



0255311: Conservation of a Threatened Polylepis Forest for maintain Ecosystem Services in Boliva

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Centro de Análisis Espacial CAE
Instituto de Hidrología e Hidráulica IHH
Parque Nacional Cotapata del SERNAP
Cultura Ciudadana del Gobierno Autónomo de La Paz
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Unidad Educativa Pongo
Fotógrafos para la Conservación
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Provincia Murillo, La Paz city

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The overall aim: To raise awareness in Pongo community through conservation actions on Polylepis Choquetanga forest.

Table of contents

Summary	3
INTRODUCTION	4
AIM AND OBJECTIVES.....	7
METHODOLOGY	7
CONCLUSION.....	18
PROBLEMS ENCOUNTERED AND LESSONS LEARNT	18
IN THE FUTURE.....	21
APPENDIX.....	22
BIBLIOGRAPHY	29

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Summary

The project "Conservation of a threatened *Polylepis* forest for maintain ecosystem services in Bolivia" (2011-2012) had the purpose to raise awareness in Pongo community and the general public through conservation actions on *Polylepis* Choquetanga forest and the demonstration of importance of its ecosystem services. In order to achieve this; has been demonstrated that the forest catch more water than the same surface of grassland and can provide of water to 8,016 people by year. Has been dictated three educational workshops to the students of Pongo schools using ludic material like the ecochess and alphabet soup, and at the end an environmental fair was outcome to this assisted students from two rural and one city La Paz schools. All this information given has the objective of encourage the kids to participate the two reforestation campaigns and take the responsibility to monitor the new seedlings which has a survival rate of 98%, getting a total of 1176 seedlings alive increasing the

forest area by 2%. Finally all this information was summarized in a brochure distributed to all residents Pongo community, environmental institutions and tourist increasing awareness in the conservation of these forests.

INTRODUCTION

Polylepis (kewiña, queñua) forests occur in one of highest zones in the world (Altamirano & Terán 2005), because they were refuges during the last glacial era (Simpson 1971) they have been generated speciation events, like two birds endangered species: *Anairetes alpinus* (EN: endangered) and *Cinclodes aricomae* (CR: Critical Endangered) they feed and build their nests only in these forests (IUCN 2012, Gómez 2009), these species only occur in Perú and Bolivia like *Polylepis pepeï*, tree catalogued as Vulnerable (IUCN 2012). These forests are most endangered ecosystems in South America (Kessler 2006, Navarro et al. 2005). In Bolivia, there are 62 *Polylepis pepeï* forests and besides their little area they develop and important ecological function compared with grasslands round them, one of this is the water capture (Fjeldsa&Kessler 2004).

Based on previous experiences inside the zone We proposed to work focusing on the forest importance since an anthropocentrism approach as strategy to improve its conservation, because the forest where we are working it is the home of six individuals of *Anairetes alpinus* and it is a genetic pool key to the tree *Polylepis pepeï*, the project it is trying to resolve the knowledge gap regarding the importance of these forests and their ecosystem services, focusing on water capture because it is the main ecosystem service, which could face climate change in the future.



Figure 1. Satellite Image, showing the area of Choquetanga forest, the glacial valley, where the *Polylepis* forest slope with west exhibition

Key partners who supported us with advices, information and fixed assets were Asociación Civil Armonía whose depends on BirdLife, all the time they monitored our work. In addition Conservation Leadership Programme supported us with contacts, support to develop a course, information, etc. An important support came from PhD. Michele Ataroff Soler from Instituto de Ciencias Ambientales y Ecológicas from Venezuela, another support came from Physic carrer who's lent us their metereologic equipment needed, the same role played Instituto de Hidrología e Hidráulica and Instituto de Hidráulica. Regarding educational support we received support form Culture department from La Paz city government whose supported us with zebras (vial educators), and lent us panels to the fair and inviting us to participate Plan La Paz 2040. Also the National Park Cotapata supports us with their participation during environmental fair. Finally Institute Technician-Scientific Investigation from Police University gave us support lend us its auditorium to the course and lend us equipments to weight and analyze data.

PROJECT MEMBERS

VANESA SERRUDO GONZÁLES

Qualification: Biologist

Experience: Three years working as leader of the project "*Polylepis* forest conservation" in Bolivia, experience in environmental education during four years.

Job Title: Project leader

Team Role: Coordinate the educational, investigation and conservation activities, write the reports, make the contacts, manage the money and maintain the team enthusiastic.

DANIELA ANDREA ARTEAGA VOIGT

Qualification: Biologist **Experience:** One year working with many Ethnics in Bolivia in diverse communities, experience with field work on *Polylepis* forests during two years. Management of Photoshop.

Job Title: Project assistant **Team Role:** Gathering information about climate change, forests, water use, environmental services and everything needed to develop educational workshops and promotions. Design and produce publicity for the project. Compiling the information generated in all areas.

MARTÍN ANTONIO APAZA TICONA

Qualification: Agronomist **Experience:** Participation as coordinator in more than ten forestation campaigns related with native species as kiswara, queñua, aliso, etc. in ecosystems related with *Polylepis* forests.

Job Title: Agronomist **Team Role:** Coordinate reforestation action by guiding the vegetation map execution, calculate the surface needed to be reforested, produce and care seedlings *Polylepis pepeí* and help in the research activities.

