlier. Moreover, surveys and interviews were submitted to professors belonging to 21 Educational Units that actively provided information regarding food conditions, cooking procedures, biomass gathering process, quantities used and under what conditions. In addition, it was also possible to observe the high level of erosion that affects the region, the deforestation process and the condition of the cultivated area in the proximity of native forests.

Then in 2015, CEDESOL was visited by Sr. Eliodoro Uriona Pardo, the newly elected mayor of Toro Toro who inspected our ecological devices and discussed the details of the project with CEDESOL's team. He had some specific observations about sustainability and logistics, recommending that CEDESOL focus more on giving individual attention to several schools instead of the original plan of interventions in 21 schools. In addition, he manifested that it was prudent to treat the "internados" (school housing for students that lived further than 2 hrs walking distance) as stand alone cooking units rather than lump them together with the schools where they were located since their alimentation program and physical location was apart from the school alimentation program.

Thus, this project version has incorporated everything observed by the highest municipal authority, helping to make the project more successful by having the backing and participation of the municipal government and the district school supervisor.

2. Site Background

The aim of the following background information is to identify the current situation, geographical and socio-economic aspects of the Toro Toro region and ultimately present a broad picture of the project selected region.

2.1 Biophysical Aspects

The Toro Toro region is located between 1800 and 3986 meters of altitude in the extreme north-east of the Department of Potosi. Moreover, the municipality is 138 km away from Cochabamba, needing about 4 hours to be reached. The communities are located in the Eastern Andean Cordillera and inside the sub-Andean belt, therefore presenting different kinds of climate (from dry and cold typical of high Andean villages to warm-sub tropical) and temperatures (from 5 °C to 33 °C). This wide climatic diversity naturally implies a likewise wide diversity in flora and fauna.

The existing flora presents characteristics typical of this specific region and therefore traditionally important in common life as materials for construction, combustibles and for medical use. The more important plants are Molles, Eucalyptus, Sotos, Tipas and native Pines. The fauna is majorly composed by Andean cats, foxes, bats, parrots, larks, chaffinches, reptiles, amphibians and fishes.

2.2 Socio-Economic Aspects

Toro Toro population is composed of 12,000 people divided in 7 cantons further divided in 70 smaller communities.

The economy of the [Toro Toro municipality](#) is primarily based on traditional agriculture, which mainly produces potatoes, corn, wheat, oat, peanuts, beans, barley, tarwi, oranges and lemons. The second developed economic activity is raising livestock such as cows, sheep, pigs, horses and chicken. The soil destined and available for these activities is currently shrinking as a consequence of the erosion process.

Another activity that generates revenue for the municipality is tourism, an activity that currently counts a significant number of visits every year thanks to the dinosaur footprints, the Vergel, the Garrapatal Canyon and other biophysical characteristics of the territory that makes it one of the most visited in Bolivia.

Undoubtedly, tourism represents additional revenue for the population. However, it is important to point out the polarization of tourism in certain specific sectors of the municipality, which results in that not all the communities, especially the most rural ones, benefit from it. In conclusion, it is safe to establish that displaced communities can not consider tourism as an income option.

2.2.1 Education

Formal education in the Toro Toro municipality follows the parameters of the National Education System and is organized in 7 educational districts and 61 smaller educational units all equidistant and distributed in their respective communities. Furthermore, two important alternative education centers are present: “Yuyay Japina” and “el Taypi”.

The architectural infrastructures of the educational units are in regular conditions. Despite that, the fact that schools do not have the necessary didactic material and furniture presents relevant difficulties. These issues slow down the learning process of students at different educational levels. This problem is partially caused by the fact that about 38 schools were established by parents and do not achieve the minimum pedagogic requirements.

The drop-out rate from school is 7.8% and is mainly caused by:

- The educational calendar is not compatible with the agricultural calendar; the choice between education and work to acquire food is a hard dilemma considering the income of many families is based entirely on agriculture.
- The distances to reach the educational centers are often extremely far, from 1 to 3 hours depending on the community.

2.2.2 Health

The health situation of the Toro Toro municipality presents a wide gamma of issues. The region counts for only 1 health-center, 6 sanitary-stations and 12 small community-stations. The medicines offered by these institutes are conventional and traditional remedies, the latter thanks to the incredible diversity of medical plants that exists on the site.

