
Reforestation with Native Species in the Dry Lands of Panama

Raíces Nativas

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Project name: Reforestation with Native Species in the Dry Lands of Panama

Host country/site location: Republic of Panama/La Toza, Nata, Cocle

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Project Partners & Collaborators

Miambiente - Panama's environmental ministry regulates all activities affecting the protection, conservation, improvement and restoration of the country's environment. Formerly known as environment authority ANAM. They helped us with trainers and seeds to start the nursery facilities.

Ministry of Education of Panama - They supported us with the space for nursery facilities and permitted us to develop all the training activities in the local school grounds.

Peace Corps - has been a leader in international development and citizen diplomacy for more than 50 years across more than 140 countries. They supported us with a peace corps response volunteer, who worked collaboratively with us during 14 months.

Jacob Slusser (ELTI) - As an initiative of Yale University's School of Forestry and Environmental Studies, ELTI supports the efforts of people to design and implement an array of land use practices and initiatives that conserve and restore tropical forests and native tree cover in human-dominated landscapes that are rich in biodiversity. Jacob supported us with technical advice and native species seeds.

Fundacion Cosecha Sostenible - is NGO who sponsored two small-scale family managed tree nursery projects, is located near Pintada, Cocle. They helped us to increase and improve the team knowledge in relation to tree production and other opportunities that may be available to them.

Section 1 – Project Overview

Summary

In the past 14 months the project successfully engaged the community of La Toza in reforestation with native species, including 4 threatened species according to the IUCN red list. We increased biodiversity in farms, established a small scale production of timber, and gave alternatives to the community to increase their revenue. The community was trained in multiple areas of biodiversity conservation, reforestation, agroforestry techniques, climate change, among other, increasing their level of knowledge and interest in the environment. With a slow beginning, the project soon started to rapidly progress, engaging the community in several small scale initiatives not only in reforestation, but also in conservation of the environment, understanding of climate change challenges and adaptative measures to cope with negative effects, food security plans, and reduce agro inputs by producing their own fertilizers using diverse techniques. Particular weather conditions delayed our planting scheme, but the flexibility of our team and the community, managed to plant over 2,300 native trees in ten farms. The successful establishment of a local nursery at the school premises is allowing the community to carry on with the

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reforestation activities on their own with a strong sense of ownership and the capabilities implemented to continue to make a difference in La Toza.

Introduction

La Toza de Cocle, located in the dry arch of Panama, has suffered intense deforestation in the past decades, and now faces serious environmental degradation. The National Environmental Authority identified this area as a priority for reforestation efforts. Natural populations of precious timber species in Panama are being overexploited. A combination of high demand, illegal trading, deforestation, and weak law enforcement has led to the inclusion of several native species in the IUCN red list in recent years. Within the overall framework of natural resource scarcity and mounting effects of climate change, the need for sustainable production of native trees that offer added values of water cycle regulation, soil improvement, and biodiversity conservation is stressed. The project not only trained the community in key aspects of biodiversity conservation, climate change and reforestation techniques, but also increased their level of interest and understanding of their environment, and the importance of contributing to larger restoration efforts in the region. One of our main goals was to engage community members and empower them to start an organized group that could continue with the projects mission after we concluded, and it was achieved. Several conservation problems were addressed during the project including reducing deforestation, at least in the farms where we worked, reduced forest fires in the surrounding areas. In addition, the project increased tree diversity in the farms, increased understanding of climate change and the negative impacts on their livelihoods, improved adaptation to climate change, reduced the use of agricultural inputs and replaced them with organic options, reduced living costs with establishment of home orchards. Our key partners included: The National Environmental Authority to support during trainings and provide seeds, local community leaders to organize the work done at the community level, local government to provide guidance on other initiatives and support efforts on the long term, and Peace Corps Response Volunteer to manage group and collaborate in all objectives.

Project members

Carla Chizmar

Panamanian biologist with a Master in Environmental Sciences. Over ten years working in the environmental arena, more recently focusing in biodiversity issues and conservation. Currently working as the Environmental Services Specialist for UNDP/Ministry of Environment Project on Carbon Sequestration in Mangroves in Panama. Carla was the project leader, in charge of the conceptual idea and implementation, including financial execution, trainings, and main focal point.

Jose De Gracia

Jose is a Panamanian biologist with almost 15 years of experience. He has managed successful restoration with native species in mining projects. He has experience with biodiversity management, IFC standard, EsIA consulting and seed banks.