SUSANA KARINA FLORES PINTO

Qualification: Educator **Experience:** Experience in environmental education during five years, relationship with teachers and communities. Experience in managing recreational group and methodologies related with games.

Job Title: Educator **Team Role:** Prepare, develop and conduct workshops on education, and support reforestation campaigns.

KAREN YOANA UDAETA RODRÍGUEZ

Qualification: Biologist **Experience:** Experience in management of GIS for conservation studies. Experience in conservation through education methodologies. Relationships with communities

Job Title: Researcher **Team Role:** Elaborate the maps, collaborate with field work and make contacts through institutions.

ALVARO MANZANEDA SERRANO

Qualification: Agronomist **Experience:** Participation as researcher in watering projects.

Job Title: Researcher **Team Role:** Help to coordinate reforestation action by guiding the vegetation map execution, guide the data needed to evaluate water catchment.

ZULMA CHURA ZÁRATE

Qualification: Biologist **Experience:** Experience in filed work for conservation studies related with protected areas inside La Paz. Experience with jobs related with communities.

Job Title: Researcher assistant **Team Role:** Assist to in field work and educational activities.

AIM AND OBJECTIVES

Project purpose

To raise awareness in Pongo community and the general public through conservation actions on *Polylepis* Choquetanga forest and the demonstration of importance of its ecosystem services.

- To obtain information about Choquetanga forest water catchment as ecosystem service.
- To raise awareness in Pongo community youth of the importance of taking actions for conservation of Choquetanga forest.
- To restore Choquetanga forest trough plantation of 1000 seedlings.
- To raise public awareness of the importance of *Polylepis* forest conservation.

METHODOLOGY

Investigation water catchment by Choquetanga forest

To evaluate the water catchment inside forest was taken a prospection trip where were evaluated methodologies previously discussed with our supervisors, basing our work on García et al. (2007) publication, after that were labeled random with laminated labels tree species of plants: two trees, one shrub and one grassland dominant inside the forest all with a sample of 10: *Polylepis pepeii* (PO), *Gynoxis asterotrichia* (GY), *Baccharis buxifolia* (BA) and *Festuca asplundi* (FE) respectively. To more detailed view Appendix 2.

Education

During a year were conducted the following workshops: Climate change and contamination, forest functions and Reforestation. To organize them were developed following concept maps

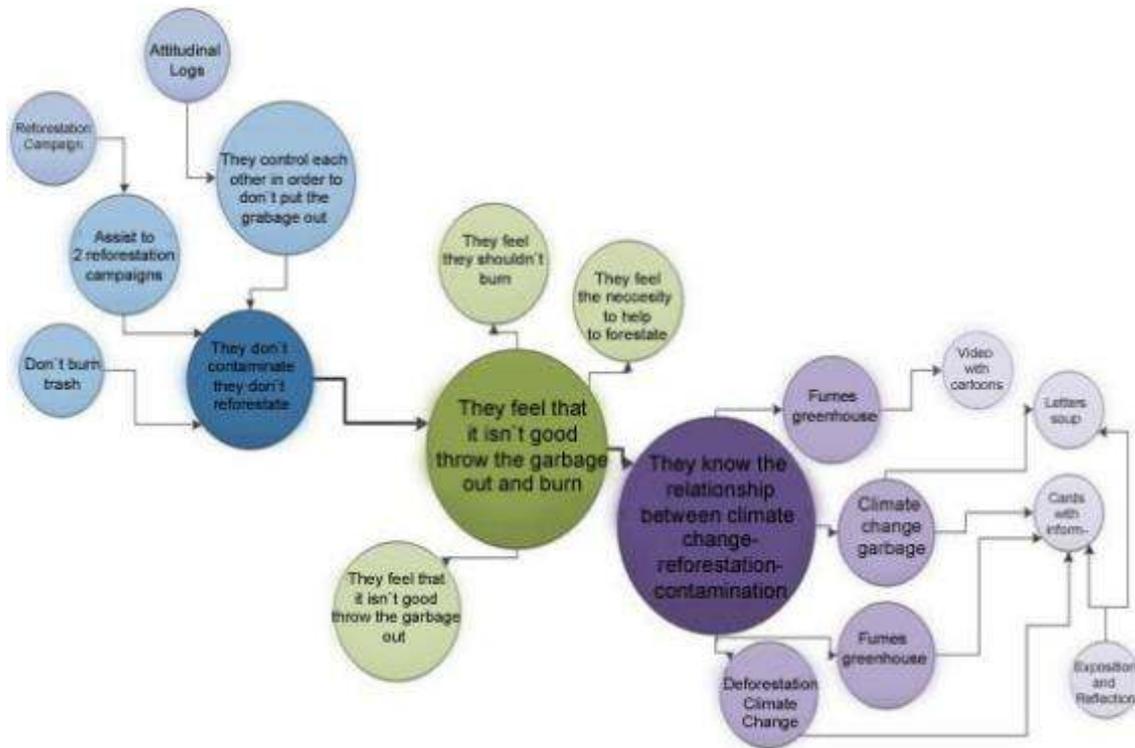


Figure 2. Workshop concept map "climate change and Contamination"