The more recurring problems encountered by the population are respiratory problems and intestinal diseases. On one hand, the respiratory problems are generally caused by

the use of wood as main combustible for cooking and burning soils before planting new cultivations. On the other hand, people without access to drinkable water mainly encounter intestinal diseases as a consequence of consuming unboiled water in order to save fuel.

General health is negatively affected by the fact that only 67% of the population of larger centers has access to drinkable water. This percentage falls to 31% in the most rural displaced areas. To further address this issue, it is important to point out that more than 45% of the rural communities use rivers and ponds as sources of water.

2.2.3 Access to Energy

The vast majority of the population in the Toro Toro (around 95%) uses wood as its main combustible for domestic use (cooking + boiling water for consumption) or for personal hygiene. The access to gas is difficult because of the wide dispersion of the communities which need on average more than 1 hour for collecting gas cylinders, usually overpriced by more than 30% compared to national average price (35Bs vs 22Bs).

2.3 Issues

The municipality of Toro Toro suffers, as many other regions of the country, unusually fast processes of soil erosion and environmental deterioration, and from all the problems that these two issues entail. The causes are mainly, if not totally, anthropic. In fact, the environmental damage is primarily provoked by the daily activities carried out by the local population and only in smaller amount by strong winds and other hydric causes.

The exploitation of native trees such as Eucalyptus, Molle and Soto is directed toward domestic cooking use (wood), medical use, construction and building of agricultural infrastructures. The use of wood as combustible for cooking has an especially negative impact in the following areas:

- **Health** – Respiratory infections are particularly high in the municipality. The traditional K'oncha cooking method affects the people who are constantly exposed to its smoke (especially women that are responsible for cooking food and the children that stay with them). Furthermore, this way of cooking increases the risk of burns.
- **Environment** – Deforestation, erosion and soil decay, reduction of soil fertility, superficial warming (from areas were trees have been cut) and

biomass burning are clearly destroying the micro-biologic population's ecosystem by steadily favoring the release of nitrogen and sulfur in the atmosphere. One of the main issues encountered in the region is that while the process of deforestation occurs, no re-planting initiatives are implemented and therefore wood-gathering is essentially an extractive process.

The intensive use of chemical fertilizers instead of natural dung and other biodegradable options contributes to soil impoverishment and ultimately leads to field abandonment and new fires in the countryside to transform other wild green areas into agricultural fields.

The previous issues are amplified by other factors that undermine the health of the environment:

- The population generally lacks education regarding behavior to preserve the environment.
- The municipality lacks a garbage collection or recycling program, exposing the natural environment to many plastics and other recyclable materials that can contaminate water and soil.
- The municipality does not contemplate any sewage disposal process and this fact dramatically increases the risk of rivers, aquifers and underground water contamination.

For all the reasons listed above, the situation of the population seems to present a large array of problems. Some of the problems related to the environment are caused by the local population, affecting them negatively, creating a vicious cycle.

The conditions of Educational Units in Toro Toro are not that much different from those of the general population. The schools use wood as principal combustible to prepare the school-alimentation, which is distributed with the objective of improving the nutrition of the students and their learning performances. The biomass collection is a duty of the children and the parents that prepare the food. For doing this, they have to sacrifice their own private and working time.

This is translated into a society that traded the protection of its environment for satisfying its basic needs and improving its life conditions by unsustainable agricultural activities. Born in this harsh reality, children lose their connection with the values related to the respect of the environment. Because of this, the future prospective for the environment seems as gray as ever.

3. Justification of the Project

The current reality of children going to school in the rural sector of the municipality is seriously affected by different circumstances and factors, like:

- The distance they have to walk to reach the educative facilities requires between 1-3 hours, usually covered by foot as public transportation only exists in the inter-departmental line.
- The wood gathering process takes time away from educational activities and in some schools, wood collection is assigned to every student as homework. Some other schools dedicate 1 school hour every day in which students will have to find and gather combustible for cooking purposes.
- Most students need to collect water for their families, as they do not have access to drinkable water. This activity is generally carried out daily and requires about 1 hour and a half to transport the water from a public reservoir to the students' families.

