



Fog Collection Evaluation Project



**Isla de Margarita
Venezuela**

FogQuest
SUSTAINABLE WATER SOLUTIONS



Melissa Rosato Larrauri
January - March 2005

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I would like to express a sincere thanks to all the people who made this phase of the project successful. Bob, without you there would be no FogQuest, no projects and no fog water to ease the suffering of those in poverty. All the staff at INPARQUES who wouldn't hesitate to meet with me, hike up a mountain or take measurements. Mr. Edgard Villarroel, Deicy, Lírise, Anais Marcales, Nieves Torres, Guardaparques: Ismael Valera (Valera), Carlos Gamero (Gamero), Mássimo Gil (Macho), Wualmort Moreno, Eudis Marín Maporo, Miguel Silva, Marcos, and Superintendent Gilberto Figueroa. MARN, the Ministry of the Environment provided many important files, maps and expertise, a special thanks to director Eduardo Borrás and Olga Umpierrez for their help. From Provita's team I must recognize the helpfulness of the president Jon Paúl Rodríguez who believed in my project from the start. However, without the ground support from the Margarita staff this project would have been impossible. A huge thank you to: Marialejandra Faría, José Manuel Briceño, Stephanie Dashiell, Consuelo Hernández, Hector and especially to the biomonitors who taught me much more than they will ever know. Gracias José Luis, Jesús (Chucho), Rodolfo, Pablo Antonio, Darvis y Evans. Many thanks to family and friends who kept me sane, especially Dad for "vacationing" with me and Kaveh, your calls and encouragement kept me going. Thanks to you all.

SUMMARY

FogQuest: Sustainable Water Solutions uses an innovative water harvesting technique through the use of nets to collect fog water, a technology especially designed for use in arid ecosystems where no other sources of water exist. Margarita Island was identified as a potential place and in January 2005 I carried out a two and a half month field trip to begin the evaluation work in Margarita Island.

This report includes a brief background on Margarita, and comments on topography, climate, water resources and population and poverty issues. In addition the project objectives are identified and elaborated upon. Specifically, they include:

- 1) Identify and foster local partnerships
- 2) Community Outreach
- 3) Transfer the Technology
- 4) Build the Standard Fog Collectors (SFCs)
- 5) Conduct Site Assessments and Install the SFCs
- 6) Establish the Data Transfer Protocol

Lastly, conclusions and recommendations were made, outlining the effectiveness of the field trip and taking into account the feasibility of an expansion to this project in the near future. Important preliminary data is annexed as well as a multitude of resources such as contact lists, templates, meteorological data and more.

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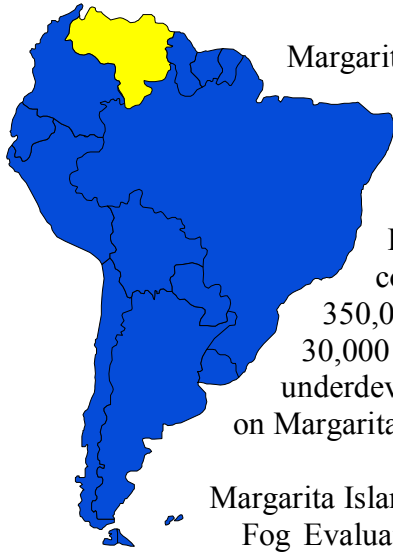
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1.0 MARGARITA AND VENEZUELA



Margarita Island (11° N, 64° W) is located just north of mainland Venezuela, the northern tip of South America. Together with the smaller islands of Coche and Cubagua, the three islands make up the state of Nueva Esparta. Together they have a combined population of around 350,000 inhabitants. Only about 30,000 of those are located on the underdeveloped peninsula of Macanao, on Margarita Island.



Margarita Island was chosen to conduct a Fog Evaluation project for a few reasons. It holds similar characteristics to other Caribbean islands where successful fog evaluation projects have already taken place, it is an arid location with water problems, and it is a developing country where people live in poverty and where an adequate source of clean water may improve their standard of living in a significant way.

Cultural considerations were both a factor in carrying out this project as well as an impediment. Since my family has lived in Venezuela, I am at a certain advantage in communicating and understanding the local context, moreover I was eager to revisit a place I held close to my heart. However, I was surprised to find difficulties that arise from the same local culture in which I was eager to participate. Margarita, especially so since it is an island, is like many other developing countries where challenges are the norm and simple solutions are hard to come by. After all, that is why a development project is appropriate.

Difficulties quickly surfaced during the project. Mobility was a challenge as there are a shortage of taxis and they are expensive and the buses are very slow, especially when trying to get to the other side of the island. Everything closes down for a few hours at noon. Either a meeting or a request must be made in writing days in advance, or plans can change instantaneously and one has to adjust. All in all, organizing and planning was a true challenge and this impeded the success of the project to an extent. On the other hand, there was little that could be done to avoid these local realities and the project went ahead as best as possible.

This report documents the things learned and the activities that were carried out in January through March 2005 on Margarita Island.

1.1 Funding

Essential funding for the project came from a few sources which are greatly appreciated. IDRC, the International Development Research Centre, generously contributed funds for the airfare and a co-op student stipend. The South Wellington Rotary Club of Guelph generously donated the funds that went towards the materials and tools for the SFCs. Lastly, FogQuest fundraising activities covered the remaining costs of the project.



2.0 GEOGRAPHY

Maps

Topographical names are a curiosity in Margarita Island and there is much discrepancy for various reasons. The first is that people tend to be bound to their immediate area and because people do not move around as much, they are only exposed to the local name they use. Another reason for the discrepancy is that when the official map was done, it disregarded this local knowledge. For example, the highest peak on the Peninsula of Macanao is Cerro Macanao and anyone on the whole peninsula will confirm this. On the map, the peak is called Cerro Soledad, but when you ask a local which peak that is, they will tell you they have never heard of it. Of the half a dozen maps, there are few similarities between them when referring to mountain peaks.

For this project, as I am in constant communication with the locals and as a sign of respect to their reality, I have decided to follow the names they are most comfortable with. I have, however provided the corresponding names on the official map.

Macanao (West)		Margarita (East)	
<u>Locals</u>	<u>On Map</u>	<u>Locals</u>	<u>On Map</u>
Los Cedros	Guaraguao	La Valla / El Cacao	Guacharaca
Guaraguao	Risco Blanco	El Tapado	Tragaplata
Risco Blanco	Macanao	El Tamoco	El Mico
Macanao	Soledad		

The official map for Margarita Island is one produced by Venezuela's National Cartographic Institute. Originally published in 1988 it has not had any revisions to date and is not viewed as the authority on names by any local, even civil servants.

2.1 Topography and Vegetation

Margarita Island is really two separate peninsulas connected by a large mangrove lagoon and a thin sandbar, the isthmus of La Restinga. The peninsula to the West is Macanao and to the East Margarita proper (very rarely is it referred to by its native name Paraguachoa) and both have significantly distinct features.

Margarita

Margarita is composed of a central mountain range that extends from the north to the southwest of the peninsula, though not continuously. There are various mountains that, despite a relatively low altitude (500 m.a.s.l), are often shrouded by clouds near their peaks. The highest peak (of both peninsulas), Cerro El Copey, is located on the southern part of the range, and other notable peaks are Cerros Guayamurí and Matasiete and Cerro Tragaplata. To the east of this range are the most popular beaches and most populous towns, including Porlamar, the capital. To the west the mountains taper out into flatlands that have smaller communities. The valleys contain the majority of the population as it is arable land that receives more water from the surrounding mountains. The entire southwestern part of Margarita is mostly lowland without any notable hills other than the National Monument: Tetas de Maria Guevara at a height of under 300 m.a.s.l. The highway runs just past these two mounds and eventually leads to a small bridge which connects the peninsula of Macanao to Margarita.



Figure 1: Cerro El Copey

On the mountains there is a marked contrast in vegetation, especially in the upper sections (that is to say over 500 m.a.s.l.) where there is evidence of wet forest ecosystems. On Cerro El Copey the upper part of the mountains also contains stunted vegetation and an abundance of lichens and bromeliads. It is these mountains that enable a limited number of springs and rivulets to exist. Lower down the mountain, as well as throughout the foothills and lowlands, the terrain is covered by low brush and grasses in some cases. The populated valleys are composed of cultivated species.

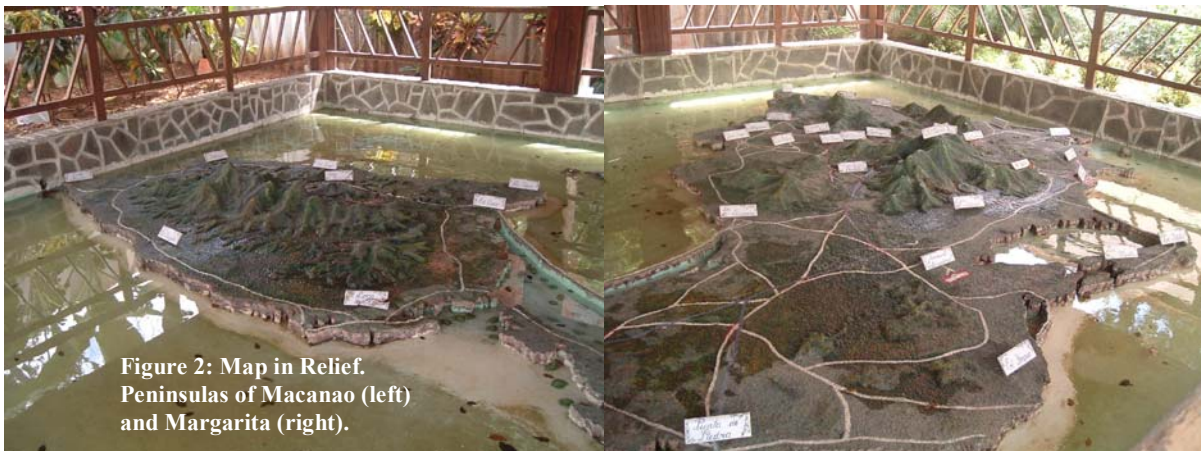


Figure 2: Map in Relief.
Peninsulas of Macanao (left)
and Margarita (right).

Macanao

Macanao is also comprised of a mountain range for the most part aligned in an east-west fashion and concentrated in the middle of the peninsula. The mountains are slightly lower in elevation, with the highest peak, Pico Macanao (Soledad) rising to 785 m.a.s.l. There are also smaller ridges that cross this middle ridgeline thereby creating sharp valleys. The only valley that is populated is the valley of San Francisco, the rest of the Macanao

Figure 3:
Reddish Landscape of Macanao



population live in coastal settlements. As a whole, the ridges of Macanao appear much more jagged than the broader slopes of Margarita. There are lower hills that border this central range and they are also significant features.

Figure 4:
Macanao mountain ridge looking south, note the cacti at the forefront.



The vegetation on Macanao is surprisingly different from Margarita, despite their close proximity. The majority of the landscape is a red orange color, much of containing only sparse low brush or none at all. This is very noticeable as the Margarita peninsula is green despite similar aridity. The green shades on the mountain of Macanao are also deceptive as much of the flora are either cacti or plants that only remain green during the rainy season, although Pico Los Cedros apparently has an always green and lush forest cover near the peak (Sugden 226). Pico Macanao, although barren, has stunted vegetation, an indication of prevailing winds, and very thick beardlike lichens, as seen in the SFC section of this report. Alexander states that “It is the prevalence of dry years that gives the island its characteristically arid appearance.” (97).



Figure 5:
In Macanao's arid landscape, cacti form prickly fences.

2.2 Climate

Wind

Margarita Island, a Caribbean wintering spot, is generally only known for sun and warm temperatures. While it is true that average temperatures are between 26° and 30° C, the constant northeasterly trade winds greatly affect the climate. These tradewinds are almost exclusively from the northeast, though they will rarely come from the south. This variation is inconsistent throughout the year. It must also be mentioned that wind speed is consistently augmented with altitude, and Cerro El Copey has recorded wind speeds of over 80 Km per hour (Sugden p.191).

Precipitation

Margarita's aridity is indicative of very little rainfall. As a whole throughout the year, Margarita receives always less than 1000 mm and usually less than 500 mm (Sugden p. 189). However, there is significant variability in these numbers over the years (Alexander p. 97). Though the preciseness of the dates is arguable, there are two general rainy periods: one in December and January and another in July and August (Sugden 191). On Macanao, these rainy periods are shortened and according to Sugden, he claims there is only one real rainy season in July and August (p. 190). March, April and May constitute the driest months on both peninsulas. Precipitation data for the town of San Francisco is included in the appendix.

