

"Dressing the Mountains in Green"

"Vistiendo las Montañas de Verde" Community Well Building Proposal

Restoration in the High Andes with the Pilco family and Agua Santa Community, Chimborazo province, central highlands Andean Ecuador.

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A project in collaboration with: Dressing the Mountains Green "VMV" (Juan Patricio Pilco & Family), Agua Santa community, Living Bridges Foundation, Fundación OSA, Tian Gong Institute, and Earthlife



OSA



Living Bridges



VMV

Purpose:

The following proposal seeks financial support to construct a water well for the Agua Santa Puruwa-Quechua speaking indigenous peoples community in the high Andes region of Chimborazo province in Ecuador. The water supply in the high Andes of Ecuador is rapidly diminishing due to deforestation and global warming and this well is a necessary solution for the survival of Agua Santa. The well will supply water to the Agua Santa community and the Dressing the Mountains in Green (VMV) reforestation project an initiative being brought forth by Juan Patricio Pilco a local community leader, since 1998. Over two-hundred and thirty (230) families will benefit from the construction of the proposed water well.



Agua Santa community members digging trenches to lay the pipe from the water tank atop Miraloma to the village center.

Introduction:

Agua Santa is a highland Quechua (Kichua) speaking community near Riobamba, in Chimborazo Province, central Andean Ecuador. The Agua Santa community is located in the agricultural heartland of Ecuador which is responsible for producing a significant food supply for the entire country. However, the Inter-Andean region and future productivity is in danger. These lands have undergone severe devastation from overgrazing and burning by colonial land barons. The critical state of this region threatens the well being of its peoples. The Agua Santa villagers have already organized and have made many efforts toward improving the future of their land and of their quality of life. Now, with climate change impacting the weather patterns in Ecuador, the region is drying out and soil erosion is at a peak. Water is scarce and is a precious commodity. To ensure the survival of Agua Santa and the future success of the VMV project, Agua Santa needs assistance funding the construction of a water well.

The well will be built at the base of Miraloma hill, where a group of Italian and Japanese water engineers with Juan Patricio have located a source, where it is evident that many years ago, when the region was once inter-Andean mountain forest, there was a lake and spring. Now it is a barren desert! Here a well can be made, and the water pumped into a holding tank that will then be pumped up 95 meters to the top of Miraloma hill where the community built a water storage tank, that has piping 80% installed distributing the water to the villagers. The following report and proposal explains the need and justification for the projects request of \$31,700 US to accomplish the drilling and installment of this necessary water well and pump system.

History:

Agua Santa is an exceptional indigenous community in central Andean Ecuador with a strong history. Situated on the land of their ancestors, the Agua Santa village is in the agricultural heartland of Ecuador which produces the majority of the vegetables and grain for the rest of the country. They are master agriculturalists; their diversified crops, irrigation, organic composting, and fertilization systems set a proper example of living sustainably with the earth. On their land they grow barley, quinoa, amaranth, potatoes and native crops such as oca and mashua, melloco and habas, peas and corn. They raise many kinds of livestock, such as, guinea pigs, lamb, pigs, donkeys, milk cows, goats, chickens, ducks, geese, and rabbits, all of which provide valuable manure that is collected and used as compost for their food crops. They understand the word moderation and with only a little they do so much. The people embody the true heritage of sustainability through organic agriculture. The lands of the indigenous peoples were usurped by the hacendados (Spanish colonial land barons) and the ancestors of the Agua Santa village were forced to work as indentured servants under a feudal "plantations hacienda – huasipungo (large estate/bonded labor) system" (Mecham). The ancestral Inca terraces were destroyed furthering the decimation of their native style of agriculture which had protected and preserved soil fertility, the native environment and yielded abundant stores annually for centuries.



Above: deforested hillsides in the territory of Agua Santa

"The ancient and highly productive native irrigation, terrace, and agroforestry systems had been abandoned early in the colonial period as the indigenous population was decimated and placed under various forms of bondage"
(Mecham).

Feudalism in Ecuador began to be dismantled by the Agrarian Reform laws of the 1960-70s. Unfortunately, by this time, many years of detrimental colonial farming practices such as annual agricultural burning and the over-grazing of non-native animals such as sheep and cattle have left the region deforested, degraded, and have prevented the native forests from regenerating. These herds of animals have devastated the soil over large areas and the Eucalyptus and Pine trees that have been planted choke out significant amounts of the groundwater.