The effects of those circumstances are inevitably reflected in the lives of the students:

- Less time for studying and learning, both in school and at home with homework
- Less time for helping the family with agricultural tasks that are the base to sustain themselves or otherwise increase risk of school drop-out
- Less time for creative development and self-realization, which is especially important for children of this age
- Inhalation of noxious smoke and exposition to accidents (burns)

The aspects and effects of the identified problems (like high wood consumption) are numerous and the more affected will be undoubtedly the coming generation. The research and surveys conducted in the region clearly demonstrate that the deforestation process is not only a threat to the environment, but also to the health conditions of children living in the Toro Toro municipality.

4. Proposal

At the moment about 80% of the educational units in Toro Toro use traditional K'oncha or 3-stone stoves as the main instrument for cooking school breakfasts. Those methods have a negative impact not only from a health standpoint, but also from environmental and social perspectives. This is the main factor that showed us the necessity of working in collaboration with the educational units toward making steps for real change.

The present project recognizes the vital relationship that entwines a society with the natural environment around it. The idea is that current allocation and use of resources will impact the present and future generations. Changing the present generation is the right way to spread changes to a larger society in the long term. We deeply believe that providing schools with environmental knowledge, sustainable values and positive attitude is the best way to improve the living conditions of the poor displaced communities of Toro Toro.

The proposal is the result of a careful and critical analysis of causes and effects the current social-environmental situation in the Toro Toro municipality. Before writing the actual proposal, interviews, surveys, test and field visits were conducted to better know and address the issues.

The pillars of this project have been defined according to the natural social characteristics of the site, which are:

- Efficient Cooking Stoves
- Environmental-friendly practices
- Health
- Nutrition

During its long experience, Cedesol identified the environmental training program as an essential element for the implementation of cooking stoves that will facilitate learning and support long-term changes.

The modular training program will be developed through workshops designed for the target population and for this specific case by following the 4 guide-pillars, and by taking into account the socio-economic and environmental situation of the municipality.

4.1 General Objective

“Improve the living conditions of children, parents and teachers through the implementation of ecological education and clean cook-stove solutions for preparing the meals in 11 rural Educational Units of the municipality of Toro Toro”.

4.1.1 Specific Objectives

- Implement an educational program regarding resource management and environmental friendly practices that will equip the children studying in rural sectors of the Toro Toro Region with tools to better manage their environment
- Raise awareness about health and environmental issues
- Institute sustainable solutions proposed by Cedesol Foundation
- Integrate the educational workshops with the implementation of ecological cookers (solar and biomass-efficient stoves)
- Train the school population and responsible personnel in the use and maintenance of ecological cookers in the educational units
- Strengthen the symbiotic relationship between the society and the environment

4.2 Project Target Population

Cedesol field studies determined to include in the current project 11 formal Educational Units belonging to different communities that use biomass as their main fuel for the preparation of food for students (the same that have been previously interviewed).

In total, there are 2051 people who eat at the 11 educational units (EU), mainly students and a minority of teachers and parents (2-3 per EU).

The identified beneficiaries of the project “Ecological Cookers for 11 Educational Units in the rural Toro Toro Municipality” are the following:

- **All students in the schools and *internados***

All of the students will be positively affected by reduced fuel consumption, shorter cooking times and access to the didactical material furnished to the educational units.

- **Students from 5th grade**

It has been suggested that the optimal group of students would be between 9-18 years, the age in which assimilation is most rapid, internalization of concepts is deep. It is at this age that children have the ability to easily transmit their learning to the rest of their educational unit, influence their family and the wider community. This period of the students' lives is also when they acquire conscience of the situation they live and start to integrate and feel as a part of society.

- **Parents**

The parents are often assigned to prepare the school's alimentation. In the majority of cases, they are organized in a rotatory system, in which 2-3 parents cook the school's food each day. A positive note is that the main source of their motivation is their care for their children's health and education, from didactic to nutritional aspects.

- **Teachers**

The teachers of 5th grade students **and above** will be present during the implementation of educational workshops and the contest as activity coordinators.

The population of the individual educational units that will join the project varies. This aspect will influence the type of ecological stove that will be implemented in each school.