Jose holds a Masters in Biology from the Universidad de Costa Rica in Costa Rica and a Bachelor in Botany from the Universidad Panama in Panama.

Mauricio Hoyos

Panamanian biologist/ornithologist. Has been working primarily in ecotourism, and bird watching, and more recently has been involved in reforestation projects and forestry. Currently working independently as consultant. He was a trainer, and technical resource in the field during data collection and implementation of activities.

Section 2 – Objectives and Outputs

Aim and objectives

Overall goal - Contribute to reduce pressure on forests, reduce overexploitation of native tree species, and increase biodiversity conservation whilst improving the livelihoods of the people through capacity building and diversification of sources of revenue in the region of La Toza, Cocle in Panama.

The aim of the project was to increase biodiversity in farms by reforesting with native species. To accomplish our goal we raised awareness on environmental issues, built capacity on reforestation techniques, started a local nursery, and reforested with native species. Our efforts contributed to restore degraded forests/lands, increased biodiversity in tree species in farms, improved environmental services locally, and reduced pressure on natural forests by providing sustainable sources of timber in the long term, while improving the livelihood conditions of the community.

Changes to original project plan

The team faced problems mainly with establishing a working group and securing attendance to the first events. Gaining the trust of the community took longer than expected, and rivalry among community leaders hindered the start of the project. Once we got to know the people better and decided to work with less problematic members of the community the problem was solved.

The main problem we encounter was the timing of the project. Funds arrived in July 2013, and by the time we were able to buy seedling/seeds most commercial/local greenhouses had sold/committed all their stock to other buyers. We managed to find one supplier and at least conducted an initial planting during the middle of rainy season despite our doubts regarding survival rates. Also, most of the preparation activities have to happen during the dry season (late December 2013 thru March 2014) and planting activities at the beginning of rainy season (April 2014). In 2014 we had one of the longest dry seasons causing a serious drought in the region that delayed all our efforts making it impossible to plant according to our schedule (April-July 2014). All the calendar of activities changed due to the drought but we managed to accommodate all trainings and workshops back to back early on in 2014, so we could start reforesting as soon as the rains started.

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Methodology

- I. Site selection/Field trips: assessment of on the ground conditions, evaluations of farms, surveys and interviews: closed-ended questionnaire to learn about the level of knowledge regarding environmental issues.
- II. Capacity building activities
 - Teaching/learning materials: develop materials according to the level of understanding of the community.
 - Informal trainings/workshops and meetings: 1-2 day (s) per event in the school premises and sometimes with fieldwork or hands on exercises in farms. We used one or two instructors each time. Provided food for participants and all materials for the hands on exercises. Also we conducted a field trip with a small group of participants to another project in Cocola to share learning experiences with similar initiatives in the region.
 - Participatory Rural Appraisal (PRA): open ended questionnaire to learn about the interests of the local people, the current crops, farming methods, and other relevant information.
 - Desk Research: we selected a series of topics (i.e. reforestation techniques, species selection, endangered/vulnerable species, greenhouses, soils, planting schemes, etc.) that we considered necessary to develop our project and used mainly internet sources and a few books.
- III. Reforestation/Planting activities
 - Soil sampling/collection/preparation: prepare a mix of soils using soil from the farms, sand, and hummus.
 - Design planting scheme: select areas for planting, design corridors, select species according to each farmer's preferences and farm conditions.
 - Community work: conduct plantings of mixed species of native trees in 3x3 blocks, or living fences, and rows, depending on the available space in the farm. Build natural corridors, increase protection of water bodies, space wise underplantings beneath crops.
 - Visit partners, collaborators, government agencies, other similar initiatives, and possible buyers.

Outputs and Results

Project objectives

1. Raise awareness among the farmers about forest degradation and its impacts on environmental services (biodiversity, water, carbon, soils).

Activity	Dates	Outputs
1.1 Research about the current situation of	August 2013- March 2014	We assessed the state of the forest remnants and farms during several field visits.