"In the inter-Andean basin native vegetation has been practically eliminated since colonial times, replaced by crops, pasture, towns and cities, and exotic tree (eucalyptus and pine) plantations. This region suffers serious soil erosion problems and today only about 1 - 2% of its original forest cover remains..."
(Mecham).

The story of how they recuperated these lands is one of deep love and of commitment to abiding to a celestial and original way of life. After the landowners destroyed these lands through overgrazing and burning, the land soon became infertile and lifeless.



Juan Patricio Pilco (right) & Juan Hipo (left) distributing out Chocho seeds after a community meeting in promotion of the restoration efforts.

The Agua Santa elders between the years 1930's-1950's saved all their money by living extremely purposeful and frugal lives in order to save the large amounts of money necessary to buy back their lands. They raised animals and crops and sold the best of these saving all their money in order to purchase back their lands. Daily, they worked long, arduous work hours, subsided on one meal a day, and used the least possible resources. They saved all money they raised in earth jars that they buried in their gardens. Like this, gradually, the people saved enough funds and

succeeded in buying back their ancestral lands from the hacendados (the Spanish colonial land barons).

Later came the land reforms inspired by Monseñor Leonidas Proaño and followed by the support of the government many thousands of hectares of land in the hands of large land owners was returned to its rightful and original stewards, the highland Kichwa speaking mountain people of Ecuador, who today cultivate these lands and literally feed the entire country from the sweat and love of their service and labor. They produce annually thousands of pounds of potatoes, barley, wheat, carrots, cabbage, onions, garlic and so much more, that gets sold all over the country in the local markets. Today despite the hardships they undergo and economic dearth they are forced to accommodate to, their love for life is seen daily through their dedication to an integral and community oriented way of living.

Dressing the Mountains in Green (VMV):

Initiated by Patricio Pilco (Patricio) and Juan Hipo, Patricio's uncle and community leader, the Dressing the Mountains in Green (VMV) project strives to promote the survival of the Quechua speaking indigenous peoples of the high Andes Provinces. VMV reforests their degraded ancestral lands, and provides environmental education and cultural preservation resources for the public. Through planting native nitrogen enriching plants, Agua Santa will recuperate soil fertility in their province, improve water supply, and produce food for the community and native wildlife. VMV has been supported by the entire community which has invested numerous volunteer hours towards restoring native plants and wildlife to their ancestral lands in the High Andes. Countless "mingas," or community work sessions, have been organized to accomplish these tasks.

Patricio's ancestral knowledge of using strategic reforestation practices using native plants is not merely tribal folklore, but its effectiveness is backed by modern scientific research. A clear link has been made between water capture of lush native vegetation in the highlands and lowland water supply. According to a report from the Earthwatch Institute, "Highland forests are crucial for local water supply, and studies have shown that water supply depends as much upon fog as on rainfall." Despite the desert-like



Morning and afternoon mist bring necessary humidity that can only be captured with plants, or large metallic screens.

levels of precipitation of recent years in this region of the Andes, when the Ecuadorian mountains are covered with native humid forest species the growth captures the fog. The Andean highlands are the recipients of dense fog blankets that drift inland that can then be absorbed by the vegetation resulting in a humid highland forest ecosystem. The water collected by the native bushes and trees such as Polylepis, Lupin and Alder is filtered down through the plants and introduced into the soil replenishing nutrients and rehydrating the ground.

Water In Agua Santa:

The Agua Santa village is one of 23 communities which rely on glacial melt waters from the Chimborazo Glacier on the side of the Chimborazo Volcano for their community's water supply. Many years ago, aided by a Swiss German engineer, Patricio and other local community members worked together to construct a series of tubes to channel water from the glacier to each of the 23 communities. Agua Santa, 45 kilometers away, is the last of the 23 communities to receive water. Every 8 days Agua Santa receives water for 2 days. The villagers worked furiously for many hours during these days to capture the water with anything they could to bring back to their homes and community centers. This practice proved to me extremely time consuming and inefficient and the villagers could only use the water little by little.