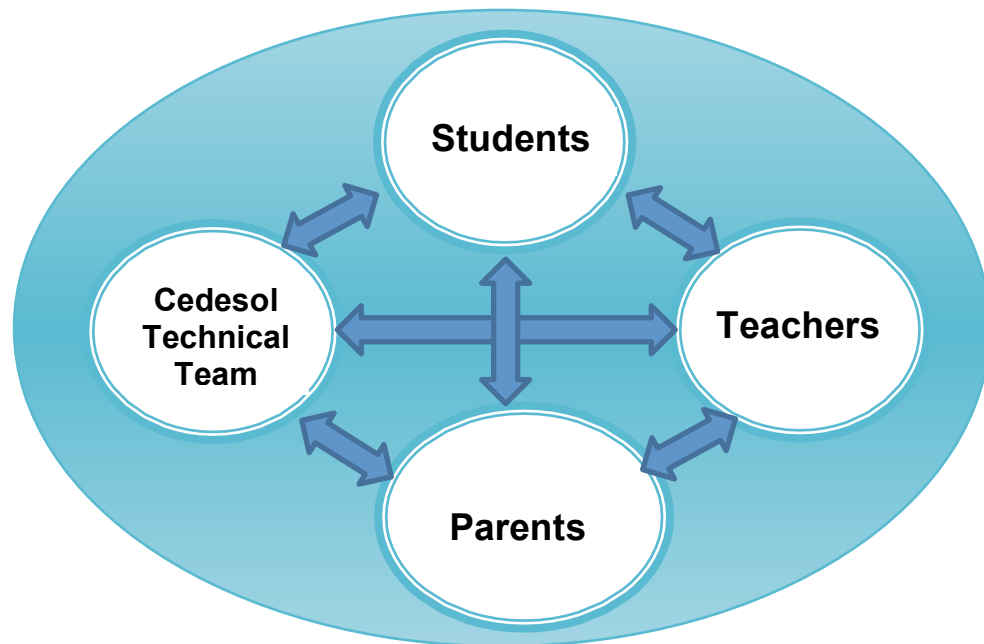
4.3 Methodology

The educational methodology that will be used in the project will be:

- Participative- The aim is to actively involve people, to make them feel responsible as an integral part of the project and key factors for achieving satisfactory results. For this reason, the flow of information will be bidirectional.

- Inductive- Information will be given starting from a general point and leading to specific concepts that will touch the interest of future beneficiaries. The adaptable and creative activities will also facilitate the interiorization of concepts.

Figure 1. Development of Workshops – Information flows



4.4 The Ecological Stoves

The ecological Rocket Stove is an efficient cooking device that uses biomass as fuel. Its design provides an efficient combustion joined with an efficient heat-transfer system to pots or other recipients. In these stoves, materials like wood, dung or carbon can be used. The Rocket Stoves provide double efficiency compared with most cooking systems used in Bolivia and the cooking method is substantially clean.

The design of these particular stoves allows the use of small wood pieces like branches. The wood necessary to cook with this technology can be gathered relatively quickly without cutting any trees (small pieces of wood are sufficient for long sessions of cooking) and without destroying forest areas. This characteristic is why we have chosen to provide Rocket Stoves for the project instead of other technologies.

Its benefits:

- Reduces the smoke and creates a healthy kitchen and indoor environment
- Cooks extremely fast and retains heat for longer periods
- Saves up to 75% of wood compared to a traditional 3-stone stove
- Reduces risk of burning and prevents open fires

- Substantially reduces carbon and soot emissions into the environment

The Rocket Stove is available in 2 versions: Rocket Standard and Rocket Institutional.

Rocket Standard - Has a capacity of 2 pots of 35 liters and is destined to small groups of people like families and medium-sized educational units with 20-50 students

Rocket Institutional – Created for institutions such as educational units with more than 80 students. It has a capacity of 60-100 liters. The material with which it is built is a metal barrel. In accordance with studies realized by Cedesol, it has been demonstrated that with an 80 liters capacity, the stove can reduce up to 10 tons/year of greenhouse gases emissions otherwise emitted by traditional stoves.

More details regarding technical characteristics of the Rocket stoves appear in Figure 2.