Clouds and Fog

As mentioned above, the persistent northeasterly tradewinds, together with the proximity to the ocean ensure a continual source of humidity and potential cloud formation on Margarita Island. Due to the orientation of the mountain ridge on the peninsula of Margarita, it is these mountains that are often found capped with clouds. Alexander states that in Margarita, the small streams the locals claim are ever present, even during drought, are attributed to the input from the fogs that cap the mountain tops (p. 98). Sugden complements this through his field experience from Sept. 1982 – 1983 where he noted the fog occurrence on the mountains of Margarita. He found that clouds were not absent from the main peaks on Margarita for more than 72 hours, and only 7 times for 48 hours (p. 191). This signifies a remarkably constant source of fog.

In Macanao, the ridges are more aligned with the tradewinds, therefore decreasing the consistency of such clouds and fog (Alexander p. 99), and Sugden suggests a warming of the airstream could further contribute to this (p. 191). Despite this, clouds form over the mountains in Margarita and continue as if on a path towards Macanao. When this happens the different peaks on Macanao also remain fog-covered. And on a few occasions during my visit, the Macanao mountains were fog covered where on Margarita they were not. This would signify an unusual occurrence and a gap in the research.

As there is extremely limited research done on Macanao and to better understand the fog occurrence, a local from the town of San Francisco has been carrying out cloud observations on five identified peaks surrounding San Francisco. He is recording the occurrence of fog both at nightfall and sunrise and it is hoped his observations will span

one year's time and show interesting patterns. The first month's data is included as an appendix.

Understanding of Fog on Island

A goal of this evaluation project is to substantially contribute to fog research in Margarita, and precisely what is this resource's role. In the future, water testing will hopefully be conducted to understand fog water in Margarita further. On a quarterly basis, reports will be issued to begin to analyze the data from the SFCs. As well, a final report will provide a year's worth of data and thus legitimize a much clearer understanding of this water source.

2.3 Water Resources

Water is a precious resource on Margarita Island. This is due to the abovementioned aridity and a notable lack of existing sources of water. In fact, the vast majority of the water to the entire island comes from pumping stations on the mainland, some 50 km away, and makes its way through pipes that run along the ocean floor. This water arrives at various pumping stations on the island and subsequently gets distributed from there. However, much of the distribution system is old and decrepit, having received little maintenance over the years, and the service is not reliable.



Figure 6:
Water Truck on Margarita Island

For this reason it is not uncommon for a municipality to ration the water and only allow it to run through the water mains a few days a week. When the locals gleefully call each other up to announce the water came, this is what they mean.

In Boca de Rio in Macanao, very representative of other towns on Margarita, the water would "come" every 3rd and 7th day. When water flows through the mains, those that have water tanks ensure the key to

the main line is open and run a hose from this main line into a tank, either subterranean or aerial. As the entire town tries to fill their tanks up, the water arrives with little pressure, trickling away in fact. It is unusual for a tank to overflow as the water is rarely available for over 6 hours and most tanks hold at least 3 m³ or more. If you happen to forget to open the key, it is likely you won't have enough water stored up to last until the next water day. There are also still many homes and even entire towns, especially on Macanao, that do not have a connection to the main line and both of these cases require the use of a common sight on the island, the water truck.

The exemptions to the above scenario are the few landowners that have drilled wells for access to subterranean aquifers. This was a rare sight indeed, although not completely absent. As drilling machinery is expensive, most Margaritans do not contemplate this possibility, especially since in many cases when this has been tried, the groundwater has proved inadequately saline, even for agricultural applications.

There are a handful of towns that are able to take advantage of the very limited local sources of potable water: springs or streams that emanate only from a select few mountains on the Margarita peninsula. One of these towns is Fuentidueño located in the valley to the west of Cerro El Copey. Until last year when a government project subsidized a large pipeline to divert water from the only average sized river on the island, the entire town used thin 1” PVC tubes to run water from the river into their homes. One



Figure 7: Tubes redirecting water from existing streams on Cerro El Copey into nearby towns.

year on from the government project, not all the houses have been provided with a direct hook up and one can still see a tangled mess of leaky pipes to service the remaining houses. This makeshift water provision is also seen in the town of La Sierra (located just below

the National Park Cerro El Copey). The park staff tolerate this as it is often the only source of water for the community. On a constant basis, often daily, the families that rely on this method of water distribution follow their water tube up the mountain to unclog it, especially after a rainfall or to retie the tubes that are disconnected (be it by thirsty hikers, hunters or water stealers). Ingeniously, they use old bike tires to tie and seal the tube junctions.

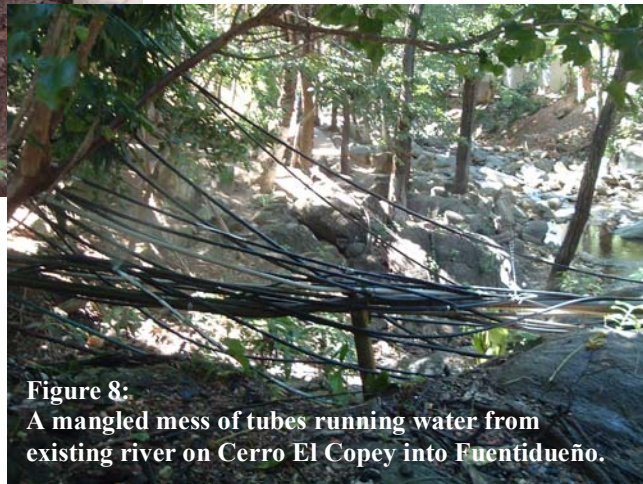


Figure 8: A mangled mess of tubes running water from existing river on Cerro El Copey into Fuentidueño.

There are no rivers in Macanao, and even when it rains the riverbeds stay wet only as long as it takes the water to run out into the sea. So naturally, there are communities that do not fall into any of the above categories, especially the most poverty-stricken ones. Instead they desperately depend on a water truck to donate water and usually make the most of seasonal rainfall collection. Please see the following page for a collection of rudimentary rooftop rainwater collection systems. A Hidrocaribe water census reveals that the average water requirement in rural areas per person per day is 20 L. This is a modest amount that can be supplied though fog collection under the right conditions.

The SFC on Cerro El Copey has already been yielding useful amounts of water per day, as the preliminary data included in the appendix demonstrate . The park guards who have a station roughly 5 km from the SFC are happy for this water resource and are currently using it for their consumption. During the Easter season, I thought it both interesting and encouraging that Valera, the park guard who is taking the SFC measurements, asked a priest to bless this fog water in the hope and faith for a fruitful project.

Figure 9: Rooftop Rainwater Collection Photos



La Valla, Margarita



La Valla, Margarita



El Tamoco, Margarita



San Francisco, Macanao



**Stored rainwater
San Francisco, Macanao**

Desalination Plant

On islands such as Margarita where potable water is a scarcity, desalination plants can prove useful. The peninsula of Margarita has 12 operational desalination plants, all are privately run and pertain to the hotels and large malls. Often the quality of the water is questionable depending on how well the plant is managed and what standards are kept.

In Macanao an extensive government project has been recently undertaken to bring, for the first time, running water to the town of San Francisco. The first public desalination plant has been rebuilt where an old one used to exist and I was able to tour the facility and speak with the engineer in charge. The following is not meant to be an exhaustive explanation of a desalination plant's functionality, only points of interest:

- ◆ Every Liter of salt water produces only 300 ml. of potable water.
- ◆ The water cannot be removed directly from the sea; wells are dug and this water is then pumped into the plant.
- ◆ The system is built to be completely automatic and controllable through a fax modem.
- ◆ It is capable of desalinating 120 L. / minute currently, and 480,000 L / day when it is completely functional.
- ◆ Water standards are ensured through certification by the government's Ministry of Health
- ◆ The total cost of the project ran over \$ 750,000 USD.
- ◆ Future stages of the project include providing water for the entire peninsula of Macanao.

Problems

- ◆ Because the electrical grid is outdated and the amount of electricity a desalination plant uses is so high, plant technicians are constantly calling the island's electricity provider to ensure they do not cause an unintended blackout to the public service.
- ◆ Replacement parts (already required less than a year into the project) are expensive as they are all imported from abroad.
- ◆ The piping into San Francisco has not yet been completed, many houses do not have a direct connection. Pumping water to the town creates another demand for electricity that must be met from the island's resources.
- ◆ Likely in the summer of 2005, the management of the plant will be handed over to a handful of local interns from San Francisco who have been undergoing training and who will form a co-operative to run the plant.
- ◆ Due to this lack of capacitated personnel, it is of the engineer's opinion that the plant will not be functioning properly within a year's time, especially since not even the government's water agency (Hidrocaribe) has this specialized skill set, only private industry who has had experience.

It will be interesting to follow the developments of this desalination plant. For further information a Costa Rican, Mr. Orville Rigbys, is the person in charge, though he is often away from Margarita.

2.4 Population and Poverty

Margarita as a whole underwent a population explosion no earlier than the 1950s when Venezuela was booming from oil discoveries. Macanao, specifically, was not even



Figure 10:
Kids from San Francisco and I
in front of their mud shack.

connected to the peninsula of Margarita until this time when a bridge was built. Today's population of 350,000 people are centered on the peninsula of Margarita and in the city of Porlamar. Though fishing continues to be the main industry, tourism is a recent rival, hoping to attract international markets. Despite these recent developments, many small towns in Margarita remain much as they likely were 50 years ago.

However, those that have been able to profit from tourism have managed to rise up. The differences in income levels are varied and you will find poor fishing communities often near luxurious summer homes, owned by Venezuelans from the mainland who take their wealth with them. Recent political strife has also triggered a decrease in tourism, not only international but more importantly the national tourist, which is more significant.

The peninsula of Macanao is the "other" side, the forgotten and underdeveloped peninsula. Except for the largest town, Boca del Rio, all of the communities on the peninsula are quite poverty stricken. Houses are often made out of mud as pictured above and incredibly, some people still lack access to water and a phone line, as is the case with San Francisco. Personally, I witnessed people living without proper bathroom facilities, eating very modestly and suffering from basic diseases, many related to malnourishment. In general, people survive off fishing and subsistence agriculture. Few travel to the other side of the island looking for work and even fewer have any hope of escaping the cycle of poverty. A lack of education and opportunities combined with a high birth rate translates into increased challenges of breaking this mold. Many from Macanao opt to engage in hunting rabbits, deer and



Figure 11:
A carpenter from San Francisco.

fishing for food, cultivating the land perhaps to sell some of the harvest, and others engage in the lucrative poaching of the parrots. This is easy to understand as a single parrot to an interested buyer can equal a week's salary. Below are some sample wages:

Profession	Weekly Salary in Bs.	Weekly Salary in \$USD
Park Guard	70,000	\$30.00
Chauffeur	90,000	\$37.50
Biologist	1,000,000	\$415.000
Biomonitor	62,500	\$26.00

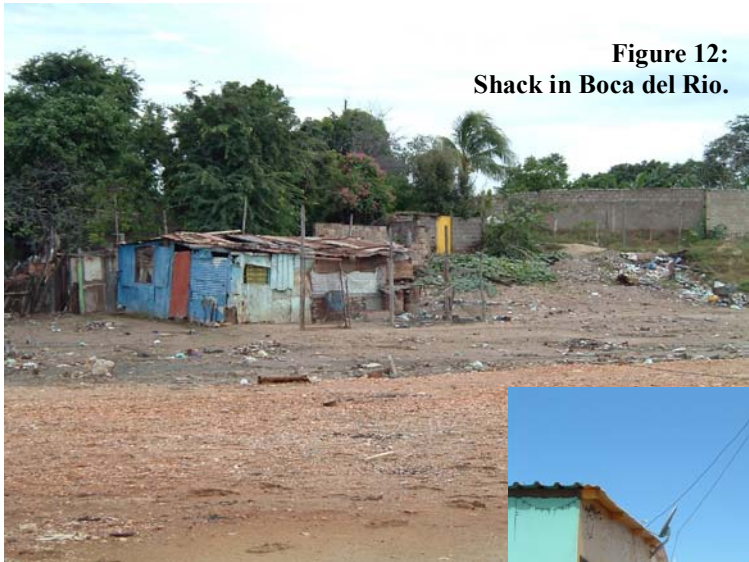


Figure 12:
Shack in Boca del Rio.

There is a debate as to the state of the poor in Venezuela as a whole. While there does appear to be improvements in

access to health care and education due to heavily subsidized government programs, the island's tourism economy has and will continue to suffer so long as there is



Figure 13:
Typical street in Boca del Rio.