Thanks to the progressive thinking and devout efforts of Patricio and his Dressing the Mountains in Green (VMV) project and support from the Living Bridges Foundation, the Tian Gong International Foundation, and the Fundacion OSA (Council for Cultural and Biological Diversity – CCBD) Agua Santa villagers worked together to construct a 250 cubic meter water tank to capture their water. The tank has been built atop Miraloma hill to store and supply water to the peoples of the Agua Santa community. Everyone in the village of Agua Santa shares this water for drinking and for their household gardens.



Agua Santa village making the tank atop miraloma hill

Unfortunately due to global warming and climate change, the water that arrives to Agua Santa community is less and less. When their two days of water arrive, the village can only hope and pray for their tank to fill up.

The loss of adequate water supplies many scientists, researchers, and environmentalists believe is that the greatest and most immediate risk global warming poses to Ecuador. Increasing temperatures due to global warming cause an acceleration of glacial melt and water evaporation from the soil of the highland grasslands (Simpson). A 2003 study of the Chimborazo glacier found that the glacier is melting meters within the fern layer without refreezing (Schotterer). The evidence of melting without refreezing suggests that the glacier is in fact diminishing and is an unsustainable source of water. Another study has found that the melt acceleration process in Ecuador is linked to increase in atmospheric temperature which transforms snowfalls into rain on the lower half of the glacier (Chaffaut).

Furthermore, experts are concerned that the warmer temperatures in Ecuador are an increasing threat to high-altitude ecosystems. In recent years evidence of global warming can be seen on the high altitude mountainsides, once too cold, are increasingly being used for farming livestock which is disruptive to the delicate environments in the Andes. With regard to the fragile status of the Andean highlands Jorge Nuñez, of Ecuador's Environment Ministry said, "Our priority is to conserve water resources, because without water there is no food. We need to protect the highlands ecosystems to ensure our water supply, on the glacier and in the city." (Wagner) Agua Santa has not only mastered minimizing their consumption of resources like water, but they are actively working toward improving the water supply through their work in mingas, community work sessions, for VMV. By planting native trees and reforesting their lands Agua Santa is protecting ground water sources from the heat and intensity of the sun.

Successes of Vistiendo las Montañas de Verde “Dressing the Mountain in Green”



Since 1995 over 100,000 native trees have been planted in the local region surrounding Agua Santa.



A tree nursery has been built which can accommodate 40,000 trees.



Many hours of meetings have been held socializing the importance of the reforestation project.



January 2009 - a water storage pond was constructed according to permaculture design at the Pilco family homestead.



In 2010 (thanks to the devout efforts of Patricio and support from the Living Bridges Foundation, the Tian Gong International Foundation, and the Fundacion OSA (Council for Cultural and Biological Diversity – CCBD) the Agua Santa village worked together to construct a 250 cubic meter water tank has been built atop Miraloma hill to supply water for gardening the Agua Santa community.



Bruce Harlow (project ally) making seeds balls at Agua Santa, Nov 2011

2011 - The community experimented with various planting methods for populating dramatic geographical landscapes with vegetation and has used "seed balls" composed of clay, various types of drought resistant native vegetation seeds, and fungi spores which they threw into the sides of steep cliff sides and slopes at the onset of the rainy season.



As of November, 2012 - 2,500 trees have been successfully produced in Juan Patricios' nursery. Due to lack of funding only this amount was produced. Non the less through diligent networking to the local municipality and local military he was able to acquire over 7,000 native trees starts to continue the community forestation mingas.



As of March 2013: 80% of the piping from the water tank down to the community has been completed. This has included digging of 9 kilometers of trenches.



Community leaders have been brought to other reforestation projects in the Andes to further their environmental education.



Countless community work sessions called "mingas" have been organized to accomplish these tasks.



2012 - A community minga digging trenches to lay the water pipe

A monthly stipend of \$300 has been secured by the Living Bridges Foundation for Juan Patricio Pilco that has allowed to him to continue working.

About the well:

Patricio has been in contact with Italian technicians to discuss potential solutions for the water crisis in Agua Santa. These technicians have many years of expertise in perforating wells for water. Patricio has already gotten the technicians to come to Agua Santa in order to complete a geological survey of the groundwater and determine if a well is a viable solution to provide water for their community. The results of the study were positive.