The number of ecological cookers to be installed in each educational unit will depend on the number of people who eat at the school. For this reason, the following distribution has been developed:

Figure 2. Rocket stoves per Educational Units

Kind of Stove	Educational Unit Population
1 Standard Rocket Stove	20 - 40 between students, professors and parents
1 Institutional Rocket Stove 1 Standard Rocket Stove	60 - 120 between students, professors and parents
2 Institutional Rocket Stove 1 Standard Rocket Stove	More than 150 between students, professors and parents

Figure 3. Efficient Cookstoves and their Costs

Kind of Stove	Unit Price (Bs)	Quantity	Total in Bs.
Rocket Standard	1 000 Bs	18	18 000
Rocket Institutional * with pot	3 000 Bs.	18	54 000
TOTAL in Bs.			72 000

It could be possible we will need one or more institutional and standard combinations.

4.5 Project activities

The activities that will be realized have been designed specifically considering the previously listed project objectives.

The present project has been divided in 3 phases to facilitate an appropriate and easy development. Every phase has been planned following a gradual and sequential criteria and taking into account all necessary activities to be executed.

PHASE 1

Duration – 5 Months

Phase 1 is the base of the project, where the technical and practical aspects are defined and the first educational workshops are carried out. It is composed of two sub-parts:

A. Formation/training of the technical team and design/elaboration of material and procedures

During this step the technical team will be recruited. It will be formed by 4 people and the parameters of choice will be their capacities, knowledge and adaptability to education in rural areas. The technical team will manage and coordinate the activities for the entire duration of the project.

Once the technical team has been formed and adequately trained, the next step will be to design the educational material and develop the practical and participative dynamics appropriate for implementing the workshops. Furthermore, informative posters about Rocket Stoves will be designed and used in Phase 2.

B. Educational Training

This is the key step of the project during which the basic fundamental knowledge will be delivered to the project participants through focused workshops in every educational unit.

The inductive methodology chosen to conduct the educational training will be modular in design, covering all four pillars of the project. The first module will focus mainly on eco-friendly practices, which brings to forefront the current conditions of their schools/communities. For example, one of the activities will invite the participants to draw a picture of what they like about their community, and what they would like to see changed. Other workshops in the first module will introduce sustainable solutions in waste management, new green technologies, and how to reuse common items into other useful products for the benefit of the home, school or community. At the end of the first module, the benefits and basic usage guidelines of the ecological cookstoves will be explained and the more specific details that are important to the people will be highlighted (namely nutrition, time and health benefits). Workshops in the second module will cover adequate maintenance of health, dealing with proper hygiene, nutrition, and common first aid situations. Each workshop contains activities that not only review material, but are designed so that the students internalize and begin to apply the content in their lives. Coupled with extra material that covers related issues and ideas for projects that further serve as learning extension, a positive cause-and-effect relationship between society and environment can be fostered through the application of the educational program.

The educational training program will include the use of dynamic visuals (banners, posters, handouts, videos, pictures, DVDs and PowerPoint presentations if electricity is available), consistent and precise theoretical examples and active and highly participative dynamics aimed to involve the people as integrant part of the project. Cedesol, thanks to its long time experience in the field, observed that participation is the key point to boost the spreading of teachings among the larger community. At the end of the workshop, a survey regarding the training will be submitted to participants to obtain an immediate evaluation.

At the same time, during this phase it will be possible to establish the base of the contest that will be finalized in phase 3. The contest aim is to evaluate in a general way the implementation and impact of the responsible and sustainable practices taught during phase 1.

During phase 1, a theoretical immersion will be conducted about the activities of waste management, the 3 R's, and healthy living. To carry out the implementation of these

activities in the wider communities, teams of students denominated “Green Patrols” will be formed and appointed with the mission to spread the knowledge and put in place the practices learned. The contest will principally evaluate the quality of results by taking into account the population differences between the educational units (ranging from 20 to 200 people).

Recap of the materials to be used in this phase:

Audio-visual content

Informative Banners

Brochures

Key Concepts: local environmental situation, causes and effects, efficient stoves, waste management, environmental-friendly practices easy to implement, health, hygiene, nutrition, and first aid

Simultaneous to those educational activities, the technical team will conduct the activities for the **base line** and **field tests** on the old stoves currently used in the educational units (K'onchas and 3-stones). The objective of pre-installation tests is to determine combustible savings generated by the introduction of the efficient Rocket stoves.