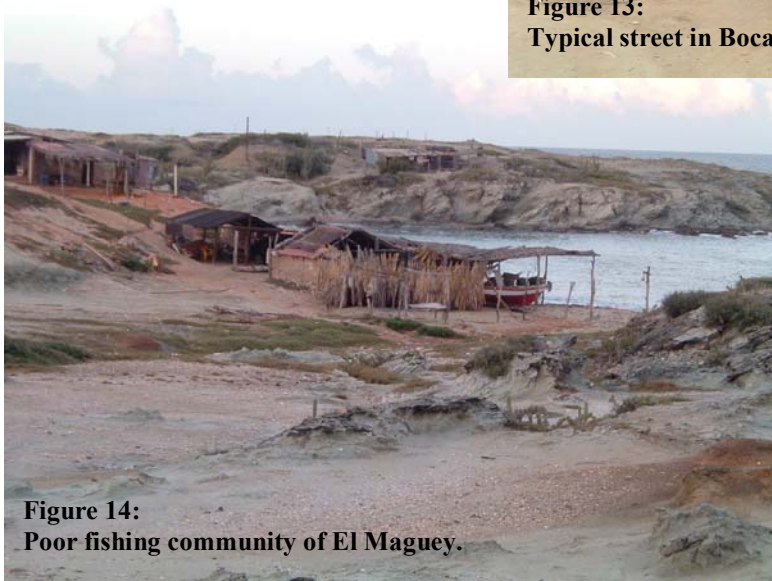


Figure 14:
Poor fishing community of El Maguey.

political and economic strife at the national level. Aid in many areas is drastically needed, water being a definite priority.

3.0 PROJECT GOALS

3.1 Identify and Foster Local Partnerships

Provita is a Venezuelan-based non-for-profit organization that mostly deals with conservation issues, especially the protection of endangered species native to Venezuela. However, as their motto states, “Conservation through Innovation”, they were eager to participate in this project and served as a local link for FogQuest.

They are a large organization with sufficient infrastructure and resources to be a great help to the project. Though they have their head office in Caracas, the real advantage lies in their activities on Margarita Island, specifically carrying out the majority of their work on the less developed and more arid peninsula of Macanao. They have a house that encompasses a few bedrooms, an office, a kitchen, etc. and it became a home during my stay.



Figure 15: Provita's Centre in Boca de Rio

Their flagship program, now in its 20th year, is the protection of the *Amazona Barbadensis*, the endemic Yellow-shouldered parrot, the only parrot to live in arid ecosystems. As part of this program, they have a staff of 6 young men, some former poachers, from the town of San Francisco who are not only the field experts, having hiked and lived in the wilderness, but they are also local members of the community and a great asset for the aims of outreach and education. Provita seeks to capacitate these young men and empower them to make substantial changes in their lives and communities. These impoverished young men are also the potential beneficiaries of fog water in the town of San Francisco.

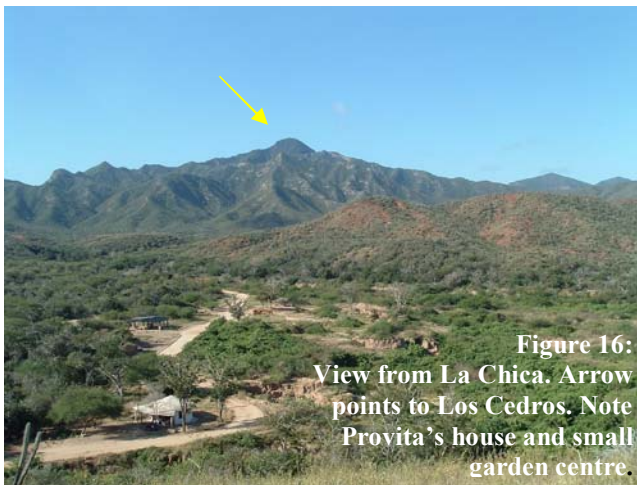


Figure 16: View from La Chica. Arrow points to Los Cedros. Note Provita's house and small garden centre.

The majority of the Yellow-shouldered parrot program is carried out in the region known as La Chica, a privately-owned plot of land, partly being exploited for sand mining (a valuable resource for construction on the island). Provita's formal agreement with the landowners now includes an ecological restoration project in addition to a nature trail. Provita has recently built a little structure on the land and they hope to expand this to encompass an educational ecocentre. Both a future ecocentre as well as the restoration projects could greatly benefit from fog water. It is

also interesting to note that a possible project relating to the impact of water on flora and fauna species of the dry forest ecosystem could also be generated.



Another fantastic group who helped tremendously with the project is INPARQUES, (National Institute of Parks), a regional governmental branch. Though their work is limited to the areas that fall within existing or proposed national parks, they truly became my link with the eastern peninsula (Margarita), as Provita does very little work on this side. Many of the park guards are veterans in the field and moreover, have

important local community contacts. The director facilitated meetings on several occasions and approved park guards to help with the SFC installations and work in the foreseeable future. I met close to the whole 40 person staff and I can honestly say that most are incredibly interested in the project. 4 SFCs, (El Copey, El Tamoco, La Valla and El Volantín) are currently being monitored by INPARQUES staff and data collection is reliable and certain. It is important to note that to consider the installation of LFCs, permits from INPARQUES national office (in Caracas) are required.

Another government group that facilitated the project is MARN, the Ministry of the Environment and Natural Resources. MARN is responsible for all land outside of national parks. They were also the contacts for maps, meteorological data and approval of the project as well as meeting space. For future stages they will also need to be consulted and permits obtained.



Provita
Urbanización Augusto
Malavé Villalba
Av. 9 (Monagas), Casa No. 15
Boca de Río, Macanao,
Isla de Margarita, Venezuela

Office: 0295 291 3432

Provita Head Office
Apdo. 47552
Caracas, 1041 –A
Venezuela



INPARQUES
Instituto Nacional de Parques
La Asunción
Margarita
Venezuela

Office: 0295 242 0306



MARN
Ministerio del Ambiente y
Recursos Naturales
Salamanca
Margarita
Venezuela

Office: 0295 242 0382

3.2 Community Outreach

As it is important to involve the local community in a development project to ensure they achieve sustainability, various community outreach activities were organized. It should be stated that this goal is constantly achieved in part through daily activities and conversations with people from all sectors of society. Perhaps the greatest achievement in this regard is the extent of the work done through the biomonitors, as they truly served as multiplier agents. However, it is also advisable to organize formal events, especially favorable in Latin America, which were planned and are described below.

An open presentation put on by Dr. Robert Schemenauer and myself was held at the Universidad del Oriente (UDO), a local university in Boca del Rio, and had a turnout of about 40 people. Among them useful government contacts, interested students and the local community attended along with a journalist from the Margaritan daily, El Sol. The following day an article about the project went to print and is available as an appendix.

A workshop was also held at the MARN office in February and all employees were invited. This successful event had a turnout of about 20 staff, all of whom engaged in a great question and answer period. And yet another outreach activity involved being a guest on a weekly conservation program on Margarita's oldest radio station, (over 50 years), Radio Nueva Esparta. I was interviewed and had the chance to discuss the project details.

As much as possible, it is encouraged that more time be spent focused on this aspect in future projects. It is absolutely essential to try to meet with members of the direct community that are potential beneficiaries at this early stage of the project.

3.3 Technology Transfer

The transfer of technology is in essence the aim of fog collection projects. It is hoped a project becomes sustainable, that is to say in the future it will be completely managed by the local beneficiaries themselves. For this to become possible, capacity-building is required as a fundamental aspect of projects. To be able to truly transfer the technology, an understanding of the basics of fog collection technology must be fostered. This was carried out in small part through the community outreach identified above, but more intensively through the intensive involvement of Provita staff and the biomonitors. It is they who will hopefully become, to a small extent, the fog collection connoisseurs of Margarita. I believe this to be truly a long-term process as the realities of developing countries are a lack of educated population often with a good grasp of basic reading writing and arithmetic. Fortunately, this same capacity-building is part of Provita's mandate with their biomonitors.



Figure 18:
Discussing the Technology

From the point of view of specific knowledge and training regarding fog and fog collection, Dr. Schemenauer's visit proved invaluable. During the weeklong visit, the biomonitors accompanied us on site evaluations and engaged in constant conversations regarding issues such as the process of fog formation, wind, orientation of ridges, rain etc. Their involvement in building the SFCs also helped achieve this goal. Lastly, through field evaluations and installations, they were trained to recognize the important aspects of appropriately locating collectors and how to take reliable data.

3.4 Build SFCs

As outlined in the technology transfer section above, the decision to build the SFCs amongst Provita staff and myself was a conscious one. Usually the SFCs are built by a



local metal worker who goes to the trouble of ordering materials but as plastic is so commonly used and cheaper in Margarita, FogQuest embarked on a learning experience as plastic posts have never been used in the past. Time was spent seeking out the right materials and tools, (which often meant spending days at a time on the other side of the island). Construction was an iterative process, often tweaking different aspects of the construction and materials. A gigantic

thank you to Alfredo from Ferre Azul, without him I would still be seeking out materials. Another thank you to Augusto Yendis from Boca del Rio for donating the wooden platforms for the posts.

Once the first collector was built and installed and left for a week in the field to gage any immediate problems, it took approximately 3 days to build the remaining 9 collectors. The 6 biomonitors were not only great workers, they fully understood the design and function of a collector and towards the end even suggested design improvements.

It is hoped the PVC posts used are able to withstand the elements as efficiently as other materials used. A great advantage is their weight (important when hiking is necessary) as well as the fact that they do not rust (from fog water or salinity). The PVC posts have a diameter of 75mm and a minimum wall thickness of 3.20mm. An important element to scrutinize is how the posts will withstand the hot sun over the period of a year, especially in terms of warping. If it is found they withstand the elements well, PVC posts can be considered for use in the LFCs. It should be noted that originally 1" PVC tubes were also used for the frame, however, they were not strong enough for the pressure from the stretched mesh and are not recommended for future projects. Also please note the construction of the SFCs was done before the FogQuest Fog Water Collection Manual was available. Building collectors in plastic will be a consideration touched on in future editions (Schemenauer, Cereceda and Osses, 2005). Included as an appendix is a list of items bought for the SFCs including pricing and where they were purchased.

DESCRIPTION OF STANDARD FOG COLLECTOR (SFC) SITES

Please see the map and chart in the appendix for the locations of the SFCs.

3.5 Installed SFCs

SFC 1

- Area name: El Copey
- Location UTM: 20 P 0400652 - 1216530
- Orientation of the SFC: 155° SE
- Elevation: 878 m.a.s.l.
- Observer name: Ismael Valera (INPARQUES Guard)
- Landowner: INPARQUES (Government of Venezuela)

Brief Description:

The SFC is located within the National Park Cerro El Copey, a section of La Sierra mountain range that forms the highest point on Margarita Island. The exact location of the SFC is close to the highest peak which is characterized by stunted vegetation and very frequent fog. There is a road right to the summit where about a dozen telecommunication antennas stand and personnel are hired to watch over them. The SFC is roughly 200 m. from this area adjacent to the road.



Figure 20:
SFC on El Copey

About 5 km from the summit there is an INPARQUES park station where a gate prevents unauthorized entry by vehicle, although traffic on foot is permitted to the peak, though not inside the sectioned-off antenna area. Just below this park station, lying between 5 and 15 km from the peak is the community of La Sierra, comprised of roughly 150 homes.

Currently, this community obtains its water from tubes that run water from mountain springs, rainwater when present and water trucks.

SFC Data has been collected since early February 2005 and these figures are available in the appendix. There are various ridges that are adequate for the installation of LFCs.

3.5 Installed SFCs

SFC 2

- ◆ Area name: El Tamoco (near Tacarigua)
- ◆ Location UTM: 20 P 0402941 - 1224185
- ◆ Orientation of the SFC: 105° E
- ◆ Elevation: 305 m.a.s.l.
- ◆ Observer name: Carlos Gamero and Máximo Gil (INPARQUES Guards)
- ◆ Land owner: Mr. Felixberto Gonzalez

Brief Description:

The SFC is located nestled in amongst various ridges that are part of the Sierra mountain range, north of the town of Tacarigua. Most of this land is used for subsistence agriculture during the rainy season. The towns surrounding the mountains are located at the base of the mountains, what you find up the mountains are small shacks sprawled in a random fashion. It is precisely a lack of water that impedes permanent residency on the mountain, as is the case with Mr. Felix the landowner of the site of the SFC. The day of the installation he was getting a larger water tank built (to store rain water) in the hopes of allowing him to spend longer periods of time cultivating his land

There is a road up to his land, albeit a very treacherous one and only navigable with a well-tuned 4 x 4 vehicle. Despite the low altitude, there is preliminary data indicating fog water and there is enough room for several Large Fog Collectors (LFC) in the area.