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the immediate environment of the community, farms and forest remnants.		
1.2 Elaborate practical guides and teaching materials for the training.	February 2014	<p>We elaborated several guides and teaching materials (including pamphlets, ppt presentations, summaries, etc.) for participants according to the topics of the trainings:</p> <ul style="list-style-type: none"> • Seed collection and storage, • Greenhouse/nursery construction and maintenance, • Climate change impacts, • Biodiversity importance and conservation, • Reforestation with native species, • Elaboration of liquid manure, composting, among other. • Establishment of home orchards.
1.3 Organize capacity building event.	July 2013/November 2013/March 2014	We conducted several capacity building events and town meetings on the current situation of the environment in Toza and globally, The importance of conserving nature, also on climate change and biodiversity.
1.4 Conduct training on environmental education for the community.	July, November, December 2013 February-March 2014	We conducted several capacity building events and town meetings on the current situation of the environment in Toza and globally (July 2013), The importance of conserving nature (November 2013), also on climate change for children (December 2013) and biodiversity/native species for adults (February 2014)
1.5 Write a report on the training.	December 2013 and April 2014	We have several reports on the different trainings.
1.6 Launch a blog, webpage, facebook page to promote activities conducted, provide a platform to exchange ideas, and increase engagement of external people in our activities, possibly future donors.	November 2013	We launched our facebook page (over 250 followers) and update.

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<p>1.7 Disseminate results of the training through multiple channels (newsletter, internet, email)</p>	<p>December 2013</p>	<p>We appear in the map of projects of Panamanian biology society (http://www.zeemaps.com/view?group=685893&x=-79.495428&y=8.405764&z=10), which is a network of research led by national scientists. We have 179 followers in our Facebook page. We are currently starting a mailing list to distribute information on our project in Toza and future projects with the intention to bring attention to the community efforts and hopefully identify donors, and/or volunteers. We have established contact with several local organizations and we are sharing information with them.</p>
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Picture 1. Team members.

2. Conduct environmental education on reforestation with native species, and train community members in its techniques.

Activity	Dates	Outputs
<p>2.1 Conduct research about native species, and reforestation in the region.</p>	<p>July – December 2013 Ongoing process-</p>	<p>We have conducted research on all the native species used in the project. We also consulted with Panama Environmental Authority and they provided us with information on seed collection and conservation. We have been following the news with regard to <i>Dalbergia retusa</i>, the species that is most threat in Panama and currently banned to harvest from natural stands by the government. We have conducted research on reforestation efforts in Panama and the region.</p>

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<p>2.2 Contact other agencies/government offices/NGO's working on reforestation with native species to find alliances, materials, opportunities for collaboration.</p>	<p>July 2013 – July 2014 – ongoing process.</p>	<p>We have established contact with ANAM (Ministry of Environment), the government representative for the community, the local community leader (water committee), Environmental Leadership and Training Initiative, Community greenhouses, Peace Corps, Reforestadores de Centroamérica, Cosecha Sostenible, Friend of the Americas, among many other.</p>
<p>2.3 Elaborate guides/factsheets/training materials for the training.</p>	<p>August 2013-April 2014</p>	<p>We elaborated several guides and teaching materials (including pamphlets, ppt presentations, summaries, etc.) for participants according to the topics of the trainings: Seed collection, greenhouse construction and maintenance, climate change, biodiversity, reforestation, native species, liquid manure, composting, among other.</p>
<p>2.4 Organize and prepare training event on reforestation with natives species, and alternative farming practices, including agroforestry, and silvo pastoral.</p>	<p>Feb, march, June, July, august 2014</p>	<p>We organized several trainings in Toza for community members and other adjacent communities were invited too. We developed materials, produced flyers to invite the community, visited each house in the community to secure participants, made arrangements with local school to allow us to conduct all trainings in their premises, we hired local people to help cooking, cleaning and organizing the event, we used local materials for the practices, we prepared all PPTS and other printed materials for distribution.</p> <ol style="list-style-type: none"> 1. Seed collection and processing 2. Nursery building and maintenance 3. Reforestation techniques 4. Agroforestry and silvopastoral techniques. 5. Composting, organic farming, organic fertilizer (solid and liquid), vermiculture.
<p>2.5 Conduct a parallel training on alternative sources of revenue for their farms (apiaries, fodder, fruits, fuel wood, seedling sales)</p>	<p>March 2014, April 2014, July 2014.</p>	<ul style="list-style-type: none"> • March 2014 with support from ANAM we conducted training on seed collection so they can start producing seedlings for sale. • April 2014 - Started a small project to produce fruits and vegetables in the community members farms. • July 2014- started a food security project at school with vegetables and fruit crops, and reforesting the school premises with fruits trees.