The tests are divided in 4 examinations and are conducted in accordance with the frequency and quantity of wood recollection. The tests will measure the following:

- A. How often wood is collected in one week
- B. Quantity of wood collected in one week
- C. How many people, including children, are involved in this activity
- D. How much time is needed to complete this activity

The parents will be also involved in the pre-installation tests (after having been trained) to help measure the quantity of combustible and to point out changes during the whole project development.

Last but not least, in this phase the transportation logistics for the delivery of the stoves from the stove reception point (somewhere in the middle of Toro Toro region to the different displaced communities) will be established. This will be completely defined and coordinated with the help of the District Education Director and the Municipality, the parents and the persons appointed for the transportation. Furthermore, the Rocket stove installation area will be prepared.

PHASE 2

Duration - 4 Months

The main objective of phase 2 is the installation and implementation of the Rocket Ecological Stoves. This includes all the activities connected with the delivery, reception in the center of Toro Toro municipality, the rural distribution, the installation and the training of the personal appointed by the educational units to their use and maintenance.

The number of efficient-cookers delivered to each school unit has been decided in accordance to the number of people who eat and the capacity of the two different models of Rocket stoves. Therefore, according to our calculation, 36 ecological stoves (between Standard and Institutional) will be required.

The number of stoves indicated for each educational unit follows:

Figure 4. Educational Units – Population – Type of Stove

LIST OF EDUCATIONAL UNITS IN TORO TORO CHOSEN FOR THE PILOT PROJECT

Name of Educational Unit	Municipality	Community	Number of people who attend and eat at the educational unit	Quantity and type of stove for the educational unit	Quantity and type of stove for boarding school
U.E. Julo Chico	Toro Toro	Julo Chico	254	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E. Central Tambo K'asa	Toro Toro	Tambo K'asa	200	1 Institutional 1 Standard	1 Institutional 1 Standard
U. E. Añahuani	Toro Toro	Añahuani	230	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E. Carasi	Toro Toro	Carasi	240	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E. Yambata	Toro Toro	Yambata	200	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E. Internado-Poco Suco	Toro Toro	Poco Suco	173	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E.-Internado-Vaqueria	Toro Toro	Vaqueria	67	1 Institutional 1 Standard	1 Institutional 1 Standard
U.E. Simón Bolívar	Toro Toro	Pampajasi	104	1 Institutional 1 Standard	
U.E. 12 de Abril	Toro Toro	Omereque	22	1 Institutional 1 Standard	
U.E. Palla Palla	Toro Toro	Palla Palla	104	1 Institutional 1 Standard	
U.E. Sacavillqua	Toro Toro	Rodeo Escalón	90	1 Institutional 1 Standard	
			Total	11 Institutional 11 Standard	7 Institutional 7 Standard
				18 Institutional Total	Total 18 Standard

SOURCE: *elaboration – CEDESOL Foundation 2015*

For the transportation, a truck with 2 rigid axles will be required in order to transport all the stoves from Cochabamba to a central collection point in the Toro Toro municipality, from where afterwards the stoves will be distributed to the different school units by the previously appointed persons.

Therefore, the work logistics of the project in this phase are:

1st Deliver the stove in a central spot in Toro Toro

2nd Distribute and install the ecological cookers to the different educational units

3rd Train the personnel in every single educational unit to the stove usage and maintenance and provide informational material (posters and brochures)

During this phase, the information previously given in phase 1 regarding the Rocket Stoves will be reinforced as well as the basic environmental and health prevention knowledge.

The installation tests will last for about four days in each educational unit. This could be eventually longer in those educational units that will not be able to install the stove before the arrival of our technical team for transportation issues. Despite this, we are confident that these problems will not affect the correct development of this phase.

Simultaneously to installation, other activities such as compost, separation of waste and collection of rainwater explained in phase1 will be monitored.

Material to use in this phase:

- **Brochures**
- **Informative Posters regarding use and maintenance of Rocket Stoves**
- **Audio visual material such as PowerPoints, videos, via DVD**

PHASE 3

Duration – 3 Months

The aim of phase 3 is to evaluate the implementation of sustainable and healthy practices taught during phase 1 as well as to evaluate the performances, usage and maintenance of

the Rocket Stoves installed during phase 2. The evaluation will be both quantitative and qualitative.