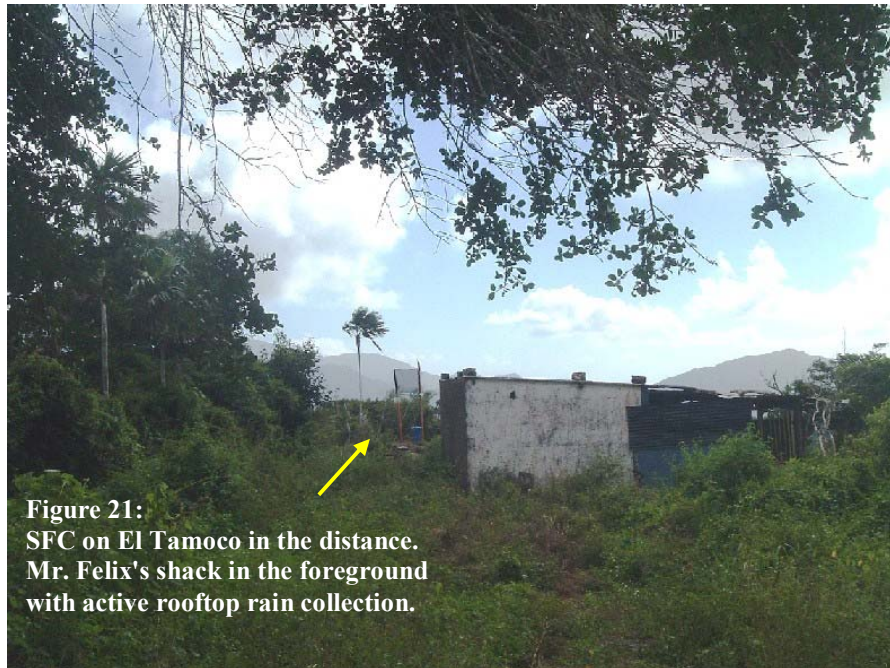


Figure 21:
SFC on El Tamoco in the distance.
Mr. Felix's shack in the foreground
with active rooftop rain collection.

3.5 Installed SFCs

SFC 3

- ◆ Area name: La Valla
- ◆ Location UTM: 20 P 0402123 - 1230719
- ◆ Orientation of the SFC: 127° SE
- ◆ Elevation: 280 m.a.s.l.
- ◆ Observer name: Carlos Gamero and Máximo Gil (INPARQUES Guards)
- ◆ Land owner: Mr. Gregorio Hernandez (& 4 brothers)

Brief Description:

The SFC is located about halfway up the La Valla mountain, which is part of the Tragaplata mountainous region. Tragaplata is also the name of the mountain facing La Valla. The walking path to the SFC is fairly steep but the relatively short distance enables one to hike it within an hour at the most. The peaks of all the mountains in the region are characterized by very tall trees and thick vegetation thus explaining the unusual location

of the collector. The SFC sits on an open area that had at one time been cleared for cultivation. It is distinguishable by the remnant trees of a coconut plantation.



Figure 22:
SFC at La Valla

In fact, this region boasts the most fertile lands on the whole island. Though few landowners are aware, INPARQUES staff have indicated that almost the entirety of the region is officially owned by the government Department of Lands, INTI, a group that strictly regulates all land use decisions. Calmly, Mr. Hernandez and family own two little shacks that are used as storage for their tools and provisions. They also own a little burrito which proved quite useful.

They actually live in the community below and hike up to work the land each day. The small town of El Valle de Juangriego (located in the valley between the two mountains), is made up mostly of typical laborers. There is also a small school pictured below.

These mountains as a whole, though not the La Valla mountain side which faces the valley, are the most northeasterly on the island and thus the first obstacle in the path of the prevailing trade winds. It is certain that fog plays an important role in water production in the area as the mountains are always very lush, there are streams that remain wet past the rainy season and some wells have been found in the area. Most of the houses, especially the shacks in the mountain also have provisions for rainwater collection. The picture shown below is the storage shack of Mr. Gregorio Hernandez, about 10 m from where the SFC is located.



Figure 23:
Elementary school in the
town of El Valle de Juangriego.
Yellow arrow indicates SFC location.



Figure 24:
Rooftop Rainwater Collection in La Valla

There is enough room for several LFCs in the area though serious clearing is required to access adequate ridges. It is hoped security issues can be resolved to place another SFC on this same mountain but with a more northerly orientation to take advantage of the winds.

Further investigation is strongly encouraged.

3.5 Installed SFCs

SFC 4

- ◆ Area name: Lomito de San Francisco
- ◆ Location UTM: 20 P 0358035 - 1218201
- ◆ Orientation of the SFC: 96° SE
- ◆ Elevation: 318 m.a.s.l.
- ◆ Observer name: Provita
- ◆ Land owner: MARN (Government of Venezuela) (needs confirmation)

Brief Description:

The SFC is located on a ridge on the western side of the town of San Francisco. A great advantage of this site is the proximity to the town, especially in terms of installing large collectors, (for which there is ample space), and transporting the collected water. The town itself is probably no more than a few kilometers from the collector. On the other side of the ridge (further to the West) there are a number of small farms that could equally benefit from the water. Though the SFC is located at a low elevation, the vegetation surrounding the SFC is thought to be indicative of fog, species of lichens and bromeliads were abundant despite the very arid ecosystem. Notably the western ridges were more arid than the eastern ones surrounding San Francisco.

The SFC is located on the same trail that leads to the Pico Macanao, not only where there is another collector installed, but a popular hiking peak. This combined with its proximity to town raises the prospect of meddling by visitors, though it is hoped community outreach will help curb this. There is ample space for LFCs all along this ridge.

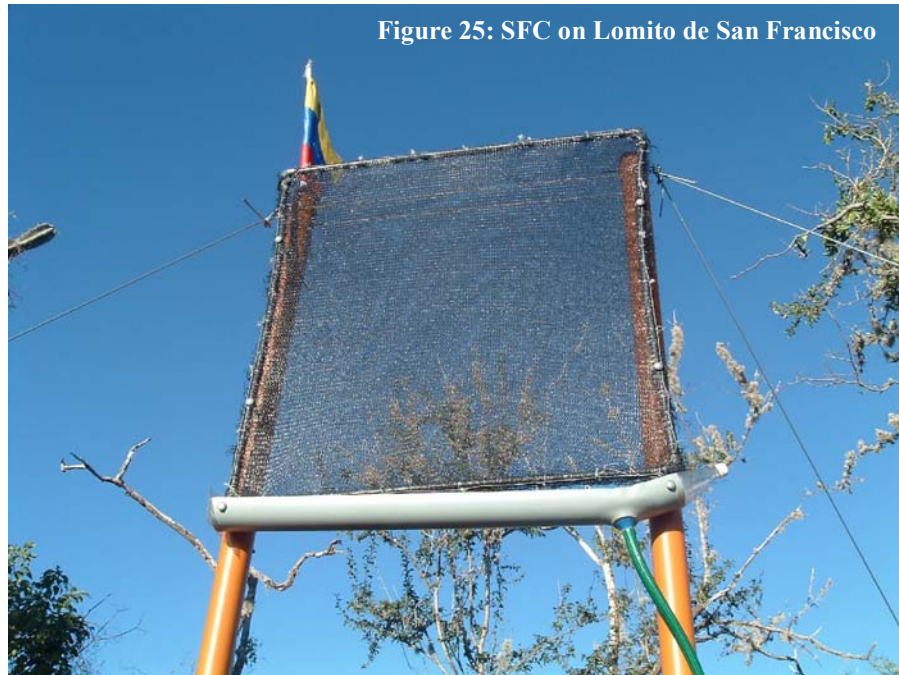


Figure 25: SFC on Lomito de San Francisco

3.5 Installed SFCs

SFC 5

- ◆ Area name: Pico Macanao
- ◆ Location UTM: 20 P 0356461 - 1216854
- ◆ Orientation of the SFC: 80° NE
- ◆ Elevation: 785 m.a.s.l.
- ◆ Observer name: Provita
- ◆ Landowner: MARN (Government of Venezuela – needs confirmation)

Brief Description:

Pico Macanao is the highest peak on the peninsula and as such has not only spectacular views, but great fog collection potential. The summit is not more than 100 m in length while the ridge rising up to it could provide enough space for several large collectors. It should be noted the last 100 m rise to the peak is extremely steep, rocky, and should not be considered when discussing the possibilities of LFCs.

The vegetation is truly stunted at the top and the trees grew at an impressively slanted angle caused no doubt by heavy and consistent winds. The lichen known locally as “Barba de Palo”, Branch’s Beard, was the thickest I had seen on the island and present in large quantities as depicted in the photos below.

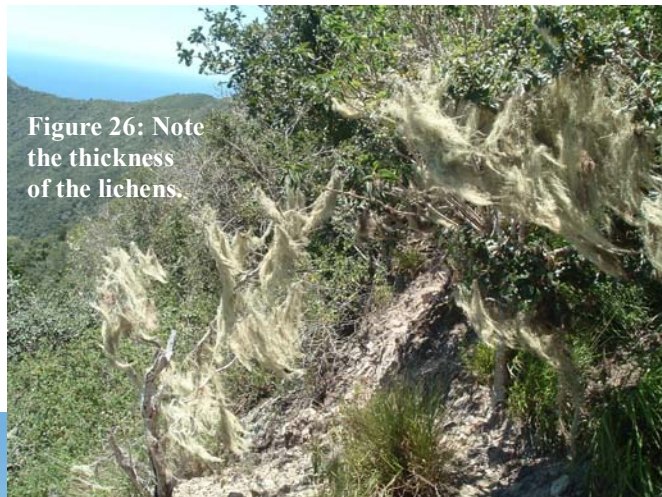


Figure 26: Note the thickness of the lichens.



Figure 27: Presence of Barba de Palo, Branch’s Beard Lichen.

Located close to the middle of the peninsula, water collected from Pico Macanao could essentially be taken many directions. Following the same hiking path would bring it back to San Francisco, though this is several kilometers away.



Figure 28:
SFC on Pico
Macanao with the
installation team.

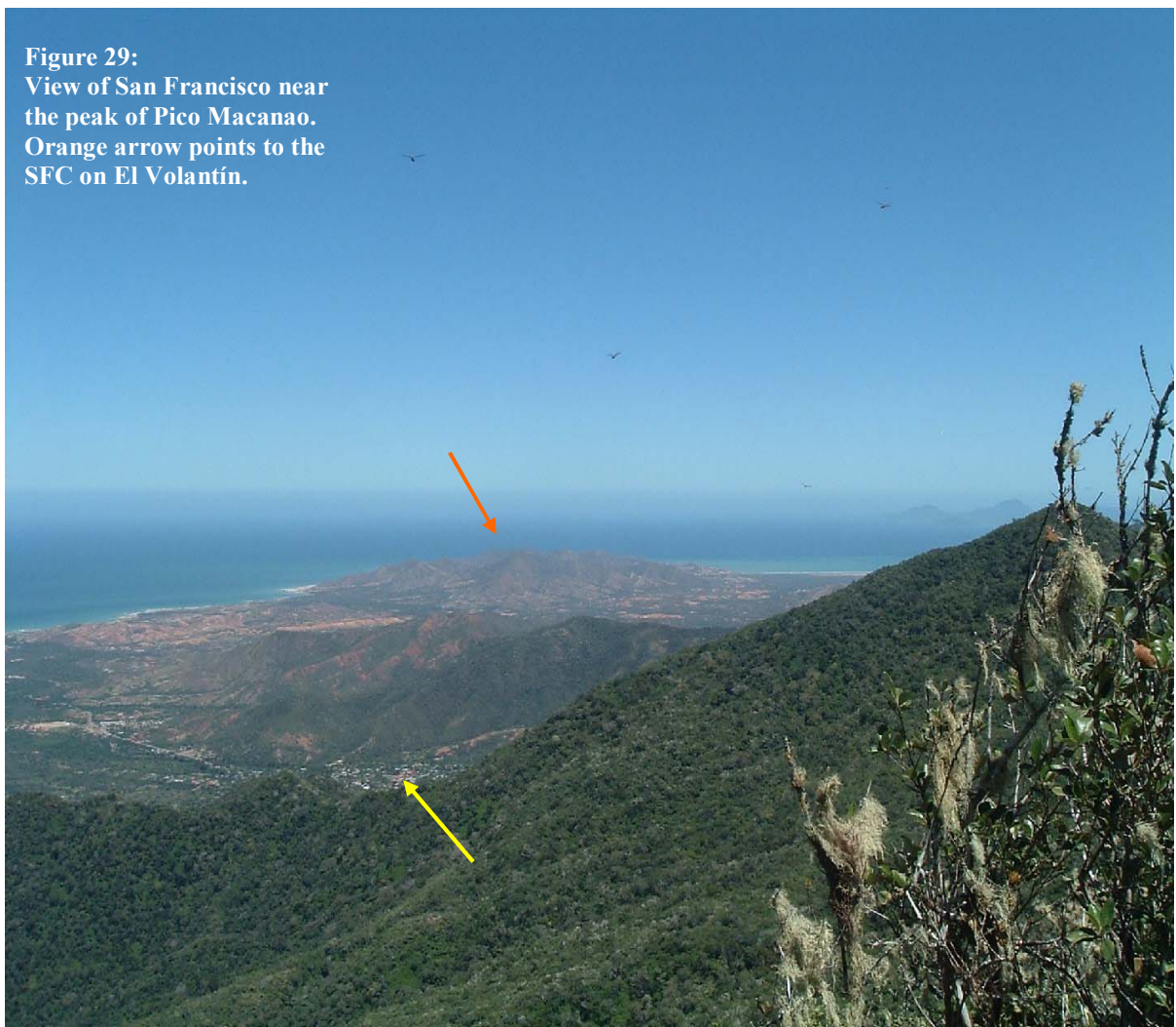


Figure 29:
View of San Francisco near
the peak of Pico Macanao.
Orange arrow points to the
SFC on El Volantín.