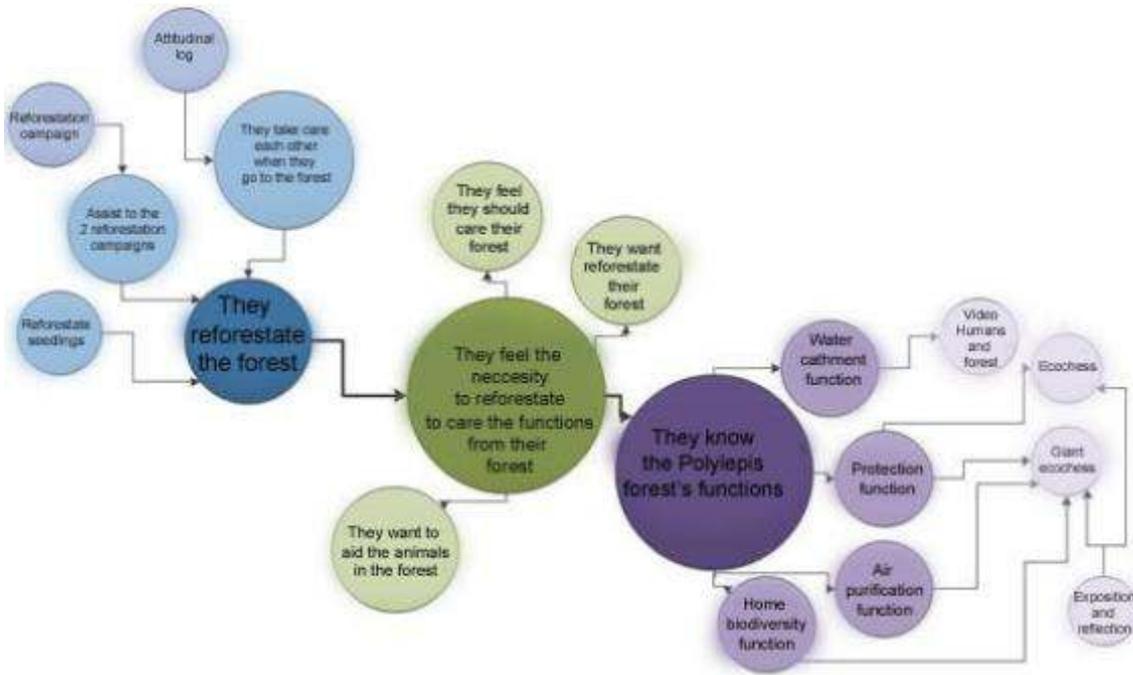


Figure 3. Workshop concept map "forest functions"

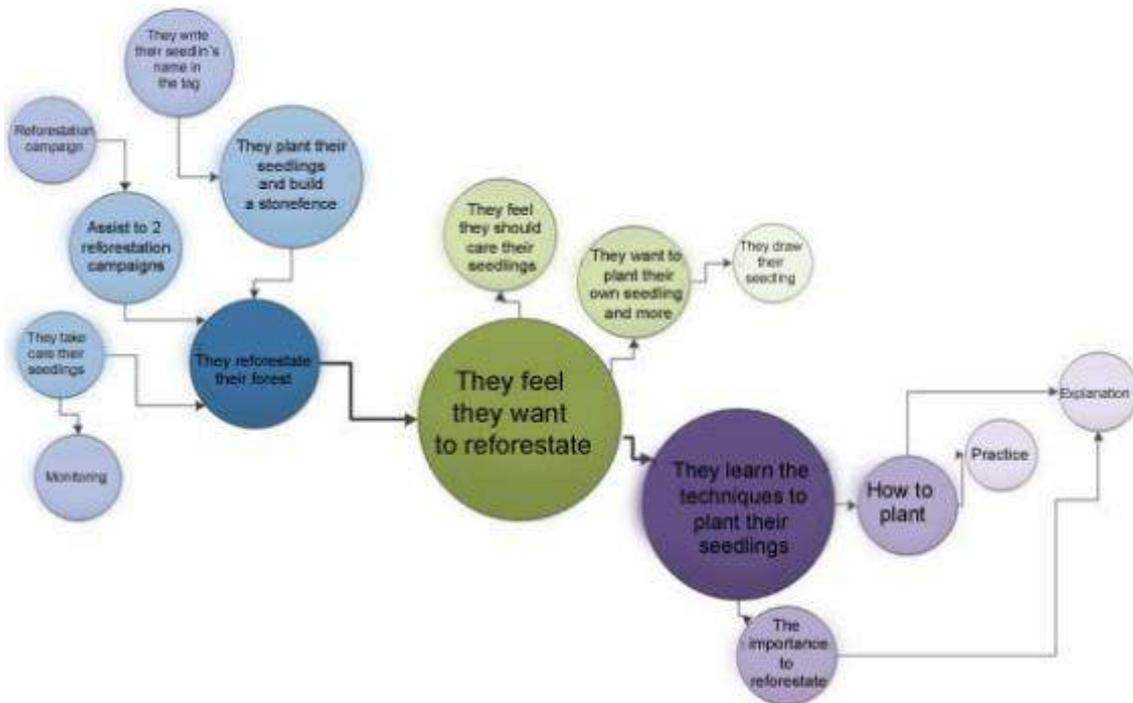


Figure 4. Workshop concept map "Reforestation"

To evaluate the effect of the teachings, attitudinal loggings were distributed to the teachers from schools, they had the following structure:

Date	Attitude	Interpretation

In addition tests were filled (Appendix 1) to nine students before and after to give the knowledge through workshops, the results were analyzed with a goodness test to each question and Mann-Whitney one tail to the compare between pre and post tests.