Qualitative Evaluation

This information will allow us to evaluate whether the practices introduced during phase 1 have been correctly implemented. Gathering this information will be possible through the contest “Quality Living in Toro Toro” that will be held between the “Green Patrols” of different educational units in the Toro Toro municipality.

The winning student will be the one that best and most effectively implements the healthy, sustainable and environmental practices taught during phase 1 (special attention will be paid to waste management, the 3 R’s, and healthy living and the use of ecological stoves for the school breakfast). The 1st place winner will have their parent’s kitchen remodeled and a new clean burning cookstove installed.

The 2nd and 3rd prizes will consist in school material for the students.

Quantitative Evaluation

The tests will consist of interviews and post-installation tests of the stoves. Through these tests, it is possible to determine quantitatively the reduction in biomass consumption in every educational unit generated by the introduction of Rocket Stoves. The tests, similar to those in phase 1, will be divided in 4 parts (quantity of wood collected, people, frequency, other parameters) and parents will help the measurement operations.

The following is a **general recap** of the key activities to be conducted in each phase:

	Activities
<p>Phase 1</p> <p>5 Months</p>	<ul style="list-style-type: none"> • Contract and train of technical team (4 people) • Design and elaboration of educational material to be used in workshops • Design of inductive and participative dynamics to be used in workshops • Buy pencils, make copies and prepare other incentive material to improve workshop dynamics and learning outcome • Meet with District Director and authorities to coordinate starting of the project and define a workshop timeline • Travel of technical team to Toro Toro • Develop participative and inductive workshops as planned • Establish green patrols and leaders for the contest

	<ul style="list-style-type: none"> • Coordinate logistics for stove delivery with district director and student parents • Prepare installation area • Develop pre-installation tests and elaborate Base Line • Define collection spot with district director • Appoint parents responsible for stove dissemination in the EU • Return of technical team to Cochabamba (3 trips are planned)
<p>Phase 2</p> <p>4 Months</p>	<ul style="list-style-type: none"> • Produce Rocket Stoves • Contract a truck to deliver the 27 stoves from Cochabamba to Toro Toro • Deliver stoves from CBB to POI (Approx. 6 Hours) • Leave stoves in designated spot in Toro Toro where they will be collected by appointed parents • Inform parents about stoves' arrival • Train personnel in use and maintenance of the Rocket Stoves in every educational unit • Provide educational posters • Develop pre-installation tests to units that had problems in phase1 • Monitor implementation of practices taught during phase 1 • Begin post-installation tests in the educational units where the Rocket stoves are already operative (on site 3 weeks) • Determine with the district director the date for the contest award • Return of technical team to Cochabamba
<p>Phase 3</p> <p>3 Months</p>	<ul style="list-style-type: none"> • Travel of Cedesol team to Toro Toro • Start Rocket stove post-installation with help of parents • Monitor practices taught during phase 1 • Evaluate state and performance of installed stoves • Organize contest and declare the first, second and third place winners

5. Budget

The estimated budget for the project “Ecological Cookers for 11 schools in the rural Toro Toro municipality” has been determined based upon Cedesol’s previous extensive experience in the execution of similar projects in rural areas of Bolivia.

The required budget for each phase is shown in order to be as transparent and comprehensible as possible.

5.1 DIRECT COSTS

The following includes all costs that are directly related with the project execution.

1. Personnel – External Personnel Costs

The technical team that will realize this project will be composed of 4 people: 1 coordinator and 3 technicians. They will be responsible for the correct development and execution of the project. In addition to them, external partners will be eventually required, like for example a graphic designer that will be appointed to draw and produce informative banners and parents or community members that will help during the installation tests of traditional and rocket stoves.

2. Cost of material required for organizing effective workshops

These costs include all expenses related with the elaboration of posters, educative banners, brochures, contest incentive gadgets and other elements strictly necessary to boost the learning process. Furthermore, here are also included expenses for the realization of installation tests and interviews (paper, pencils, and pens).

3. Communication expenses

These account for the costs of communication of the technical team.

4. Transportation expenses

These include the travel expenses that the technical team will encounter to move from Cochabamba to Toro Toro as well as the inter-communitarian transportation necessary to reach the 11 displaced educational units and operate to execute the project during all phases.