3.5 Installed SFCs

SFC 6

- ◆ Area name: El Volantín
- ◆ Location UTM: 20 P 0365109 - 1222885
- ◆ Orientation of the SFC: 110° SE
- ◆ Elevation: 305 m.a.s.l.
- ◆ Observer name: Deicy (INPARQUES Supervisor)
- ◆ Land owner: INPARQUES (Government of Venezuela)

Brief Description:

El Volantín is the highest of the various low peaks on the northeastern part of the Macanao, an area that juts out a bit from the rest of the peninsula (see orange arrow in Figure 10). The whole region is extremely arid with very little dense vegetation or tall trees. El Volantín is roughly 5 km from the tiny town of El Maguey, a coastal village



Figure 30:
Town of El Maguey.
Arrows show park station and school.

comprised of 50 people who make their living off fishing. There is a small school for the 10 or so local children.

There is also a park station in town as the area falls within the boundaries of the National Park La Restinga. The town suffers severe water shortages: the only source of water is by a water truck and often the unpaved road into town is inaccessible for vehicles, especially during the rainy season.

To reach el Volantín there are various paths. The dry river bed of El Saco, (located just before reaching El Maguey) is an option, however cleared hiking paths are accessible through the main paved road that encircles the peninsula; some are thought to have been used for off-road vehicles in the past. Due to the low altitude of El Volantín, it is not tremendously difficult to hike. Near the summit there are lichen species that are thought to be fog-indicating, though not a lot of room for a series of LFCs. As I understand, any amount of water available, no matter how small, would make a huge difference especially in the immediate vicinity.



Figure 31:
SFC on El Volantín,
park guards and myself.

3.5 Installed SFCs

SFC 7

- ◆ Area name: El Pílon
- ◆ Location UTM: 20 P 0359961 – 1219030
- ◆ Orientation of the SFC: TBA
- ◆ Elevation: 330 m.a.s.l.
- ◆ Observer name: Provita
- ◆ Land owner: MARN (Government of Venezuela) (needs confirmation)

Brief Description:

A site evaluation has been conducted for El Pílon and though no SFC is in place, it is hoped one will be installed at this location in the near future. El Pílon is a peak to the East of San Francisco, closely bordering the town. It is very accessible as it is not very high, though again, fog-indicating species are present. There exists a great place for a collector as the area is relatively free of vegetation and is level.

El Pílon is part of the ridge that runs perpendicular to the trade winds from the northeast.



Figure 32:
The chosen site for an SFC on El Pílon. Yellow arrow indicates direction to San Francisco.

That is to say, the same clouds that form over the peninsula of Margarita continue west and potentially encounter this ridge. Equally this ridge serves as the first obstacle for new cloud formations.

The hiking path that runs to El Pílon continues along the

ridgeline towards Pico Los Cedros, the highest peak of this ridge, in the past confused as the highest peak of the peninsula, as perceived from certain orientations. The vegetation along this ridge is markedly more lush and Pico Los Cedros is purported to have once had a small pine forest (Sugden 191) and currently has Bromeliads and vegetation not found anywhere else in Macanao. Though the ridge is spiked by various peaks, it seems an excellent place for LFCs. Two other SFCs will hopefully be installed along this ridge. One at the peak of Los Cedros, another in an area the locals claim funnels high winds, just below the last rise to the peak.

3.6 Data Transfer Protocol

A template was developed to be filled out by the individuals who are taking the measurements from the SFCs. This is available as an appendix. Each measurer underwent a training session and were left clear instructions on the process of relaying the data. Currently, 4 of the collectors are being measured by INPARQUES staff who will pass along the completed sheets to Provita who is serving as the link and has agreed to email the data on a frequent basis, every 2 weeks if possible. In addition, there is direct contact information for each of the measurers if necessary, including cell phone numbers. Follow-up is being conducted regularly.

3.7 Future Goals of Project

The future goal of any evaluation project is to find both adequate supplies of fog water as well as appropriate places to work in terms of local communities and contacts. This goal will be fostered as the evaluation phase continues and more and more information is acquired. A long term goal is to install large fog collectors and institute a complete water supply system to eligible communities and ensure its sustainability in the long term.

The proposed timeline for further advancement of this project is directly related to the results obtained from the SFCs, funding possibilities as well as cooperation from local stakeholders. At this point in time a proposal is being generated with more precise information, including a proposed budget. Please refer to this document for further details.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Of the goals proposed, the majority were met. Partnerships were established, the transfer of the technology has begun, the building of 10 SFCs was carried out and the installation of 6 in the field. Community outreach was conducted and my visit sure involved many actors and piqued community interests. In general a lot was learned during the trip and the groundwork was laid for a positive continuation to this project. Improvements can always be had and recommendations are found below.

Recommendations

In an effort to further expose the project, in seeking additional long-term partners, or simply to involve parties that have an interest or a connection to FogQuest's work, the following contacts should be fostered:

- ◆ **A Rotary club active in Margarita.**

As far as the information I could obtain, Rotary has a club active in Porlamar. Provita may have a contact with more information.

- ◆ **Hidrocaribe, the government water agency.**

Hidrocaribe is not only a supposed wealth of information on water usage (surveys) as well as the group responsible for water supply, importantly, they are perhaps a group that may wish to manage a fog water project on a long-term basis. No contact information is available at this time although INPARQUES can surely introduce a contact.

- ◆ **Canadians**

Although there is no embassy or consulate, an Honorary Consul is stationed in Margarita from the Canadian government. Her contact information is found below as well as on the Foreign Affairs government website.

Honorary Consul Mrs. Joanne Beland	0295 264 1684
Calle Ortega Edif. Monserrato	0414 792 3378
#12-100 Apartment 2-B	0295 400 8111
Porlamar	(hours 7:30 AM – 4:30 PM, Fri: 7:30 AM – 1 PM)

belandjoanne@cantv.net

At the Canadian Embassy in Caracas, the person in charge of international trade could also be contacted: Mr. Louis Marcotte, crcas-td@international.gc.ca

Science Contacts

To further involve the scientific community, a presentation at the IVIC, the Venezuelan Institution for Scientific Investigation, is encouraged. Though they are located in Los Teques (one hour outside of Caracas), it is worthwhile to consider as many important scientists with interest, funding and potential project spin-offs are located here. To book a presentation get in touch with Dr. Astolfo Mata, Provita can provide an email or phone number.

A presentation at the Provita head office is also strongly encouraged as they are a well-connected NGO with a central Caracas office. They have already shown interest in hosting an afternoon seminar or something of the sort to present partial findings of this evaluation phase of the project.

◆ Water Testing

There are two options to consider for any water testing that may be done in the future. The Universidad del Oriente (UDO), with a campus in Boca del Rio has offered to participate in water quality tests and have some labs, although their capacity is unknown.

Alternatively, the La Salle foundation is another option that has a chemistry lab as part of their quality control department. This is located in Punta de Piedras and currently does water testing on the desalination plant for San Francisco.

Fundación La Salle de Ciencias Naturales
Estación de Investigaciones Marinas (EDIMAR)
Departamento de Control de Calidad
Laboratorio de Química

It is important to note that under the Ministry of Health and Social Development (MSDS), Corposalud is the government agency that certifies water lab results. Their involvement may be required in future stages of the project.

- ◆ A strong recommendation is to fundraise specifically to allow to pay for wages. Although a debatable approach to a development project, having the means to pay some basic wage to laborers, truck drivers, etc. not only ensures the speedier execution of a project, but equally important, it is actually a motivating factor. Local people will more easily become interested and participate in a project if they know there is an immediate benefit. It also, to an extent, legitimizes NGO work by demonstrating no one is trying to take advantage of the locals through free labour, access to a vehicle, etc.
- ◆ Further general project recommendations can also be found in the appendix: Lessons Learned from my Field Experience in Margarita Island 2005.

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- Schemenauer, Cereceda and Osses. (2005) *FogQuest Fog Water Collection Manual*. Toronto.
- Sugden, Andrew M. (1986) *The Montane Vegetation and Flora of Margarita Island, Venezuela*. *Journal of the Arnold Arboretum*, 67(2), 187-232.

APPENDICES

Map of SFC locations
Chart of SFC Locations
SFC parts list and budget
Lessons Learned from Field Experience
Article in El Sol Margaritan Daily
SFC Data Collection Form with instruction sheets
Fog Observation Preliminary Data from Macanao
Precipitation Data from San Francisco de Macanao
Preliminary SFC Data from Cerro El Copey
Contact List
Margarita Island Fog Collection Proposal (in Spanish)

Provita Pamphlet
Ceero El Copey Pamphlet
La Restinga Pamphlet
Water Resources Pamphlet

SFC Locations Margarita Island



SFC Location Information, Margarita Island, State of Nueva Esparta, Venezuela 2005

Area name	SFC Number	Location UTM	Orientation	Elevation	Observer name	Telephone	Landowner name
El Copey	1	20 P 0400652 - 1216530	155 SE	878	Ismael Valera	0414 789 0386	INPARQUES
El Tamoco	2	20 P 0402941 - 1224185	105 E		Gamero y Macho	0414 790 0302 (Gamero)	Sr. Felixberto Gonzalez
La Valla	3	20 P 0402123 - 1230719	127 SE	280	Gamero y Macho	0414 790 0302 (Gamero)	Sres. Hernández (Gregorio)
Lomito de San Francisco	4	20 P 0358035 - 1218201	96 SE	318	Provita	0295 291 3432	MARN?
Pico Macanao	5	20 P 0356461 - 1216854	80 NE	785	Provita	0295 291 3432	MARN?
El Volantín	6	20 P 0365109 - 1222885	110 SE	305	Deicy	0416 896 2395	INPARQUES
El Pilón	7	20 P 0359961 - 1219030	TBA	330	Provita	0295 291 3432	MARN?
Piedra Lisa	8	TBA	TBA	TBA	TBA	0295 291 3432	MARN
Los Cedros	9	TBA	TBA	TBA	TBA	0295 291 3432	MARN

SFC Parts aList and Budget

Bolívares (Bs.) - \$1 USD @ 2400 Bs.

Item	Quantity	Cost in Bs.	Quantity Needed per SFC	Estimate cost per collector (Bs.)	\$ USD Equivalent	Where to buy
Posts	1	13180	2	26360	10.98	RT / CTL
Frame Tubes (Rebar)	Per 12 M	12500	4 m	8333	3.47	BDR
Frame Tubes (PVC)	Per 6 m	12000	4 m	8000	3.33	FA
Frame Elbows (PVC)	4	400	4	400	0.17	FA
Trough Tube	Per 6m Tube	14660	1	3665	1.53	RT
Trough Caps	1 lid	2000	1	2000	0.83	CH
Wooden Platform for Posts	2 per SFC	donated	n/a	n/a	n/a	Materiales Yendis (BDR)
Spacer Bar for Trough	Plastic Tube 6m	donated	n/a	n/a	n/a	Provita
Spacer Bar for Frame	aluminum bar (1 m)	3000	2 pieces of 10cm ea.	1200	0.50	FA
Brackets for post platform	2	2900	2	2900	1.21	BDR
Drain connector	1 funnel	2000	1	2000	0.83	CH
Hose	2 m	4200	2 m	4200	1.75	RT
Container	1	30000	1	30000	12.50	CTL
Long Bolts for frame and trough	6	2925	6	17550	7.31	CTL / RT
Screws for post bracket	1	200	6	1200	0.50	CTL
Eyebolts	2	2000	2	2000	0.83	FA
Bolts	30	6000		6000	2.50	FA
Washers	20	3000	20	3000	1.25	BDR
Wire	Per Roll	121600	approx. 36 m	64000	26.67	FA
U-clamps	40	32000	18	14400	6.00	FA
Mesh	2x1 M per SFC	donated FogQuest	n/a	n/a	n/a	Canada / Chile Publicidad Orbe
Sign	10	200000	1	20000	8.33	
Screws for Signs	box	10000	2	1000	0.42	FA
Measuring Cup	1	5000	1	5000	2.08	CH
5 L bottle	10	30000	1	3000	1.25	Supermarket
Nylon	2 rolls	1000	10 m	200	0.08	RT
Glue for frame	1/8 Gallon	7900	n/a	2000	0.83	CTL
Silicon	Per Tube (100 ml)	13000	50 ml	650	0.27	CTL
Rust-proof Paint (for brackets)	1 1/4 L can	10000	n/a	2000	0.83	BDR
Angles for anchors plus cuts	48 M plus cuts (400Bs./cut)	148000	6 M per SFC	28000	11.67	CT
Opening holes in anchors (welding work)	1 hole per anchor	1000	1 hole	1000	0.42	ED
Welding Work on Frames	10 frames	100000	n/a	10000	4.17	ED
Plastic needles to sew mesh	10	n/a	1	2400	1.00	Canada
Crazy glue repairs trough caps	5	25000	1	5000	2.08	BDR
Totals				277458.3333	115.61	