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		<ul style="list-style-type: none"> • March 2014 - We started several organic fertilizers, liquid manure, composting and vermiculture projects in each farm with the potential to increase revenue by selling it to other farms and to reduce costs in their agro inputs.
2.6 Conduct a practical training in the community about reforestation with native species.	Feb, march, June, July, august 2014	<p>Trainings conducted:</p> <ul style="list-style-type: none"> • Seed collection and processing • Nursery building and maintenance • Reforestation techniques • Agroforestry and silvopastoral techniques. • Composting, organic farming, organic fertilizer (solid and liquid), vermiculture. <p>We organize in conjunction with the Centro de Desarrollo Sostenible Ambiental (CEDESAM) training for the building and management of the community nursery. In addition to seed collection, natural regeneration and other topics on reforestation efforts.</p> <p>We also conducted a field visit/training to Cosecha Sostenible facilities/farms (a partner organization) with Peace corps volunteer and four community members to learn about several topics ranging from organic farming, to reforestation, greenhouse activities, and agro-silvopastoral activities.</p>
2.7 Write a report about the training.	June 2014	We prepare small reports after each training
2.8 Disseminate results through multiple channels (newsletter, internet, email)	June 2014	We use our pictures, notes, and training reports to disseminate information through our facebook account and mailing list.

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Picture 2. Nursery training with the Environmental Authority.

3. Establish a greenhouse with native species for reforestation purposes.

Activity	Dates	Outputs
3.1 Buy all materials for the construction (soil, pots, hose, nets, tags, etc.)	February 2014	We constructed the greenhouse in the school grounds and supported students and community members to get involved in the project. We also bought materials for other three community members' personal to build small greenhouses at their farms.
3.2 Identify best species to grow through scientific data, community consultation, and environmental conditions of the farms.	July 2013-2014	<ul style="list-style-type: none"> • We have interviewed of many members of the community and conducted literature review. • We sought advice from ANAM (National Environmental Authority) experts on best species for the environmental conditions in Toza and brought to Toza two of their experts to assess the conditions. • We also use our knowledge/expertise, took advantage of other projects successful experiences in similar regions, met with similar initiatives leaders to share information, most recently we are conducting soil tests to determine the conditions in each farm.
3.3 Collect/buy/find seeds/seedlings of native species (some will be donated by the ANAM seed bank).	July 2013-2014 ongoing process. We are constantly collecting seeds and seedlings.	During the project we bought (approx. 2500 seedlings) seedlings of tree species we could not find the seeds in natural landscape.

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		<p>We collected some species seeds/fruits from nature and germinated the seeds in greenhouse.</p> <p>We received a donation from ANAM on about 8 different native, timber and fruit tree species seeds.</p> <p>We received a donation from Jacob Slusser (ELTI) from his personal farm and other ELTI projects of <i>Dalbergia retusa</i> seeds and other important native species.</p>
3.4 Build the greenhouse/nursery with the help of the community.	March 2014	<p>All the participants were strongly motivated during the greenhouse construction. We received participants from 2 to 92 years old!</p> <p>The training/building session was so successful that several participants asked for help to construct their own greenhouse in their farms.</p>
3.5 Start running the nursery, and growing the seeds.	March 2014-to date	<p>We constructed the greenhouse during the dry season because is the only time were its feasible. In three months we had the first batch of seedlings ready to be planted. We are currently on the second batch of seedlings which will be planted in December2014-January 2015.</p>
3.6 Establish a local committee to manage the nursery/greenhouse.	March 2014	<p>The community members participating in the project organized themselves and divided the chores, creating their own schedule to manage the nursery. Now with the peace corps volunteer on the ground he makes sure that they follow the schedule and helps them resolve any conflicts that may arise.</p>
3.7 Document the experience, write a manual.	April 2014	In progress.
3.8 Disseminate results, share the experience.	March 2014	All the experiences were shared in the Facebook page.

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Picture 3. Project Nursery.

4. Plant native species trees in farms to increase biodiversity, improve environmental services, reduce pressure on natural forests, and contribute as an alternative source of income (apiaries, fuel wood, timber, fibers, fodder, fruits).

Activity	Dates	Outputs
4.1 Conduct an assessment of the state of the farms (soils, available space, crops, water resources, biodiversity present)	March –July 2014	We assessed almost all the areas chosen to conduct plantings considering all variables such as: type of soil, size, water availability, biodiversity, proximity to roads, slope, presence of cattle, and other.
4.2 Identify the farms that would be pilot (at least 10 depending on size) for the plantings considering level of engagement of farmer and state of the farm.	April/May 2014	We have identified 8 small farms and 2-3 large farms where owner/farmer is very interested in reforestation. We started with the small land owners.
4.3 Design the planting scheme (priority areas, species to be planted, number of seedlings, maintenance)	April/May 2014	We identified areas that are a priority because they met certain criteria. We visited the farms and explained to owner/farmer how to conduct plantings depending on the uses, the species chosen, environmental conditions, including presence of cows, water availability, slope, biodiversity, among many other.
4.4 Prepare the ground and conduct plantings previous to the rainy season with the help of the community.	May/June 2014	Depending on the framers availability of time and resources we have been conducting plantings since 2013, but more intensively between July 2014 - September 2014. We planted more than 2300 seedlings of 17 different species, almost all native.
4.5 Design a maintenance plan for the community.	June-September 2014	We are currently preparing this. Basic instructions have been given to farmers.