Reforestation

Following the recommendations given by Flores (2007) in three income forests Choquetanga and Viscachani were collected cuttings and layering simple half year before each reforestation campaign, these were taken to a specialist nursery where they developed, for *ex situ* conditions, in order to match the conditions *in situ* with *ex site* a soil analysis at the Laboratory for Environmental Quality was made. When the seedlings were on average 15 cm high were transported to the community one day before each reforestation campaign and distributing them among participants who took them to the forest to plant in areas identified three days before in function will the presence of moss, and easy access to water.



Figure 5. Harvesting hardcuttings to reforestate

Coordinating education activities with reforestation was instructed to children to plant seedlings and care of their future trees, they planted along a transect their seedlings. People who put name brand testing them with tags, in order to monitor them after 11 months to get the death rate.

Outreach methodology

To spread the knowledge given to the young population to others population the school “Colegio Santa Teresa” from La Paz city and a rural school “Unidad Educativa Unduavi” were invited to the fair organized in Pongo, which join all the information given during the workshops.

Besides an open invitation to the second reforestation campaign was launched during an interview in Catholic channel TV from La Paz city and more than 20 people were invited via email.

To achieve the goal of give information generated in the Project 1000 brochures were made and distributed to environmental institutions, to all Pongo’s communities people and all the people participated second reforestation campaign.

OUTPUTS AND RESULTS

The map displayed shows the substrates types along the micro watershed, achieving the first objective to obtaining water harvesting forest of *Polylepis* which is 146,288,299 liters a year in 186,162 m² surface, this water catchment represents 59,6% year pluvial precipitation 1319 mm².

The results of the study of water harvesting Choquetanga forest showed the following results for each plant species evaluated.

Table 1. Infiltration data in function to soil type in the Choquetanga forest

Type of substrate	Liters capable to be infiltrated/m²/month
Soil under <i>Gynoxis</i> tree	285163
Moss under <i>Gynoxis</i> tree	203898
Soil under <i>Polylepis</i> tree	108222
Moss under <i>Baccharis</i> shrub	97438
Moss under <i>Polylepis</i> tree	84178
Soil under <i>Baccharis</i> shrub	71787
Soil under <i>Festuca</i> grass	43240
Moss under <i>Festuca</i> grass	11688

Base on this results we observe type soil less water catch are soil and moss under grassland which is the type out the forest (grasslands), showing the importance of trees, shrubs and moss to this forest for water catchment.