Legend: FA: Ferre Azul CTL: Catalato CH: Chinos BDR: Boca de Rio RT: Rattan ED: Edgar

Lessons Learned from my Field Experience in Margarita Island 2005

Melissa Rosato

- ★ Tie down the water containers so they don't fly away into a neighboring town.
- ★ Number one priority upon arrival, extract the greatest amount of information from your local contacts regarding where to go to: take the bus, hire a driver, use the internet, and any other project-related information that is useful to you. Write it down and immediately get in the mindset of being completely independent. Resist the urge to count on others for support as this may not always be possible and the project will suffer the consequences.
- ★ Do not even consider executing field work without enough funds for the rental of a vehicle, at least for a week or two, and various days' labor. Especially when working with other NGOs who have their own projects, logistics are a nightmare and a lot of time can be wasted on these basics.
- ★ Get business cards printed up before leaving, preferably with a FQ logo and blank space to fill in local contact numbers upon arrival. This will prove immensely useful especially then trying to do outreach in the beginning.
- ★ For any public events being organized, a press release is a must! Make sure to include all contact names, numbers, a background on the project etc. Journalists benefit enormously and, in turn, so does the way the project gets covered.
- ★ Do not travel to the country of interest unless you can get agreement from the people in mind to do the work. Also, ask specifically before going the exact location of the towns in relation to the fog collection points. If it seems to be too difficult to hike or if there is the slightest bit of hesitation, follow-up as it is worse to arrive and then learn that the peaks you thought of working on are un-climbable. If the locals have to be convinced to climb them, you better believe you have your work cut out for you. Better yet, try to avoid working in areas that involve a lot of hiking opting instead for road access when possible.
- ★ Recognize that any project has two equally important components. One is the physical demands of building, evaluating the areas and then installing the SFCs, the other component is the community outreach, education, media coverage, etc. It is strongly encouraged to always aim to send two FogQuest volunteers, one for each component. This will help to reduce perhaps the hardest challenge which is to keep motivated when the unexpected problems arise. This second person will pay their presence in gold in moral support alone!
- ★ Always keep in mind the end use of the water. Resist the temptation to work where there is the best fog, it is fruitless to collect fog water unless there is a demand that is feasible to satisfy.

Presentan proyecto de recolección de agua desde la neblina

■ Realizarán estudios exploratorios en Cerros Macanao y Copey

» Erika Urbáez Aguilera

Grupo Sol

¿Alguna vez imaginó que el agua de la neblina fuese perfecta para el consumo humano y, mejor aún, que pudiera recogerse gota por gota, a través de una malla, para acumular hasta 15 mil litros al día?

Pues ese es el trabajo de la Organización canadiense Fog Quest, quienes escogieron la isla de Margarita como uno de los lugares para implementar este maravilloso proyecto, que busca solucionar los problemas para adquirir agua potable, en los lugares más áridos del mundo.

Este sorprendente sistema fue traído a la sede de la Universidad de Oriente, ubicada en Boca de Río, a través de un contacto con la organización Provita y presentado a profesores, estudiantes y comunidad en general, por su coordinador, Robert Schemenauer, durante el día de ayer.

"La idea de hacerlo en Boca de Río, es porque es una de las zonas más áridas y con más problemas de agua en la isla", explicó María Alejandra Fariás, miembro de Provita.

Por su parte, José Manuel Briceño, también miembro de Provita, manifestó que ellos servirán de enlace para el hacer el trabajo preliminar, en el cual se instalarán colectores de neblina en diversos sectores de Margarita, para determinar la capacidad de la zona de producir agua.

"Se colocarán colectores de neblina de un metro cuadrado, en Macanao y en el Cerro Copey, este último por tener las condiciones de un bosque nublado y una comunidad aledaña que se puede involu-

Recursos...

● Fog Quest recibe fondos para proyectos mediante contratos con agencias de cooperación, donaciones y eventos para recolectar fondos. Existe además un programa de socios. Las cuotas de socios así como donaciones o fondos captados, son gratamente recibidos y son utilizados para ayudar personas en países en desarrollo, proveyendo sistemas sustentables de abastecimiento de agua.

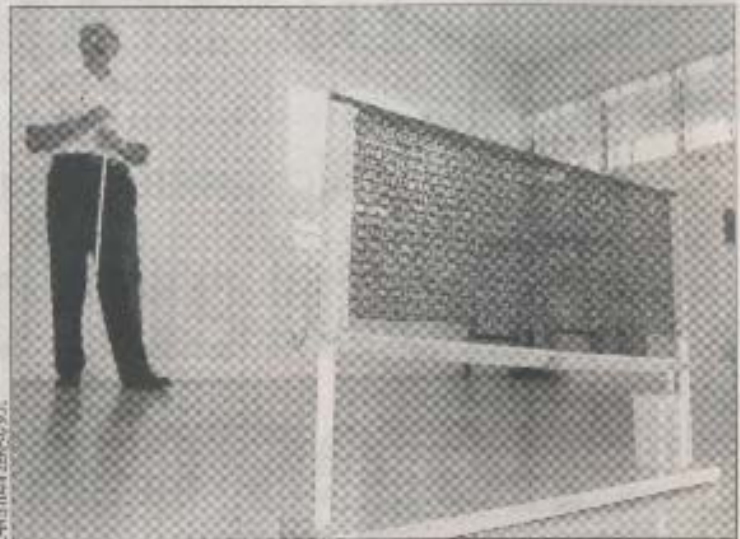
crar en el estudio", dijo.

El agua que se colecta de este trabajo puede tener uso agrícola, forestal, ecológico e incluso para el consumo humano, necesitando únicamente ser filtrada o hervida en casa.

La recolección de agua desde la niebla o la lluvia se ha aplicado en 15 países del mundo, entre los que destacan Guatemala, Israel, Nepal, Haití, República Dominicana, Namibia, Perú y Chile.

"La preocupación del grupo Fog Quest es que el agua es parte de la vida y las actividades del hombre, incluso, la salud de la humanidad depende de la calidad del agua que consume, ejemplo de esto es nuestra península. Todavía no queremos prometer que tenemos el milagro de la solución del problema del agua en la Isla, este es un proyecto exploratorio, pero muy serio", explicó Briceño.

César Romero, jefe del departamento de Acuicultura de la UDO, expresó que las puertas de la universidad están abiertas para recibir el proyecto, sobre



Robert Schemenauer muestra la malla recolectora de niebla



José Manuel Briceño, César Romero y María Fariás

todo, porque sería una oportunidad valiosa de investigación para los estudiantes de esta casa.

Asimismo, aseguró que también es un buen momento para acondicionar la estación meteorológica de la UDO, a fin de usarla como un observatorio climático, en pro del desarrollo del trabajo.

Organización

Fog Quest es una organización sin fines de lucro que reúne a ciudadanos, estudiantes, científicos y filántropos con el interés común de mejorar la calidad y acceso al recurso básico de la vida: el agua. Las oficinas centrales se encuentran en Toronto, Canadá y los primeros proyectos de captación de agua de niebla se están desarrollando en Haití y Chile.

"Los proyectos de captación de niebla han sido desarrollados por 15 años en diferentes partes del mundo, Fog Quest ha sido formada para usar esa experiencia y llevar a cabo los planes de abastecimiento de agua para uso doméstico, agrícola, forestal y ecológico, en algunas de las áreas más secas del planeta", según explicó Robert Schemenauer, coordinador de Fog Quest.

SFC Data Collection Form and Instruction Sheets

Planilla de datos SFC página 1

Para las instrucciones favor ver la página anexa

Nº de lugar	Lugar	Nº del SFC	Nombre del Observador	Fecha	Hora	Agua Colectada	Velocidad de Viento	Dirección de Viento	Lluvia (Si/No)	Cantidad de Lluvia
2	El Tamoco	2	Melissa (ejemplo)	19-01-05	16:30	0.500	0	ND	No	250ml
2	El Tamoco	2								
2	El Tamoco	2								
2	El Tamoco	2								

Planilla de datos SFC página 2

Para las instrucciones favor ver la página anexa

Fecha	Observaciones
19-01-05	Llovizna, color oscuro del agua (ejemplo)

Tareas del medidor

Orden	Tarea	Detalles
1	Observaciones Generales	Observar el lugar, el SFC, el agua, el tiempo etc. y anotar. Siempre que se presente algún detalle que pueda ayudar a entender mejor los datos, favor incluirlo. Un ejemplo puede ser una tormenta que ocurrió, una interferencia humana, etc.
2	Medida de viento*	Usando la escala adjunta, tomar la medida del viento junto con su dirección, guiándose por la bandera plástica atada en uno de los postes y la brújula sujeta cerca del colector
3	Medida de lluvia*	Vaciar el pluviómetro dentro de la siringe y anotar la cantidad lo más próximo a 25 ml posible.
4	Medida del agua de neblina*	Vaciar el agua recolectada en la tasa de medidas litro por litro y asegurándose de tomar una medida lo más precisa a 0.250 L (igual que 250 ml). Es importante no aproximar la medida por demás o por menos de este monto. Asegurar que no quede agua dentro de ningún envase, ni dentro del pipote.
5	Limpieza General	Subiéndose en una escalera, asegúrese que el canal este limpio de hojas y tierra y que se drene y fluye bien el agua. Esto se puede hacer con el agua que acaba de medir. Por esto es importante que el colector siga siempre bien nivelado. También tomar nota de cualquier duda que tenga acerca de la estructura del colector.
6	Mantenimiento del SFC	Apretar todas las tuercas y abrazaderas. Asegúrese que cada ancla aguanta bien la presión de las guayas. También afirma que la estructura este bien fijada y que no haga falta ninguna reparación.
7	Reparaciones Necesarias	Si hay algún problema con el colector, toma nota de él y intenta lo mejor que pueda de repararlo. Por esto es importante tener algunas herramientas disponibles, especialmente hilo y una aguja para coser huecos que se pueden abrir en la malla. Siempre que no se puede arreglar el problema, contacta a Provita de inmediato para resolverlo lo más pronto posible. También vea la siguiente página para algunos problemas comunes y sus soluciones.
8	Transferencia de Datos	Cada 2 semanas hacer entregar la planilla rellena a Provita y asegúrese de tener planillas en blanco para la próxima toma de datos.

Es **importantísimo** anotar NO DISPONIBLE si algún día no se pueda tomar las medidas. Se debe escribir esto en vez de 0 ya que un cero indica que se tomo la medición y que no hubo agua, viento, etc.

EMERGENCIAS

Lo siguiente detalla qué hacer cuando uno encuentra una de las siguientes situaciones:

Problema	Solución
Malla floja (es decir con una curva que resulta que el agua se bote por detrás del canal)	A) Bajar el marco y recoser la malla tensándola más de lo que estaba O B) Cambiar el marco, remplazándolo con un marco de hierro que permite que la malla se pueda tensar más al coserla. Contactar a Provita para obtener un marco nuevo
Maya rota	Si el hueco es pequeño, usar la aguja y el hilo dado para tal fin. Si el hueco es muy grande y no se pueda coser, contactar a Provita para obtener una malla nueva
Marco roto	Vea la opción B arriba
Canal botando agua	Sellar las tapas o el embudo con silicón u otra pega disponible.
Bandera volada	Atar algo de más que resiste el viento, agua y que puede bien señalar la ocurrencia y dirección del viento
Pipote roto	Reemplazar el pipote con otro de dimensiones parecidas. Contactar a Provita para obtener uno nuevo
Hilo que aguanta la malla se esta rompiendo	Bajar el marco y recoser la malla usando un hilo más fuerte y resistente. Si necesita, puede contactar a Provita para obtener sugerencias o materiales
Cualquier otro tipo de emergencia	Resolverla lo mejor posible y comunicar la información

Cualquier arreglo que sea necesario debe de ser detalladamente anotado en la planilla y asegurar que la información llegue a Provita quien se encargará a comunicar tal información con Melissa. Cualquier duda, comuníquense con Provita o con migo, la información de contacto se encuentra abajo:

Provita (José Manuel o Marialejandra)
(0295) 291 - 3432

Melissa Rosato

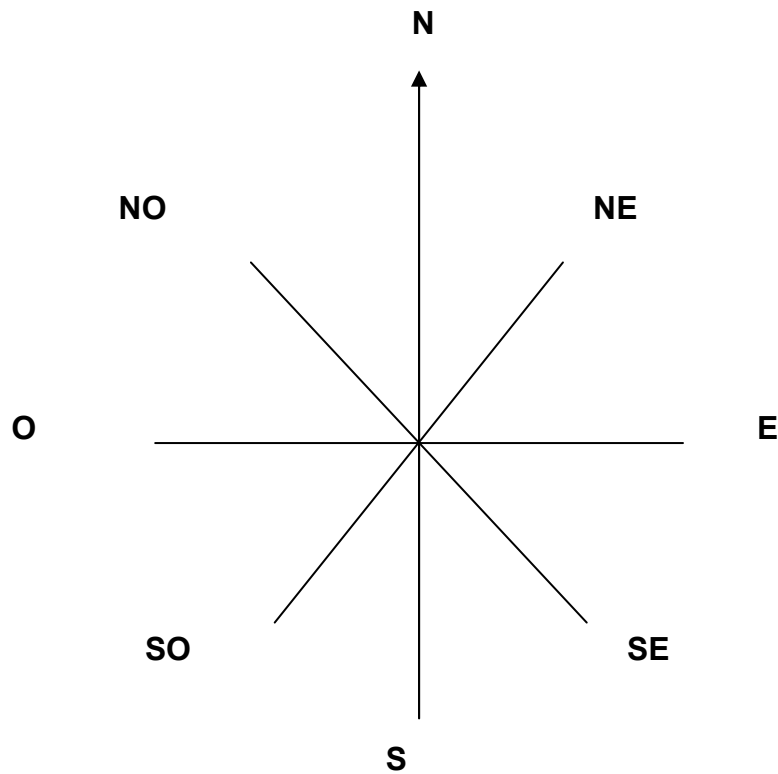
Casa: 001 (905) 858 – 8722

Oficina: 001 (416) 225 - 7794

mrosato@fes.uwaterloo.ca

ESCALA DE VIENTO

Número	Observaciones de Viento	Indicadores de Tierra
0	Sin viento	Humo sube verticalmente. Hojas quietas
1	Se nota un poco de viento ligero	Hojas se mueven un poco
2	Viento moderado, no es incomodo pero se siente	Bandera extendida
3	Viento fuerte, se siente incomodo	Ramas de los árboles se mueven bastante
4	Viento extremadamente fuerte, se hace difícil caminar hacía la dirección del viento	Las ramitas de los árboles se rompen



DIRECCIÓN DE VIENTO

N - Norte
 E - Este
 S - Sur
 O - Oeste

Observaciones de neblina en la cordillera de la Península de Macanao

Observe los varios cerros de Macanao y anote si están cubiertos de neblina con Si o No.
 Se deben hacer las observaciones a la misma hora todos los días a la salida o a la puesta del sol.
 Debe de ser el mismo observador por todo el mes.

Fecha	Hora	El Pilón	Los Cedros	Guaraguao	Risco Blanco	Macanao	Loma de S.F.	Comentario
Año 2005								
1 de febrero	ND	ND	ND	ND	ND	ND	ND	ND
2 de febrero	7:00	No	Si	No	No	No	No	Hubo lluvia desde las 2:30 hasta la 6:00 Am y a las 7:45 mas o menos habia neblina en todo los picos
3 de febrero	7:00	No	Si	No	Si	Si	No	este dia habia muy poca neblina en pico los cedros y risco blanco
4 de febrero	7:00	No	No	No	No	No	No	una mañana de mucho frío
5 de febrero	7:00	No	Si	No	No	No	No	
6 de febrero	7:00	No	Si	No	No	No	No	
7 de febrero	7:00	No	Si	No	No	No	No	
8 de febrero	7:00	No	Si	No	No	No	No	
9 de febrero	7:00	No	Si	No	Si	Si	Si	
10 de febrero	7:00	No	Si	No	No	No	No	
11 de febrero	7:00	Si	Si	Si	Si	Si	Si	una noche de lluvia y habia neblina por todas las cordilleras
12 de febrero	7:00	Si	Si	Si	Si	Si	Si	Habia neblina por todas las cordilleras
13 de febrero	7:00	Si	Si	Si	Si	Si	Si	Hubo poca lluvia en la noche
14 de febrero	7:00	No	Si	No	No	Si	No	Hubo poca lluvia en la noche
15 de febrero	7:00	No	Si	No	No	Si	No	
16 de febrero	7:00	No	Si	No	No	No	No	
17 de febrero	7:00	Si	Si	Si	Si	Si	Si	Muy poca neblina en el Pilón y loma de San Francisco
18 de febrero	7:00	No	No	No	No	No	No	
19 de febrero	7:00	No	Si	Si	Si	Si	No	
20 de febrero	7:00	No	Si	Si	Si	Si	No	Lluvia en la noche

Nombre del Observador: José Luis Rivas

21 de febrero	7:00	No	Si	Si	Si	No	Si	Si	No	cielo totalmente despejado
22 de febrero	7:00	No	No	No	No	No	No	No	No	Muy poca neblina
23 de febrero	7:00	No	Si	Si	Si	No	No	Si	No	Poca lluvia a las 7:00 AM
24 de febrero	7:00	No	Si	Si	No	No	No	No	No	cielo totalmente despejado
25 de febrero	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
26 de febrero	7:00	No	Si	Si	Si	No	No	No	No	cielo totalmente despejado
27 de febrero	7:00	No	Si	Si	Si	No	No	No	No	Una noche de lluba y habia neblina por todas las cordilleras
28 de febrero	7:00	Si	Si	Si	Si	No	No	Si	Si	cielo totalmente despejado
1 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
2 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
3 de marzo	7:00	No	Si	Si	Si	No	No	No	No	Muy poca neblina en los cedros cielo despejado
4 de marzo	7:00	No	Si	Si	Si	No	No	No	No	cielo totalmente despejado
5 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
6 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
7 de marzo	7:00	No	Si	Si	Si	No	No	Si	No	Bastante neblina en los 4 picos mas nombrados
8 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
9 de marzo	7:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
10 de marzo	7:00	No	Si	Si	Si	No	No	No	No	cielo totalmente despejado
11 de marzo	7:00	No	Si	Si	Si	No	No	No	No	cielo totalmente despejado
12 de marzo	7:00	No	Si	Si	Si	No	No	No	No	cielo totalmente despejado
1 de marzo	19:00	No	No	No	No	No	No	No	No	
2 de marzo	19:00	No	No	No	No	No	No	No	No	
3 de marzo	19:00	No	No	No	No	No	No	No	No	Poca neblina en el Pico Macanao
4 de marzo	19:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
5 de marzo	19:00	Si	Si	Si	Si	No	No	Si	Si	Neblina en todas las cordilleras
6 de marzo	19:00	Si	Si	Si	Si	No	No	Si	Si	Neblina en todas las cordilleras
7 de marzo	19:00	No	Si	Si	Si	No	No	Si	No	
8 de marzo	19:00	No	No	No	No	No	No	No	No	cielo totalmente despejado
9 de marzo	19:00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 de marzo	19:00	No	No	No	No	No	No	No	No	
11 de marzo	19:00	No	Si	Si	Si	No	No	No	No	neblina hasta en las cordilleras
12 de marzo	19:00	No	Si	Si	Si	No	No	Si	No	

M.A.R.N.
 DIRECCION ESTADAL AMBIENTAL NUEVA ESPARTA
 PROGRAMA DE HIDROLOGIA Y METEOROLOGIA
 SISTEMA NACIONAL DE INFORMACION HIDROLOGICA Y METEOROLOGIA

ESTACION: SAN FRANCISCO DE MACANAO TIPO: C2 SERIAL: 795
 EDO: NE LAT: 110130 LONG: 641726 ALT: 88 msmn
 ORG.: MARNR INST: Apr-49 ELIMI:

DATOS MENSUALES DE PRECIPITACION (MM) 6000

AÑO	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	ANUAL
1985	55.3	30.5	11.2	70.2	2.8	28.2	61.9	94.7	68.5	59.5	99.2	30.2	612.2
1986	12.8	3.1	7.6	0.0	9.6	13.0	28.0	25.4	122.2	132.6	104.2	35.0	493.5
1987	22.6	0.0	7.2	0.0	21.6	48.2	77.7	66.2	81.0	23.2	65.2	26.8	439.7
1988	37.6	27.0	6.0	0.0	3.8	82.6	40.0	440.2	167.8	240.8	43.0	75.8	1164.6
1989	8.2	27.0	36.0	0.6	0.0	50.8	64.6	45.4	89.8	32.2	45.6	36.6	436.8
1990	68.6	43.0	0.4	2.2	37.8	44.8	56.4	139.6	37.0	26.2	44.0	28.4	528.4
1991	45.2	0.0	3.2	0.0	0.0	8.8	14.0	30.6	7.8	7.2	46.8	112.2	275.8
1992	36.2	50.2	0.0	0.0	6.6	18.2	47.8	38.4	35.8	24.8	27.8	38.6	324.4
1993	1.0	0.0	0.4	23.8	10.6	14.0	56.4	20.2	37.0	34.8	9.4	6.0	213.6
1994	4.2	2.6	0.0	0.0	0.8	20.6	56.8	12.4	17.6	61.8	58.2	22.2	257.2
1995	2.0	2.6	102.0	1.4	0.0	21.0	29.4	109.6	1.0	0.0	5.2	0.0	274.2
1996	5.2	0.0	0.0	0.0	14.0	80.6	229.6	1.6	116.6	100.2	49.6	57.2	654.6
1997	22.8	40.6	22.2	0.0	0.0	68.6	18.6	21.0	11.0	12.0	11.6	11.8	240.2
1998	0.0	0.0	0.0	0.0	16.0	8.2	29.0	87.8	69.0	109.6	17.0	73.0	409.6
1999	11.6	19.8	7.8	16.4	0.0	10.2	23.0	152.6	87.0	289.2	38.8	283.4	939.8
2000	72.6	12.6	27.2	8.8	3.0	63.6	36.8	85.6	15.4	30.2	110.0	12.6	478.4
2001	5.4	37.2	0.0	9.0	0.0	43.4	60.8	104.2	61.2	76.2	0.0	44.0	441.4
2002	130.0	4.4	1.2	16.8	18.2	15.0	19.8	19.0	36.2	61.6	39.8	19.4	381.4
2003	0.0	0.8	0.0	0	23.6	22.6	41.4	48.4	114.4	51.4	39.6	18.2	360.4
PROM	28.5	15.9	12.2	7.9	8.9	34.9	52.2	81.2	61.9	72.3	45.0	49.0	469.8

MEASUREMENTS FROM THE SFC AT EL COPEY

These are the amounts of water in liters collected by a one square meter standard fog collector. The rates are substantial, especially considering that this is during the dry season. About 130 liters were collected in 20 days, for an average of about 6.5 liters per square meter per day. At this rate one large fog collector would produce 208 L per day and the four LFCs proposed in this stage of the project would produce 830 liters per day. The total volume produced can be increased at any time by increasing the number of LFCs

Nº de lugar	Lugar	Nº del SFC	Nombre del Observador	Fecha	Hora	Agua Colectada (Litros)	Velocidad de Viento	Dirección de Viento	Lluvia (Si/No)	Cantidad de Lluvia (ml)
1	El Copey	1	Valera	5/2/2005	8:45	3.500	2	n/a	No	
1	El Copey	1	Valera	6/2/2005	8:45	5.000	3	n/a	Si	
1	El Copey	1	Valera	7/2/2005	8:45	5.000	2	n/a	No	
1	El Copey	1	Valera	8/2/2005	8:45	2.500	3	n/a	No	
1	El Copey	1	Valera	9/2/2005	8:45	8.300	3	n/a	Si	550
1	El Copey	1	Valera	10/2/2005	8:45	7.100	2	n/a	Si	200
1	El Copey	1	Valera	11/2/2005	8:45	5.100	2	n/a	No	
1	El Copey	1	Valera	12/2/2005	8:45	0.750	2	SE	No	
1	El Copey	1	Valera	14/2/2005	8:45	9.150	3	n/a	Si	150
1	El Copey	1	Valera	16/2/2005	8:45	8.700	1	SE	Si	300
1	El Copey	1	Valera	18/2/2005	8:45	0.400	2	SE	No	
1	El Copey	1	Valera	21/2/2005	9:30	25.650	2	n/a	Si/No	650
1	El Copey	1	Valera	23/2/2005	9:30	4.300	2	SE	Si/No	
1	El Copey	1	Valera	25/2/2005	9:30	42.800	3	SE	Si/No	