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4.6 Advertise our products, establish relationship with buyers	May - September 2014	We have talked to other small greenhouses on this topic, also with larger land owners with interests in either buying seedlings from farmers in Toza, or make arrangements for reforestation services.
4.7 Disseminate results through different channels (internet, partners, community)	May –June 2014	We showed a final presentation to the community about all the results of this project and posted in facebook page too.
4.8 Document the experience, write a report/manual.	July 2013-June 2014	



Picture 4. One of the farm lands we reforested during training.

Communication & Application of results

We disseminated the results through reports, educational talks and internet resources. We sent several short reports to governments offices (Environmental and Education Ministries) demonstrating that is possible to achieve a balance between socioeconomic and biological goals. We conducted talks in schools and Universities to show the most important results of our project and provided training to local people. Our Facebook page has 250 followers helping us to communicate to the general audience, and as a result several of them have been involved in our activities. Recently, the Ministry of Environment is developing a project of reforestation of a million hectares and our experience has been shared with them opening possibilities to collaborate in the near future.

Monitoring and Evaluation

To assess the effectiveness of the projects' activities we established a set of indicators to evaluate the projects activities and results:

1. Number of community members that are trained in forest degradation and environmental impacts, and recognize the importance of environmental services conservation.

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At least 25 community members were trained, 10 of them remained as the core group for most of the projects' initiatives.

2. Number of community members trained in reforestation with natives species, and know how to grow, plant, and maintain the trees.

At least 25 community members were trained.

3. Number of species and seedlings grown in the local greenhouse. Community members that know how to build a greenhouse.

We used 18 species of native trees, and produced approximately over a thousand seedlings in our nursery/greenhouse. More than 20 community members participated in the construction of the greenhouse and later some 5 members even built their own in farms.

4. Number of species and seedlings planted in farms. Number of farms that benefit from the project.

18 species of native trees were planted in 10 farms.

5. Alternative sources of income initiated by the project (seedlings sales, apiaries started, etc.).

Two alternative sources of revenue were created: 1) seedling sales, 2) organic fertilizer sales.

Achievements and Impacts

In the course of the project trained more than 20 community members in reforestation, greenhouse construction and maintenance, agro-silvopastoral techniques, organic fertilizers, composting, among other. We raised awareness on climate change, environmental degradation, and importance of biodiversity conservation in community meetings and workshops with an attendance of over 100 participants in several activities (average of 20 participants per event). All school kids in Toza (42) participated from an activity that raised awareness of climate change, and the importance of reforestation and biodiversity conservation. Each student was given a tree seedling to take care for a year.

The project successfully established a community group that built and maintains the local nursery at the school premises, and three more small nurseries have been established in community members' farms. The nursery produced over 500 seedlings of about 10 different species in its first three months. All members of the core group that take care of the nursery have started individual projects of compost, organic agriculture, vermiculture, and liquid manure. In addition, we started a small food security project at the school to grow basic vegetables and fruits for the kids. Similar initiatives are been started by other community members that are part of the project. A consolidated core group of 9 people from the community, mainly women are in charge of maintenance of the greenhouse and coordination of activities, all administrated by them with our support and guidance. With all the activities described before the community has an improved awareness and capacity to collectively manage the restoration areas and the remaining forest. Environmental education appears to have been successful, generating not only a well-developed understanding of the forest itself, but also a wider appreciation of the environment and how protecting it also helps the community.

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At the end of September 2014, over 2300 tree seedlings have been planted of 18 different species tackling one of the major conservation problems faced by the project: biodiversity loss and deforestation. In addition, as a result of our intervention and training, a community member relative, that is not part of the project, initiated a reforestation in their land of over 6,000 native trees in about 6 hectares of idle land. By increasing awareness, capacity building, and empowering people to increase biodiversity through reforestation, we are securing natural forest remnants, increasing knowledge and fostering new opportunities of additional revenue.