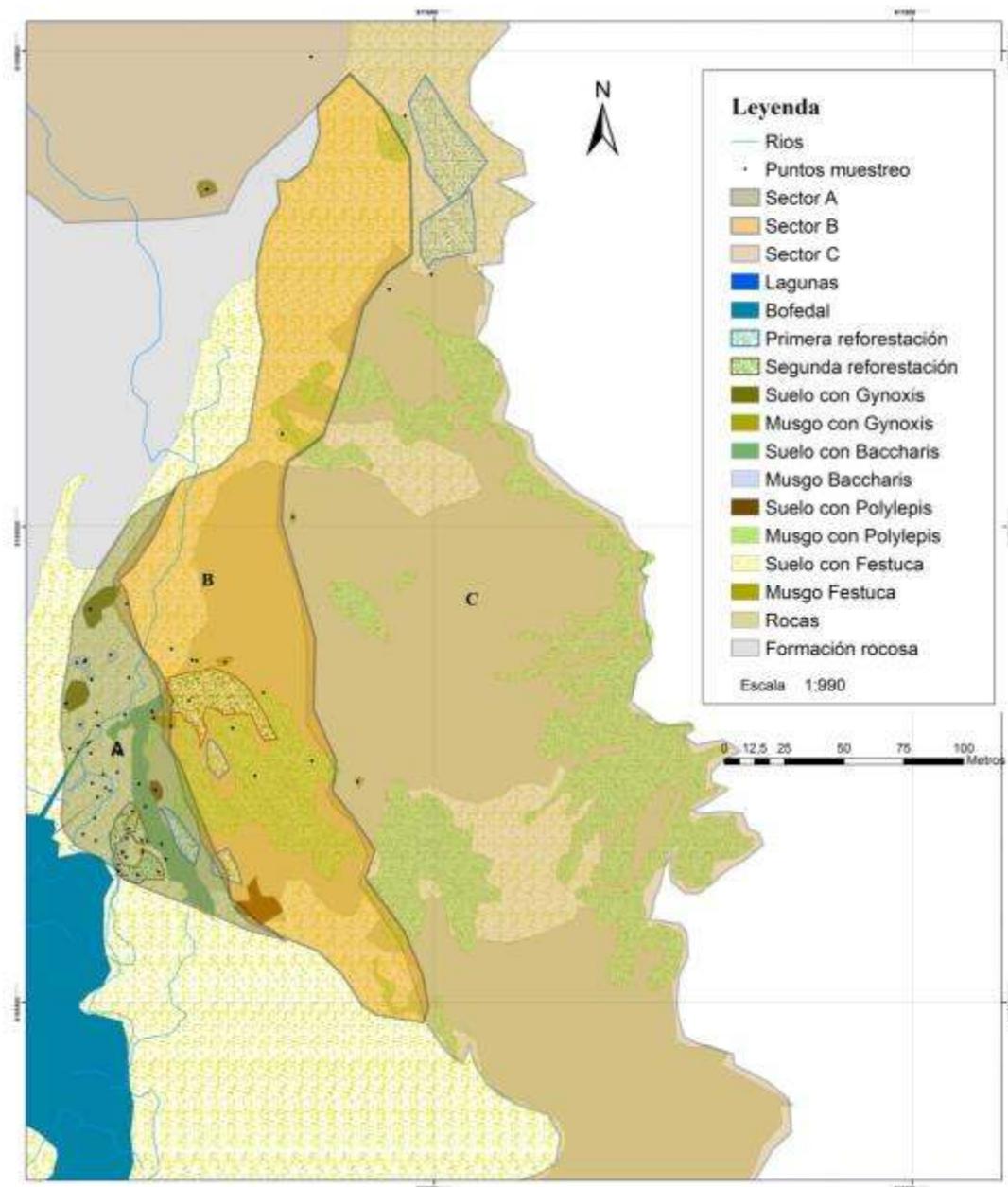


Figure 6. Map water catchment according type of soil and areas reforested

More than 1230 *Polylepis pepeii* seedlings were planted on Choquetanga forest, with these results the project exceeds the expectations of 1000 seedlings reforested. In

addition on that the high survival rate (98%) obtained during both campaign shown unprecedented results in Bolivia.



Figure 7. A child from Wayllara community with her *Polylepis* seedling and wearing the vest delivered as de incentive to each participant.

Education actions despite not showing a significant difference according tests taken before and after did show a change favorable attitude problems like contamination by solid residues, forest tending and foremost a defense behavior forest through reforestation actions, with more than twenty community participants in the first reforestation Pongo and more than thirty participants in the second.



Figure 8. Participant's second reforestation campaign

The involvement of more than 270 individuals belonging four scientific institutions, five educational, three state and six from different areas let to see the scope of the project.



Figure 9. Environmental fair with the participation of vial educators "Cebras" and students from UE Santa Teresa. Photo taken by "Fotógrafos para la conservación"

A poster in "Trough fair", one in "V National Meetig Forestal Investigation" in Cochabamba city showing the results from reforestation, one exhibition in Sucre city "III Ecology Congress" and one in La Paz city in "First Congress Education to Biodiversity Conservation and Environmental Bolivia" showing the educative results and the game ecochess socialized during the fair, besides were delivered more than 300 brochures with the information generated by the project, they were delivered to seven environmental institutions, all the people who live in Pongo community and a lot of tourists. Besides an interview in Católica TV canal in La Paz city was obtained and a publication in the portal Gaia News.



Figure 10. Brochure delivered, showing the results of education in Pongo's schools

ACHIEVEMENTS AND IMPACTS

The ecological impact of reforestation actions is reflected in the increase of water harvesting to increase forest coverage by 2%. Thereby initiating the restoration. Ecologic benefits looking to the future will be increased nesting sites for endangered species extinction *Anairetes alpinus* and therefore an increased number of individuals.

Cause was delivered to the EU Richard Lattmann and EU Pongo ecochesses is expected that knowledge about the functions of the forest, endangered species extinction and the importance of Protected Area remain at trough generations who study in these educational units, Besides the distribution of these ecochesses to protected area will help the information extended also to tourists visiting the National Park Cotapata.



Figure 11. Game Eco chess used to the workshop "Forest Functions" UE Richard Lattmann

A range achieved in the work done during this time was the establishment of a sign on the road which explains the presence of birds in danger of extinction in the Pongo, placed by the Asociación Boliviana de Caminos del Estado Plurinacional de Bolivia.



Figure 12. Sign near Pongo community

In order to evaluate our data in April we organized a course titled “Analytical methods to evaluate ecosystem service: water catchment” conducted in four days through three lectures and one videoconference via skype, dictated by a worker of the National Protected Areas Service, a worker of the Institute of Hydrology and Hydraulics, Universidad Mayor de San Andrés (State University La Paz), a professor of physics at the same university, and a professor at the Institute of Environmental and Ecological Sciences ICAE, Faculty of Science, University of Los Andes, Venezuela.



Figure 13. PhD. Eduardo Palenque's speech

The participation of 19 people 42% from Universities, 26% from state institutions, 26% NGO's (Armonía, Agua Sustentable) and 5% independent permitted a meeting of people interested in this topic generating an important impact in this little scientific community.

CONCLUSION

An important fact is that the forest observed capture much more water than grasslands rounding, capturing the microwatershed a total of 146,288,287.243 liters of water a year, demonstrating their important ecosystem service. This means that this service can provide water to a total of 8,016 people based on the requirements set by the Panamerican Organization Health (PAHO / WHO), per day, each person should have seven liters of drinking water own and requires 50 liters for all your needs, this amount of water equivalent to 15 per year regulatory Olympic pools once more this shows the importance it can have a forest of medium surface that provides this vital service for community and environment.

A total of 1200 seedlings *Polylepis pepeii* have been planted in Choquetanga forest which means 2% of the forest area increased making this action a significant contribution from the young people of the Pongo community who developed awareness of the importance of conserve their forest, appropriating their plants.

PROBLEMS ENCOUNTERED AND LESSONS LEARNT

- **What activities?**

The activities that went well were:

1. The data collection trips during dry season, because during this season the logistics within the forest is better because the site being dry is more safe to walk and record data.
2. Workshops in Environmental Education. By the fact that we have a meeting one week before the day of the workshop and planning we were based on concept maps presented in the Methodology, Besides we prepared the materials for that time and the team have experienced since we have an educator who developed the dynamics with much ease.
3. The first reforestation campaign. Because we planned it two weeks early and collected *Polylepis* seedlings during wet season ensuring them to the next wet season, besides we trained children to plant and to care their seedlings and we encourage them motivate them in order to take ownership of their seedlings to care for them as if they were their children.