* Change in SFC orientation Feb. 24th. Also, night of heavy rainfall

MEASUREMENTS FROM THE SFC AT EL COPEY

Fecha	Observaciones
5/2/2005	Llovizna no, color claro del agua, vientos moderadamente fuertes, semi nublado nublado
6/2/2005	Llovizna de 22:00 hasta 24:00, color claro del agua, vientos fuertes, nublado
7/2/2005	(#2 wind) Viento moderado, color claro del agua, totalmente nublado
8/2/2005	Ilovizna poca, color claro del agua, vientos fuertes e inkomodos, totalmente nublado
9/2/2005	Lluvia poca, color semi-clara del agua, viento fuerte e inkomodo, nublado totalmente
10/2/2005	lluvia poca, color claro del agua, vientos moderados, nublado totalmente
11/2/2005	Color claro del agua, vientos moderados, nublado parcialmente
12/2/2005	vientos moderados sur-este, color claro del agua, nublado parcialmente
14/2/2005	Ilovizna fecha 13-02, vientos fuertes e inkomodos, nublado totalmente, color claro del agua
16/2/2005	Llovizna (No.1) se nota un poco de viento ligero - sureste, nublado totalmente, color claro del agua. Madrugada de martes y miercoles Ilovizno
18/2/2005	NO.2 viento moderado, no es inkomodo pero se siente. Vientos sureste, nublado parcialmente, color claro del agua, Ilovizna el Domingo en la madrugada, en la mañana y en la noche y el Lunes en la madrugada y en la mañana.
21/2/2005	Ilovizna el Domingo en la madrugada en la mañana y en la tarde. El lunes en la madrugada y la mañana. Nublado parcialmente 750 msnm, No. 2 viento moderado. Color claro del agua
23/2/2005	Viento No. 2, color claro del agua, nublado parcialmente 750 msnm. Sureste viento
25/2/2005	(cambio de orientación del colector el 24 al medio dia - cuando Melissa estaba, había approx. 5 L dentro del pipote). Ilovizna el jueves en la madrugada. Vientos No.3 sureste. Color claro del agua, nublado totalmente

Margarita Island Fog Collection Project - Contact List			
Contact Name	Phone Number	Phone Number	Email / Notes
Publicidad Orbe - Patricio Ferrano	0417 953 0819	0295 415 6868	
MARN	0295 242 0382		
Fudena	0212 238 1761		
INPARQUES	0295 242 0306		
Anais Marcales	0416 796 7180		
Edgard Villarroel	0414 395 4478		
Ismael Valera	0414 789 0386		
Deicy	0416 896 2395		
Marcos	0416 496 4794		
Gamero (Carlos)	0414 790 0302		
IRMANE (Gobernación)	0295 242 2355	Ing. Hector Bermuda	Dir. José Ramirez
Dr. Astolfo Mata (Bird specialist) IVIC			
Canadian Embassy Contact - Louis Marcotte			crcas-td@international.gc.ca
Olga Umpierrez	0295 242 0306		ceolba@cantv.net
Puesto de Guardaparques Copey	0295 311 2072		
Natalia Ceballos Mago	0414 277 3731		nc284@cam.ac.uk
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Stephanie Dashiell	0416 399 4070		
Aeropostal	0900 284 6637		
Taxistas!!!			
Vicente	0417 953 3584		Boca de Rio
Hector	0414 799 6698	0295 291 3989	Boca de Rio
William	0417 953 0871		Porlamar
Francisco Salazar	0416 495 1872		Punta de Piedras

Project Proposal January 2005

Proyecto de colección de neblina en la Isla de Margarita

Objetivo:

Determinar la posibilidad de coleccionar la neblina en la isla de Margarita como una nueva fuente de agua y para conocer mejor su rol (junto con el papel de la lluvia) en el sistema hídrico de la isla.

Transferir y difundir la tecnología de la colección de neblina a Venezuela. La Isla de Margarita es el primer lugar donde se ha iniciado un proyecto de colección de neblina con fines de desarrollo comunitario en toda Venezuela y se busca crear un modelo que otras comunidades en el país puedan seguir. Los mismos actores de este proyecto podrán tener un papel en propagar esta tecnología, sea a través de papeles científicos o mismos otros proyectos en un futuro.

El agua coleccionada puede entonces tener muchos usos. Estos incluyen: viveros, ganado, reforestación, rehabilitación de la cuenca de agua, uso para especies en peligro de extinción, uso personal lo cual se traduce en una mejora de calidad de vida.

Justificación:

Este proyecto en particular se basa en el hecho de que existe muy poco conocimiento de la ocurrencia, frecuencia e importancia de la neblina en Margarita, y por esto, nuestra meta es investigar esto en la fase inicial.

Junto con la idea principal de aliviar los problemas provenientes de la escasez de agua, FogQuest pretende aportar literatura científica sobre la neblina. Todos los actores principales podrán incorporarse como coautores a una publicación final. La motivación principal es el elemento humano y la mejora de su calidad de vida. Se han identificado algunas comunidades que podrían beneficiarse de una futura recolección de agua como lo cual sería compatible si esta investigación determina un verdadero potencial de agua a través de esta tecnología.

Otro ramo esencial de este proyecto es la educación ambiental. La neblina es una parte importante del sistema hídrico, en especial para islas y zonas costeras, nuestro caso por ejemplo el bosque nublado del Cerro Copey, único en nuestro estado, no existiría sin la presencia de la neblina. Igualmente existe una estrecha relación entre la deforestación y la merma de fuentes de agua. En este sentido se enfocarán temas en la educación ambiental acerca de la importancia del agua, de los bosques y de la protección del ambiente en general. A través del programa de educación ambiental de Provita, se desarrollarán talleres educativos para comunicar estos puntos.

Literatura relevante de la Isla de Margarita para este proyecto:

Sugden, Andrew M. (1986) The Montane Vegetation and Flora of Margarita Island, Venezuela. *Journal of the Arnold Arboretum*, 67(2), 187-232.

Alexander, Charles, S. (1958) *The Geography of Margarita and Adjacent Islands, Venezuela*. Los Angeles: University of California Press.

Participantes:

Melissa Rosato, mrosato@fes.uwaterloo.ca

FogQuest (www.fogquest.org)

Celular: 0414 105 7072

Provita, ONG Venezolana, activa en la isla a través del programa Bioinsula

bioinsula@provitaonline.org (www.provitaonline.org)

Boca del Río: 295 291 3432

Lugares y potenciales beneficiados*: *Vea mapa en el Apéndice 1*

<i>Península de Macanao</i>		<i>U.T.M</i>	<i>Altitud (m.s.n.m.)</i>	<i>Potenciales Beneficiados</i>
1	Cerro Macanao		750	◆ Pueblo de San Francisco (agricultura) ◆ Ganado, viveros, etc. ◆ La cotorra margariteña y otras especies del bosque seco ◆ Sendero La Chica
2	Cerro Risco Blanco		660	
3	Loma de San Francisco		440	
4	Cerro Guaraguao		640	
5	Cerro Los Cedros		620	
6	Cerro El Pilón / Piedra Lisa		340	

<i>Península de Margarita</i>		<i>U.T.M</i>	<i>Altitud (m.s.n.m.)</i>	<i>Potenciales Beneficiados</i>
7	Cerro Copey		980	◆ Pueblo de La Sierra (agricultura) ◆ INPARQUES
8	Cerro Matasiete		660	◆ Pueblos Las Tapias y Salamanca
9	Cerro Guayamurí		490	◆ Pueblo El Cardón
10	Cerro Tragaplata (El Tapado)		700	◆ Pueblos de Güirigüire y Loma de Guerra

**Discusiones continuas con Provita y las comunidades locales finalizarán los lugares y beneficiarios exactos. Debido al tiempo limitado, números 8 a 10 de la tabla arriba se investigarán en una segunda fase del proyecto. La capacitación de los pueblos que se beneficiarán del agua de neblina es un elemento crucial que será llevado a cabo a través de Provita, FogQuest y consultas públicas.*

Itinerario y requisitos:

2004

Mayo – Dic.:

Recaudación de fondos y desarrollo del proyecto
(EJECUTADO)

Sept. – Dic.:

Preparaciones del viaje: compra de la malla, identificar contactos en la isla de Margarita (por ejemplo los que vayan a construir los colectores, los permisos necesarios para instalar los colectores en el terreno, etc.), encontrar alojamiento, etc. (EN PROCESO)

2005

Enero – Marzo:

Fase 1: Trabajo de campo

- ◆ Participación comunitaria (educación ambiental, talleres, etc.)
- ◆ Construcción de los colectores (utilizando mano de obra local y materiales locales también)
- ◆ Evaluaciones de los lugares
- ◆ Instalación de los colectores en el campo
- ◆ Colección de los datos de manera continua
- ◆ Entrenamiento de los colectores de los datos
- ◆ Determinar la posibilidad de colectores grandes
- ◆ Instalación de un colector grande (siempre que sea posible)

Abril – en adelante

Después del viaje: escribir informe preliminar, seguimiento y análisis de datos recolectados. Una vez que los datos se han recolectado por un año, se redactará un informe extensivo de los flujos o patrones de la neblina para la Isla de Margarita. Mantener comunicación continua con Provita para continuar el desarrollo del proyecto en la medida de lo posible.

Sept. 2005

Fase 2: Trabajo de campo: Instalación de más colectores pequeños y colectores grandes con su respectivo plan de seguimiento y plan de acción para uso final (con entidades gubernamentales).

Detalles del proyecto:

El proyecto se desarrollará según los pasos indicados a continuación:

1. **Educación comunitaria:** a través de reuniones con grupos de la comunidad, se explicará la tecnología, la meta del proyecto, la importancia de su participación, etc.
2. **Educación ambiental:** se utilizará la tecnología de la recolecta de neblina para enseñar el sistema hídrico, de dónde viene el agua que usan a diario (actualmente casi toda el agua de la Isla de Margarita viene de tierra firme), la importancia de conservar el agua, la conservación de los bosques (ya que son captadores naturales de la neblina), además de la innovación para solucionar problemas. Esto se puede hacer a través de los profesores como agentes multiplicadores, facilitar visitas a los colectores u organizar talleres educativos a través de Provita. Otros instrumentos a incluir en este paso son los medios de comunicación masivos (radio, televisión y prensa).
3. **Construir los colectores (usando materiales y mano de obra local):** Este paso será llevado a cabo lo antes posible. Ésta es la prioridad del proyecto al principio. El uso de mano de obra local esta garantizando la difusión y conocimiento de la tecnología a la escala comunitaria, quienes en un futuro pueden implementar otros proyectos y saber darles continuidad.
4. **Evaluaciones de los lugares de implementación:** Se efectuará durante la construcción de los colectores. Se analizarán lugares potenciales para finalmente establecer un mínimo de 8 lugares donde efectivamente se instalarán. La visita del Dr. Schemenauer a principios de enero facilitó las evaluaciones debido a su amplia experiencia.
5. **Instalación de los colectores en el campo:** En esta fase en particular se necesitará la ayuda de la comunidad, por ejemplo el equipo de Biomonitores que maneja Provita, miembros de las comunidades que se beneficiarán de los colectores, guarda-parques, etc., para la colocación final de los colectores.
6. **Colección de data frecuente:** Al principio mi persona o un delegado se encargará de esta fase para asegurar que los colectores estén funcionando apropiadamente, y a la vez ir pensando en la persona más adecuada para que los datos se puedan tomar por un año.
7. **Entrenamiento de los colectores de data:** Los delegados responsables de la recolecta de niebla se tendrán que comprometer por un tiempo determinado, quizás 6 meses o hasta un año. La obtención de datos es imprescindible para analizar el flujo de agua y diferenciar las temporadas de lluvia y sequía. Las planillas borradores que se piensa utilizar se encuentran anexadas.
8. **Determinar la posibilidad de instalar un colector grande:** Esto se determinará en cuanto se vea qué tipos de resultados se obtienen de los colectores preliminares. La

idea es tener una muestra de un colector grande donde realmente se produzca bastante agua, lo cual facilitará la explicación y demostrará la tecnología, y a la vez producirá agua en cantidades útiles. Si se determina que hay un lugar apropiado que tendrá buenos resultados, la instalación de un colector grande se puede coordinar de inmediato y se redactará un pequeño protocolo de seguimiento.

Provita como enlace nacional

Provita será el enlace nacional y a nivel local a través del programa Bioinsula y dará continuidad a los siguientes objetivos:

1. Ayudar a coordinar la participación local a través de reuniones informativas, instalación de los colectores en el campo, haciendo contactos importantes etc.
2. Proveer el transporte necesario para llegar a los lugares en el campo, transportar los materiales y colectores, etc.
3. Coordinar la continuidad de las observaciones por un mínimo de un año.
4. Coordinación del envío de los datos de los colectores, con una frecuencia mínima mensual al Dr. Schemenauer y a mí persona para la evaluación continua en Canadá.

Lista de los anexos:

- ◆ Mapa de la Isla de Margarita – *lugares potenciales**
- ◆ Planillas para los medidores de los SFCs

* Se debe consolidar nombres únicos para las elevaciones que se señalan a través de todos los actores involucrados (INPARQUES, MARN, PROVITA, FOGQUEST, locales).

A estos efectos se han utilizados la nomenclatura de la cartas del Instituto Cartográfico Venezuela para la Isla de Margarita elaborado en el año 1988.