Capacity Development and Leadership capabilities

In an effort to help group member's increase and improve their knowledge and experience working within a forestry project endeavor support was provided in a number of different ways. One manner of support was provided technical assistance by way of talks and a practical hands-on workshop focusing on native tree nursery management, plant care, and tree planting in the field. In another effort to help group members increase and improve their knowledge we organized trips to small-scale family managed tree nursery projects sponsored by the NGO "Cosecha Sostenible" located near Pintada, Cocle; a worm-raising (for organic manure production) and integrated agricultural project near Macaracas, Los Santos; and a visit to a large-scale commercial tree nursery enterprise near Santiago, Veraguas. All visits were characterized by active and enthusiastic member participation.

Section 3

Conclusion

Deforestation processes are complex, but a consensus is forming that the actors best positioned to confront them are these forest dwelling communities. Community-based forestry has made impressive gains in Panama, and offers hopeful examples of forest conservation and restoration that contrast with general patterns of deforestation. The project experience points to the value of combining technical forest management with the common property management systems of forest dwelling people in order to achieve biodiversity conservation, carbon sequestration, and rural development gains. Voluntary groups have accomplished some remarkable restoration achievements in our project. People can work together and develop a shared passion for restoring their surrounding environment. The project proved that the added values of reforesting with native species in rural communities are larger than the challenges that such endeavor proposes.

Problems encountered and lessons learnt

The objectives of our reforestation projects were difficult to reach because the duration is too short, and involving local communities is time consuming. In addition, observing results when conducting reforestation requires medium to long term support. Proposed outputs are in many cases excessive in relation to proposed inputs.

Challenges posed by "climate change" and the unexpected drought conditions were especially effective in limiting perceived project "success" in terms of quantity of tree production and growth. Challenges will no doubt arise again in the future but with the knowledge and experience gained during the past months and even more importantly the enthusiasm and willingness to do what is necessary to meet the challenges, I believe that better days and more successful project production and results will be available to the group in the future.

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Integration of agroforestry activities can be a decisive element for the generation of benefits to farmers particularly, during the first years of the project. In an effort to assist community members with their desire to grow some locally non-traditional vegetables for personal family consumption secondary work efforts included helping them to begin and maintain summer squash (zucchini) and cucumber projects. Local climate/ geographical conditions (i.e. high temperature drought conditions and poor soil quality) have significantly contributed to the limited development and maintenance of small-scale family vegetable gardens in the local region. To assist in increasing the availability of locally produced vegetables support was provided in helping several families to start growing these vegetables.

In addition to community groups, small-scale nursery operators and private tree farmers can be a very important component of the project strategy. Nursery projects should be more seriously considered and encouraged group members have expressed a desire to continue on with their “group” nursery endeavor. Since they have proven themselves successful in managing such a project reasonably well in face of significant “challenges” that have arisen during the past such group efforts should continue to be supported.

Projects implemented close to communities that do not benefit directly from project activities may suffer from unforeseen risks due to pressure from other land uses.

Lessons learned

It is an important lesson from the project that local authorities can be engaged and actively involved in supporting community management if the advantages are clear for all stakeholders, including themselves.

The most important lesson is to gain trust of the community, keep direct and fluent contact, get interested in what they do, what they want and who they are. We established a strong relationship with the group and by the end of the first year they felt comfortable with our team and continued with the work on their own. They are empowered and the feeling of ownership is strong. Another important lesson is to be flexible, adjust your plans to the current scenario. Nature is unpredictable and you have to be able to accommodate and take advantage of new opportunities to keep community involved and interested.

There is a need to expand the scope of the project, with particular attention to awareness raising in other, nearby villages, ensuring that there is no ‘outside’ damage to the forest from unsustainable collection of firewood, timber or other resources.

In the future

After approximately 12 months of implementation of the project, numerous lessons can be gleaned from the experience. The lessons described before reflect trends, successes, and challenges that are worthy of consideration by those interested in community-based forest restoration more broadly.

The most important action is to engage the government, because the State plays an essential role in community forestry empowerment, including: institutions, laws and policies; strategic plans; and budgeting of resources that embrace and empower community forestry.

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Raices Nativas will continue to offer guidance and support to the community reforestation efforts. Future plans include assisting in fund raising and/or establishing volunteer partnerships and collaboration with key institutions and similar initiatives to continue the restoration/reforestation efforts in the region.