- **Please detail any problems that the project encountered or deviations from original project plans. Describe how these problems were addressed and what solutions were found to deal with these issues.**

The biggest problem we have to face was the stopped of support from population Pongo due the distrust to our team because they though we have been made bad use of money in the Center Information Tourism building an activity with the other project supported by Ben Olewine and Naomi Lupka Trust. This problem was addressed participating in a meeting and giving details about Center Information Tourism building.

The initial plan was to improve interpretive trail to Choquetanga forest from Pongo, but thinking on the undesired impacts on plants and animals we decided don't do this until the forest expand their surface. Instead we worked together a technical in tourist in order she work in give information and make a plan to enhance the information about the forest and give information to the tourist really interested.

With relation to meterologic data station, this is far from forest, that the reason we decided take data both places to establish a correction factor to those data.

Another problem with which we stumbled was the lack of support from the Environmental Department of the Municipality of La Paz, who initially promised to buy 1000 seedlings of *Polylepis* seedlings to our producer and after, was denied this support under the pretext authorities that changed and was no longer the person we talked before. We solve this problem by modifying the initial budget, so what initially be funded by another institution finished being funded by CLP.

The last problem you stumble and which made us delay the delivery of the final report was the lack of support from technician that we collaborate in the Analysis of our data

generated, this problem was solved with the support of CLP in funding for a course of analysis in data carried out 8-11 april in La Paz city counting with 19 participants.

- **Briefly assess the specific project methodologies and conservation tools used.**

Outreach:

They may have used other communication tools as Facebook to invite more people to the campaign.

In the interview by Gaia no photographs are provided so that the information was distorted a little bit.

In the interview by Catolica TV channel was made a summary of all project components so that it was complete.

Regarding the brochure, we asked five people to respond to the following questions:

1. Purpose of poster, message

Going green and touristic advertising.

2. ¿Where could it be distributed?

Environmental institutions, tourists and people from the community of Pongo.

3. Who is the brochure for (target audience)?

Foreign people, tourists, environmentalists, young people and children.

4. Comment on visual aspects (picture, design, colours, etc.)

The photographs are clear, the design is cheerful color and innovative way, the text size is readable and the title called the care and appropriate.

5. Comment on the words in the brochure

El brochure is interesting and attractive.

6. How could you improve this brochure?

I will create a glossary and I will create a box of *Anairetes*.

- **Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.**

Important lessons learned along the course were thinking as funders think, carefully review the schedules made via logical frame and develop proposals the following structure: 1. tree problems, 2. target tree, 3. Stakeholders Analysis and 4. Logical frame.

Something that served much and suggest to use in future work is filling this matrix

Activity/task	Human resources	Material	Operative costs

Además para mejorar los resultados del proyecto sugiero se incentive constantemente a los miembros del equipo de trabajo y se realicen reuniones y evaluaciones de las actividades pasadas con el objeto de mejorar las siguientes actividades.

IN THE FUTURE

Given the current conditions workspace is provision must work at a level of preservation of a protected area in Cotapata developing a Plan Land Use to be consistent with the conservation of the sites that are most fragile and increasingly important for their services ecosystem as they have proven to be the *Polylepis* forests, to thereby ordering the territorial space function will of its carrying capacity, degree of fragility and its potential environmental, in order to benefit both families the communities and the conservation of these unique habitats which harbor endangered species extinction. In addition suggested reforestation replicate efforts in other forests to thereby increase the plant surface and ensure individuals *Anairetes alpinus* stocking.

It is suggested looking the social problem with a specialist in the field to focus on domestic social problems in the community that do not allow better develop.

In September this year III Congress Conservation *Polylepis* forest will be taken in Arica, Chile. It will be a great opportunity to show our results, share information, make important contacts and the most important establish strategies to conserve *Polylepis pepeii* from regional framework.

APPENDIX

Appendixes 1

TEST

DATE:
NAME:
SCHOOL:

A. READ WITH ATTENTION THE QUESTION AND UNDERLINE THE CORRECT ANSWER.

1. The forests give us

- a) Pure air
- b) Medicine and food
- c) Water
- d) Everything
- e) Anything

2. *Polylepis* forest (queñua), give us...

- a) Pure air
- b) Medicine and food
- c) Water
- d) Everything
- e) Anything

3. If you consider that all the forests give us pure air, you...

- a) Plant trees
- b) Don't burn if you don't need
- c) Boot trash inside the forests

4. ¿How do you think the forests give us water?

- a) By the fruits
- b) The tree retain water inside their roots
- c) When the trees perspire

Appendix 2

Elaboration map water catchment

To elaborate the map water catchment, first was calculated the water balance in the forest, following the next equation:

$$P_{pt} = P_v + P_h = I_f + P_n$$

Where:

Pt: Total Precipitation

Pv: Vertical Precipitation

Ph: Fog precipitation or horizontal precipitation

If: Leaves interception or evaporation

Pn: Net precipitation

Because we don't measure various variables, the equation resumed to:

$$P_{pt} = P_v + P_h = i_f + i_h + E_c + I_{nf}$$

ih: litter interception

Ec: Runoff

Inf: Infiltration

Where our principal interest it is know Inf, because it is what finally is caught by the forest, we evaluate it by photos obtained from Google Earth, backed by photos taken of the place. The Estimate of the vegetation cover was obtained by classification and monitored with the points taken in the field, using plots random, distributed throughout the forest (top: sector C, media, sector B and lower, sector A) each sector three parcels that mediate five meters long by four wide covering the entire surface Pongo (Table 1) where each point is geographically referenced and then compare it with that seen in the images.