This table shows the distances from Cochabamba to Toro Toro and from Toro Toro to the specific educational units along with their physical location via GPS coordinates. This information helps us determine with more precision how much fuel and time will be needed, not only for the equipment installation, but for the surveys, field tests, environmental trainings and the contests activities.

#	Description	Distance (Km)	Estimated Transport Cost per trip to these locations (Bs)	Latitud	Longitud
1.	Cbba. – <u>Toro Toro</u>	134,0	2.500,00	18°08'00,58" S	65°45'46,58" O
2.	Toro Toro - <u>Julo Chico</u>	21,3	500,00	18°01'24,64" S	65°47'32,30" O
3.	Toro Toro - <u>Tambo Kása</u>	20,3	600,00	18°11'38,71" S	65°46'49,09" O
4.	Toro Toro - <u>Añahuani</u>	28,0	850,00	18°14'01,48" S	65°38'52,01" O

5.	Toro Toro - <u>Carasi</u>	36,9	950,00	18°19'08,35" S	65°41'20,41" O
6.	Toro Toro - <u>Yambata</u>	39,6	950,00	18°02'42,38" S	65°56'57,47" O
7.	Toro Toro - <u>Poco Suco</u>	29,9	850,00	18°15'22,86" S	65°44'10,46" O
8.	Toro Toro - <u>Pampa Jasi</u>	43,6	1.200,00	18°20'37,67" S	65°34'01,26" O
9.	Toro Toro - <u>Vaqueria</u>	33,5	950,00	18°08'25,76" S	65°52'08,79" O
10.	Toro Toro - <u>Palla Palla</u>	43,4	1.200,00	18°19'14,98" S	65°31'35,67" O
11.	Toro Toro - <u>Omereque</u>	50,5	1.500,00	18°20'56,35" S	65°36'59,02" O

- **Rocket stoves transportation**

This accounts for the cost of transportation of the 36 ecological stoves from Cochabamba to a central point in the Toro Toro municipality.

5. Food Expenses

The Cedesol team will stay in the field for a total of 8 to 10 weeks in order to conduct the required educational workshops (divided in periods of 2 weeks each); therefore these costs account for all meals to feed the 4 members of the team.

6. Rocket Stoves Building Cost

This is the cost of 18 Rocket Standard and 18 Rocket Institutional units. This cost is exclusively allocated in phase 2.

7. Contest Material Cost

This is related to the organization of the award ceremony and cost of incentive prizes for the 1st, 2nd and 3rd places.

In total, the direct costs of the project have been estimated in **293.070 Bs.** and this value includes all the expenses strictly necessary to obtain positive results from project.

5.2 INDIRECT COSTS

The indirect costs include all the expenses that are independent from the project results but despite that, essential for their positive realization. Indirect costs include a great number of factors and therefore are difficult to individuate and measure. For this reason, a 10% of the total direct costs has been determined a realistic expectation.

Therefore the total amount of indirect costs will be 29.307Bs (10% of direct costs).

BUDGET PLAN FOR "TORO TORO PROJECT"				
Summary of expenses expected				
Direct Costs	PHASE I	PHASE II	PHASE III	TOTAL IN Bs.
1. Personnel	56500	49200	41900	147600
2. External Personnel	8330	2030	2030	12390
3. Materials	1919	3564	3115	8598
4. Rocket Stoves Production		72000		72000
5. Contest Material			8000	8000
6. Transportation Expenses	6890	4940	5140	16970
7. Food Expenses	3024	3024	3024	9072
8. Accommodation Expenses	3120	4120	4120	11360
9. Communication Expenses	2450	2360	2270	7080
TOTAL DIRECT COSTS				293070
INDIRECT COSTS 10%				29307
TOTAL BUDGET AMOUNT (Direct Costs + Indirect Costs)				322377

The total budget amount for the development of the current project, composed by direct and indirect costs, is estimated in **322.377Bs.**

6. Other Considerations -

Recently we have entered into an agreement with an optometrist who will come in with testing equipment, measure the student's eyes for glasses and provide the glasses at a reduced cost. We plan to "piggyback" this as much as possible but may look for separate funds to help cover some the cost to the students for glasses, once we have a better understanding of what that will mean.