Financial Report

Please copy and paste the summary sheet from your financial report here

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification (Verification must be provided if figure in column D is +/- 25%)	Proposed Spending (Previous Report Only)
PHASE I - PROJECT PREPARATION					
Communications (telephone/internet/postage)	360.00	648.61	180%	Postage cost to bring donation from Idea Wild were not considered in the original budget. We didn't need to buy any books or printed materials. Originally did not include this in the budget but later considered very important	
Field guide books, maps, journal articles and other printed materials	350.00	700.00	-100%		
Insurance					
Vases and permits					
Team training					
Reconnaissance	200.00		-100%	We use this money to cover part of the insurance expenses	
Other (Phase 1)	100.00	240.75	141%	We did not include any bank fees and printing costs were higher than expected	
EQUIPMENT					
Scientific/field equipment and supplies	400.00	217.50	-46%	Some of the equipment needed was donated by Idea Wild	
Photographic equipment	400.00	460.00	15%		
Camping equipment					
Boat/motor/truck (including car hire)	1,000.00	1040.44	4%		
Other (Equipment)	2,000.00	965.72	-52%	Nursery/greenhouse construction was cheaper than expected.	
PHASE II - IMPLEMENTATION					
Accommodation for team members and local guides	1,850.00	2115.57	12%		
Food for team members and local guides	1,600.00	840.45	-48%	Food during field trips was cheaper than expected. Travel costs and fuel were much more expensive.	
Travel and local transportation (including fuel)	300.00	836.98	179%		
Customs and/or port duties					
Workshops	2500	3903.76	56%	Workshops turned out to be the most expensive because of the site location and mobilization of participants	
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	750.00	864.14	15%		
Other (Phase 2)	2,250.00	1387.35	-39%	Seedlings costs were cheaper because we could not buy as many as wanted to buy originally.	
PHASE III - POST-PROJECT EXPENSES					
Administration	800.00	50.00	-94%	Only water fees were covered.	
Report production and results dissemination	500.00	187.25	-62%	Printing of reports was cheaper than expected.	
Other (Phase 3)		167.82		Originally we did not considered buying any office supplies but in the process we needed some things.	
Total	14,980.00	14,873.54			

*These figures should be the same as those listed in the original proposal

Section 4 - Appendices

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	3	Kiragu Mwagi, Julie Lewis, Iain Dickson.
Number of species assessments contributed to (E.g. IUCN assessments)	4	<i>Cedrela odorata</i> , <i>Dalbergia retusa</i> , <i>Bombacopsis quinata</i> , <i>Annona spraguei</i> .
Number of site assessments contributed to (E.g. IBA assessments)	0	
Number of NGOs established	0	
Amount of extra funding leveraged (\$)	1,000 (approx.)	In equipment.
Number of species discovered/rediscovered	0	
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	0	

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Number of species/sites legally protected for biodiversity	0	
Number of stakeholders actively engaged in species/site conservation management	8	Community members, Environmental Authority.
Number of species/site management plans/strategies developed	18 species	18 species of trees. 4 IUCN red list species.
Number of stakeholders reached	5	Environmental Authority, Peace Corps, Community members, Local school, Local government.
Examples of stakeholder behaviour change brought about by the project.	2	1. Changes in attitude towards biodiversity importance and conservation. 2. Increased interest in actively contribute to reduce pressure on forest remnants in the community.
Examples of policy change brought about by the project	0	
Number of jobs created	3	Partially during trainings and certain activities.
Number of academic papers published	0	
Number of conferences where project results have been presented	0	

Appendix 4.1 CLP M&E measures

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NGO: Fundación Cosecha Sostenible (Penonome Office) - Rodrigo Rodríguez,
Director, cellphone: 66573677.

School in Toza: Teachers: Omayra Chani, Cellphone: 68487503

Cifor: <http://www.cifor.org/>

ELTI: <http://elti.yale.edu/es>

Miambinete: <http://www.miambiente.gob.pa/>

Appendix 1. Raices Nativas informational brochure on project

Conozca nuestros proyectos:

Reforestación Comunitaria en La Taza, Nariño, Colombia

Este proyecto busca crear conciencia sobre temas ambientales, capacitar en técnicas de reforestación, iniciar un vivero local y reforestar con especies nativas en áreas degradadas de Colombia. Nuestros esfuerzos contribuirán a restaurar los bosques degradados, mejorar los servicios ambientales y reducir la presión sobre los bosques naturales proporcionando fuentes sostenibles de productos maderables y no maderables, mejorando considerablemente las condiciones de vida de la comunidad.