Table 2. Sample points according vegetal coberture

Coberture type	N° points
N° <i>Polylepis</i> (tree)	63
N° <i>Gynoxis</i> (tree)	7
N° <i>Baccharis</i> (thola)	88
N° <i>Festuca</i> (grassland)	165
N° Stones	15
N° Water	4

For the estimation individuals number (trees, shrubs and grasslands) have been worked with:

1° Sampling area (Map soil covertures')

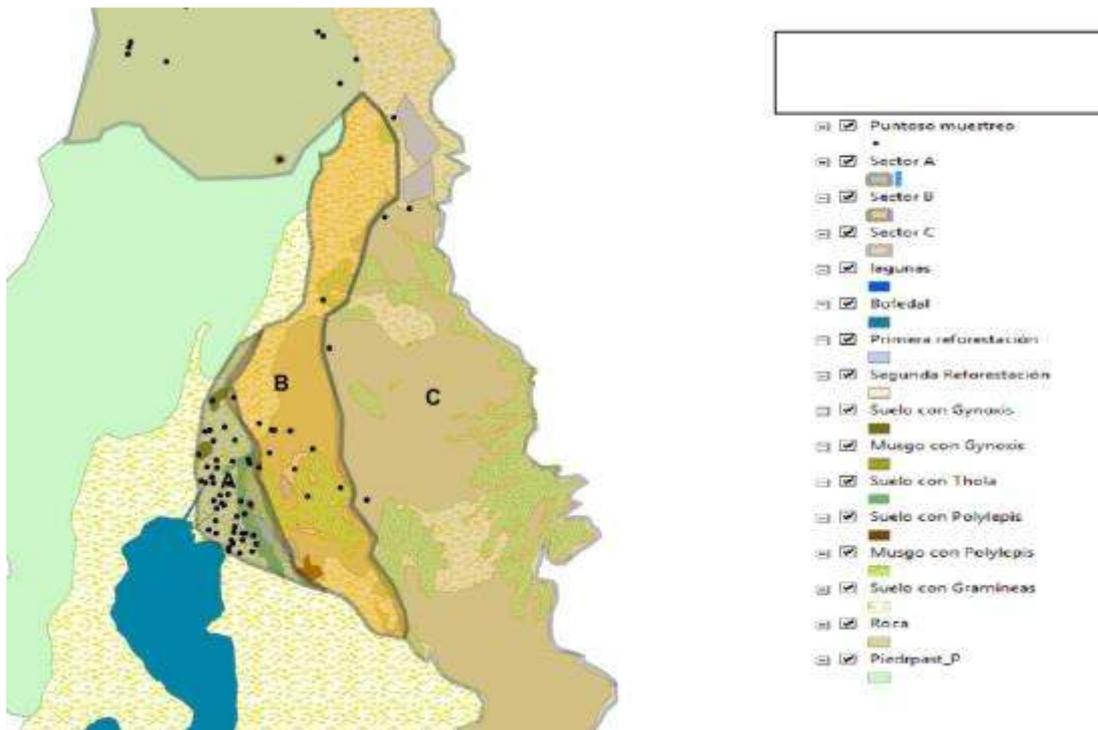


Figure 1. Sampling areas, Points indicate the individuals

2° Sample points (Plots)

Inside each plot was counted the number of individuals (Table 1) by meter square, each plot it is 20 m².

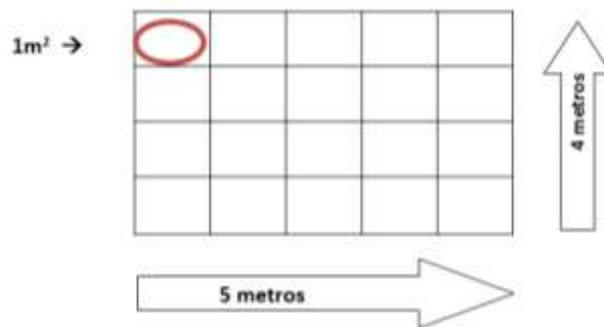


Figure 2. Plot used to calculate number of individuals

The sum from plots A, B and C result in 200 m² after that with the data covertures and based on soil types was elaborated the map using ArcGIS v. 9.3 and Google Earth.

All the data were registered in the units: 1mm: 1liter/m².

To evaluate Ppt (total precipitation), first we registered Pv (vertical precipitation) using month accumulated data from pluviometer own to Instituto de Hidrología e Hidraulica (IHH) located 200 meters above forest. In order to use those data as forest's data we made a linear regression between our data vertical precipitation registered in the forest and data Pv in IHH's meteorological station to elaborate an equation to correct IHH's data. To evaluate Ph we built a fog collector similar to Louvered Screen Fog Collector, using a can as a water collector, this instrument was positioned in the center of the forest.

To evaluate ETR: Total transpiration, we closed with Ziploc bags previously weighted stems with leaves surface known during a determined time to after that weight the bag with water again to obtain through the known equation density = mass/volume (using 1 g/cm³) the liters by specie by m²by year.