The technicians found a water reservoir only 95 meters from the water tank where they can put in a well. The total cost of constructing this well is quoted at \$31,700 USD. This well will significantly improve the lives of the 52 families in the Agua Santa community by providing fresh drinking water and allowing villagers to plant and sustain their personal fruit gardens and plant nurseries. The well will also further aid the success of the DMG reforestation project by ensuring the water supply for the native tree nursery. In addition to the fifty-two (52) families of the Agua Santa community who will directly benefit from this well, one-hundred and eighty (180) additional families from neighboring Tejar and Wiwhan villages will also be beneficiaries of this water source.

Conclusion:

The wellbeing of the Agua Santa community and their indigenous culture is threatened. The village of Agua Santa recognizes the danger the survival their community faces and has joined together with the VMV project to reverse the damage done to their ancestral lands. The community has donated countless hours working hard towards rehabilitating their lands and strengthening the ties to their cultural heritage. Further support of the VMV restoration project is critical for future sustainability of the Agua Santa village and will provide a strong example for all the Ecuadorian High Andes Provinces.



Women of Agua Santa volunteering on the water tank project.

What the \$31,700 will go toward:

The general costs here presented are based upon previous topographic and feasibility studies; therefore, we assume and accept a margin of error of up to 5% that, for the sake of clarity, we presently include in the heading "Unforeseens". The actual costs will be known after the project will be completed.

General Information

Country: Ecuador
Province: Chimborazo
County: Riobamba
Parish: Yaruquies
Community: Agua Santa
Ethnic Group: Puruhá
No. Benefited Families: 52
Water Well Depth: 70 mts
Pumping Distance: 0.3 km
Pumping Gradient: 200 mts
Pumped Flux: 1.5 liter/second

Main Technical Materials and Tools

Two-phase Electric Transformer 15 KVA	\$3000
3-inches Submersible Pump, 2 l/s, 5HP	\$4000
Thermo-Electronic Pilot Switch and Timer	\$500
Water Well Drilling Operation (see App.2)	\$13440
Protection System Construction	\$2000
PVC Glue Pipeline: 50 6mts units, 2.0" diam, 1.25Mpa Pressure	\$500
PVC Screw Pipeline: 12 6mts units, 2.0" diam	\$270
Skilled Labour	\$2000
Materials' Transportation	\$500
Fuel	\$400
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Sub-subtotal	\$26610
Unforeseens (5% sub-subtotal)	\$1330
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Subtotal	\$27940
Technical Direction	
(Topography and Engineering, 10% subtotal)	\$2794
Logistic Assistance (Human Mobility and Communication)	\$600
Fundación OSA is volunteering its services by drafting this proposal.	
1% sub-total for Living Bridges Fiscal accounting	\$279

APPENDIX 2: WELL DRILLING OPERATION

TOTAL

\$31613

We specify here the costs we foresee during the drilling operation of a 70-meters-deep and 6-inches-diameter water well, assuming a typical clay and sedimentary soil (the costs would proportionally increase for drilling operations of bigger diameters and/or rocky soils).

a) Preliminary work

a1) Transportation of materials and mechanical parts.	\$400
- Drilling Machine	
- Mechanical accessories	
- Sodium Bentonite	
- Siliceous gravel	
- Tanks	
- Casing	
- Filter	
a2) Preparation of the drilling yard.	\$100
a3) Bentonite Pools Excavation .	\$100

a4) Drilling Machine Installation	\$100
b) Siliceous gravel (60 sacks, 2.7\$ each)	\$162
c) Sodium Bentonite (20 50-kgs sacks, 25\$ each)	\$500
d) Casing (12 PVC pipe units, 6 mts/125mm/0.8 Mpa/\$76 each)	\$912
e) Filter. (1 PVC pipe, 6 mts, 125mm)	\$152
f) Caps (2 convex pressure caps, 125mm, \$22 each)	\$44
g) Polipega (1 liter, Plastigama PVC glue)	\$12
h) Polilimpia (1 liter, Plastigama PVC cleaner thinner)	\$8
i) Water well bailing operation.	\$450
h) Water well drilling operation (\$150 for each meter of drilled borehole, 70 mts deep; it is worth to stress that \$150/mt corresponds to 25% of the present market price in Ecuador.)	\$10500
h1) Machine use	
h2) Drill bits and reamers use	
h3) Hydraulic oils	
h4) Engine oils	
h5) Gas fuel	
h6) Skilled labour	

TOTAL	13440\$
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Well Proposal for DMG (VMV) Works Cited

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