“SEMBRANDO EL FUTURO”

RAÍCES NATIVAS

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Fundado por:

Conservation Leadership Programme

“Sembrar un Arbol es Sembrar Vida”

Raices Nativas es un grupo ambientalista creado con la finalidad de promover el desarrollo de programas de conservación que contribuyen a un cambio de actitud en la relación con nuestro entorno.

Nuestra misión es reducir la sobreexplotación de especies de árboles nativos y promover la conservación de la biodiversidad, mejorando la calidad de vida de los panameños y promoviendo la importancia y necesidad de un adecuado manejo ecológico de los bosques tropicales.

Importancia de los bosques

Los bosques tropicales cubren menos del 2% de la superficie de la tierra, sin embargo sostienen entre el 40% y 50% de

todas las formas de vida del planeta, incluyendo 30 millones de especies entre plantas y animales. En la actualidad un equivalente a 30 has de bosque tropical es destruido cada minuto.

Los expertos coinciden en que algunas de las principales causas de extinción son la sobreexplotación de los bosques tropicales, la extracción de madera legal, la ganadería extensiva, la minería irresponsable, la exploración petrolera y la expansión/intensificación de la agricultura.

Nuestros programas están enfocados en:

- Biodiversidad
- Conservación
- Reforestación
- Árboles Nativos
- Educación Ambiental
- Viveros
- Desarrollo de Capacidades

Metas de los Proyectos de Raices Nativas

- **Sensibilizar** a las comunidades rurales sobre la degradación de los bosques y sus impactos en los servicios ambientales (biodiversidad, agua, carbono, suelo).
- **Realizar** educación ambiental sobre reforestación con especies nativas y entrenar a los miembros de la comunidad en técnicas de producción amigables con el ambiente.
- **Plantar** árboles de especies nativas para aumentar la biodiversidad, mejorar los servicios ambientales, reducir la presión sobre los bosques naturales y contribuir como una fuente alternativa de ingresos (colmeneras, leña, madera, fibras, forraje, frutas).
- **Incrementar** el conocimiento sobre la flora de Panamá y desarrollar programas para su conservación.

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Appendix 2. Species Inventory in Toza

On the site there were deciduous tropical dry forests, however due to deforestation, forest remnants in the area are scarce and are confined to riparian areas and some natural regeneration with *Cecropia obtusifolia*, *Byrsonima crassifolia*, *Genipa americana*, *Pithecellobium* sp., *Curatella americana*, *Anacardium occidentale*, among others, biodiversity is low in this area. Introduced, cultivated, edible species include: Lime, Orange, Corn, Mango, Beans, Rice, Sugar, Manioc, Purple Yam, Mandarines, Cashew apple.

Appendix 3. Table 1. Species List. Seedlings at greenhouse/planted

Species scientific name	Common name	Main Use	Native or Introduced
<i>Anacardium occidentale</i>	marañón	edible/timber	native
<i>Annona spraguei</i>	Negrito	biodiversity/edible	Native
<i>Astronium graveolens</i>	Zorro	Timber	Native
<i>Bombacopsis quinata</i>	cedro espino	timber	native
<i>Cedrela odorata</i>	cedro amargo	timber	native
<i>Citrus</i> sp.	Lime, orange, tangerine	edible	introduced
<i>Dalbergia retusa</i>	cocobolo	timber	native
<i>Erythrina</i> sp.	Coralillo	timber	native
<i>Eucalypto citriodora</i>	eucalipto	timber	introduced
<i>Inga</i> sp.	Guaba	edible/nitrogen fixing	native
<i>Ormosia macrocalyx</i>	cabresto	timber	native
<i>Parkinsonia aculeata</i>	espino de Jerusalem	nitrogen fixing	native
<i>Pinus caribaea</i>	pino	timber	native
<i>Swietenia macrophylla</i>	caoba	timber	native
<i>Tabebuia guayacan</i>	guayacan	timber/ornamental	native
<i>Tabebuia impetiginosa</i>		timber/ornamental	native
<i>Tabebuia rosea</i>	roble	timber/ornamental	native
<i>Tecoma stans</i>	campanita amarilla	medicinal/ornamental	native

Appendix 4. Pictures

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Picture 1. Building greenhouse/nursery workshop: soil preparation



Picture 2. Building greenhouse/nursery workshop: seed bed preparation



Picture 3. Transplanting seedlings from beds to bags.

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Picture 4. Seedlings at nursery before planting season.



Picture 5. Field exercise during training on reforestation.



Picture 6. Vermiculture training at Dolores Gonzalez farm.

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Picture 7. Holiday party for children with talk about climate change and the importance of forest conservation/reforestation.