To evaluate Ec (Runoff) we measured how much time fill 1 litter in a point where the water runoff.

Appendix 3

Ecochess instructions

Ecochess is a game where more than one player can participate, because search at the same time you learn different ecological topics, like: forest's functions, species threatened (queñua, *Cinclodes* and *Anairetes*) through questions you must answer to follow up when you stay in a square with a question marker.

Ecochess start with all the pieces at their initial position on the board, each square name is squarechess.

1. The players have top ut their pieces one in front other on the correspondent square, according to the position the square shows.
2. The movements are the following:
 - Water drop just moves straight line the squares it wishes.
 - Viscachas, because they love jumping, they can move en "L" shape with a jump.
 - Jucumari bear or monkey, by they tender can move in diagonal line, the squares they wish.
 - *Anairetes*, can moves one square and in straight line, doesn't go back and just during the starting moves two squares.
 - *Cinclodes*, can move one square straight, doesn't go back and just during the starting moves two squares.
 - Queñua king, can move any direction just one square, when it can't move or it has eaten the play it is over.
 - Queñua queen, can play in different directions and the number of sqaures it wishes.

All the pieces can eat if their movements allow them achieve the square where they meet the contrincant, don't jump over the piece to eats it, it must arrives on the same square, in this way can't avoid the questions.

The play starts with the team first put their pieces on the respective squares on board. To move forward should coordinate between the players which piece should move and just can move a piece by turn.

The team don't move forward until answer the question when arrive to a square with a question mark, in the case don't answer the question the team lose their turn. If the contrincant eat a piece in the square with a question mark, just can eat if answer correctly the question.



Figure 3. Picture of the game ecochess

If some piece arrives other side board can recuperate other piece it loses. The game it is over when the King is trapped (can't move or it is eaten).

Appendix 4

Itemized expenses	Total CLP requested (USD)	CLP update	Total CLP requested (USD)
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PHASE I - PROJECT PREPARATION			
Communications (telephone/internet/postage)	200	200	200
Calls and internet use			4
Mobile credit			149
Internet use			26
Sent by courier			21
Field guide books and other printed material	100	100	100
Books			10
Cartridge			24
CDs			7
Newspapers			29
Photocopies			7
Printings			19
Receipts			1
Trapper			3
Insurance	250	279	279
6 personal insurance (35USD/person)			244
Medical supplies for research and reforestation activities			36
Visas and permits	0	0	0,00
Team training (Please detail: CLP reproduction)	200	273	273
Lunchs			91
Cake, sodas			8
Training material			84
Photocopies for workshop			7
Transportation			4
Inscriptions			79
Scientific/field equipment (equipment to evaluate water catchment and reforestate)	1500	435	435
Cut of acrylic			7
Field equipment			190
Net			8
Nylon			6
Photocopies			6
Plastic			19
Plate			32
Tape			17
Ziploc bags			150
Photographic equipment (one record camera and one photographic camera, batteries)	0	62	62
Batteries			62
Camping equipment (Please detail main items:)	0	104	104
Other equipments			104
Boat/engine/truck (including fuel) (please detail: Fuel to Pongo travels and around La Paz city, vehicle maintenance)	600	1011	1.011
Bus transportation			9
Carwash			13
Driving			13
Foodtransportation			7
Fuel			72
Infractions			11
Maintenance			14

Minibus contract			131
Minivan contract			43
Taxi			191
Transportation team members			501
Material transportation			6
Other (Please detail: Trail improve from Pongo to Choquetanga Forest)	500	0	0
PHASE II - IMPLEMENTATION EXPENSES			
Food for team members and local guides (\$17/day/51 days/6people)	2500	3439	3.439
Christmas vouchers			172
Educationalactivities			915
Evaluationwaterchatcmentmethods			71
Fairactivities			154
Meetingstoanalyze data			193
Outreachactivities			701
Reforestationpreparations			168
Reforestationactivities			331
Researchactivities			202
Trip to get water catchment data			281
Workshopscofeebraks			93
Final reportelaboration			158
Travel and local transportation (please detail: rent a minibus to get people)	1280	1706	1.706
Educationalactivities			253
Fairpreparation			115
Fair			162
Maintenance jeep Land Cruiser Toyota Armonia'spropiety			683
Outreachactivities			70
Reforestationpreparations			25
Reforestation			148
Researchactivities			51
Trip to get water catchment data			198
Customs and/or port duties (tolls to Pongo)	0	113	113
Money transfer from CLP and photocopies			100
Tollsto Pongo			13
Workshops (please detail: materials for workshops: pencils, markers, banners, papers,food)	600	758	758
MaterialstoEducation			521
Ecochess			237
Outreach/education activities and materials (brochures, caps,chest, video edition)	3820	1982	1.982
100 chests			359
100 bags			532
100 logos			460
100 caps			216
1000 brochures			359
tubes to Tourim Information Center			57
Other: reforestation equipment and buy of seedlings	0	1084	1.084
Soilstudy			66
Buy of seedlings			740
Material toreforestate			278

Administration 80%	720	720	720
OverheadtoArmonia office (80%)			720
PHASE III - POST-PROJECT EXPENSES			
Administration	180	180	180
OverheadtoArmonia office (20%)			180
Report production and result dissemination	50	53	53
Total	12500	12.499	12.500

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