

The Arkleton Trust

**COMMUNITY RESILIENCE AND PREPAREDNESS IN COPING WITH
IMPACTS OF CLIMATE CHANGE. THE CASE OF A COMMUNITY IN THE
VENEZUELAN ANDES.**

**Hilda Zara Montilla
Venezuela, October 2007**

Acknowledgments:

This project was founded by The Arkleton Trust.

Thanks to the community of El Guayabal and the Municipality of Santa Cruz de Mora

for being always available with enthusiasm.

Thanks to the Asociación Civil Siembraviva

and

De Lima – Hutchison, Stirling-Erskine and Zara-Montilla Families for their

unconditional support.

Table of Content

INTRODUCTION	4
I. LITERATURE REVIEW	6
II. METHOD	11
Aim	11
Objectives	11
Research	11
Techniques	12
The Community	15
Procedures	17
III. RESULTS	21
Climate change and its impact on the community	21
Decreasing Resilience	23
Response to climate change effects	25
Immediate response to coping with climate change	25
Responses with long term implications	27
Diminishing vulnerabilities	29
Psycho-social needs of the community of El Guayabal	33
IV. CONCLUSIONS	37
V. LITTERATURE CITED	40

INTRODUCTION

In the last six years the Venezuelan population has been affected by floods and landslides as a consequence of unexpected extreme rainfall, associated with climate change.

The combination of these weather phenomena with the existing economic and social vulnerability of communities resulted in a social catastrophe. In February 2005, torrential rains had a serious impact on different regions of the country. In particular, one of the rural regions struck by reviewed floods was the Valle de Mocoties in Merida State, located in the Venezuelan Andes.

The constant threat of weather change, has severe social and economic implications in these communities as well as an impact on personal lives. Often in these difficult circumstances, communities may respond by drawing on their local knowledge, capabilities and resources. Understanding how the community responds is the first step to developing successful strategies for coping with climate change.

This project will contribute to the understanding of psychosocial impact of climate change in the rural community of El Valle de Mocoties (Merida-Venezuela). Recognizing people's needs in terms of personal security, information, education and community's ways of coping, their beliefs about coping, the perceived control of the situation, received-perceived social support and their preparation for the future will be important inputs to attain the psychosocial consequences of climate change.

To understand this from the point of view of the community, the project was developed working closely with the participants in the field for six weeks. During this period, the researcher was actively involved with the community collecting information, systematizing it and analyzing the results.

This continuous process obtained information about the personal and communitarian experience of the rural community, but also was an opportunity for them to recognize

their own problems and resources in order to identify further actions for coping with climate change.

The data source included at the first stage participant observation. It required exposure to the day-to-day of the community to achieve a systematic description of events and behaviours in the social setting. This information provided the context for developing guides to interview in depth some members of the community (leaders, members of organisations, people affected by the climate change). These interviews clarified and extended the information gleaned during the observation phase. Finally, in order to contrast information and share the results with the community, focus groups gave their impressions and perceptions about their current situation and climate change.

This project counted on the participation of “Siembraviva Sociedad Civil”, a local organization that has been working in the Venezuelan Andes since 1989. This organization has made important contributions to the local development of Venezuelan indigenous and rural communities, promoting educative programs in ecology. The educational proposal of “Siembraviva Sociedad Civil” is based on the respect of the cultural traditions and environmental knowledge of the community and this principle is absolutely consistent with the aim of this project.

I. LITERATURE REVIEW

Climate change and its impacts are now being observed and experienced, first hand, throughout the world and in many different ways (Tompkins and Adger, 2003). The disasters taking place today related to climate change are evidence of the adverse future impact that it may have and the urgent need for reducing vulnerabilities in some communities (IISD, 2003).

Poor communities within urban and rural areas are already vulnerable to the risks associated with climate change. A strong dependence on the ecosystem may jeopardize their well being and survival due to environmental conditions. As natural resources are less available and quality drops, owing to natural and human pressure, so do guarantees and the viability of life. In this regard, climate change threatens to increase imbalances in community development and increase existing vulnerabilities.

Social vulnerability, in this case, is about the tendency of human groups or individuals to suffer the damages resulting from exposure to the effects of certain environmental stresses. Stress affects the life style of groups or individuals, and implies an imposed adjustment to physical changes in the environment (Adger, 2000).

The concept of vulnerability is clearly related to other important factors of the relation between society and environment, specifically, under circumstances where individuals and social groups adapt and respond to environmental changes: social resilience.

For Resilience Alliance, resilience is:

“The ability to absorb disturbances, to be changed and then to re-organize maintaining its identity (retain the same basic structure and ways of functioning). It includes the ability to learn from the disturbance.”

Resilience in social systems includes the additional capacity of humans' anticipation and planning for the future. Resilience, as applied to integrated systems of people and the natural environment, is a measure of the following three defining characteristics:

1. The amount of change the system can undergo and still retain control on function and structure.
2. The degree to which the system is capable of self organizing.
3. The community's ability to build and increase its capacity to learn.

Additionally, the Community Resilience Project Team (2000) has developed a model in which a resilient community is one that takes intended action to enhance the personal and collective capacity of its citizens and institutions to respond to and influence the course of social and economic change.

Conceptually, and based on experience, they establish four core components of a community's social and economic structure:

People: residents' beliefs, attitudes and behavior in matters of leadership, initiative, education, pride, co-operation, self reliance and participation.

Organizations: the scope, nature and level of collaboration within local organizations, institutions, and groups.

Resources: The extent to which the community builds on local resources to achieve its goals, while drawing on external resources strategically.

Community Process: The nature and extent of community economic development planning, participation and action (CCE, 2000)

In a resilient system, change has the potential to create opportunity for development, novelty and innovation. Resilience is essential in order to increase the ability of a socio-

ecological system to cope with new situations and keep future options, that is, its capacity to adapt (Folke, Carpenter et al. 2002).

Within social systems, this capacity is linked to the existence of institutions and networks that learn from and safeguard knowledge derived from experience; institutions that can reinforce flexibility in problem solving and balance power among interest groups (Scheffer et al. 2000, Berkes et al 2002, cp. Folke, Carpenter et al, 2002).

Vulnerability is the flip side of resilience: when a system loses resilience it becomes vulnerable to change it could have previously absorbed (Kasperson and Kasperson 2001a). In a vulnerable system, even small changes may be devastating.

The concept of resilience implies a change in policies from those who expect to control change in systems based on their stability, to manage the adapting capacity of socio-ecological systems and forge change. This tendency increases the possibility of sustainable development in changing environments in which the future is predictable and surprising (Levin et al. 1998, Holling 2001, cp. Folke, Carpenter et al, 2002).

From this perspective, new research initiatives are, today, looking into the issue of vulnerabilities owing to climate change and the community's ability to adapt in light of increasing critical events such as rising global temperatures.

Several approaches consider vulnerability related to climate change. Consequently, vulnerability can be understood as final stage, that is to say, as the resulting condition when exposure related factors and the systems' capacities are at play. This approach corresponds to an impact assessment usually with a top to bottom methodology. The issue is first tackled with an impact prediction and, subsequently, assumptions or estimations are made on the human systems' capacity to adapt to such climate changes.

By contrast, a different approach perceives vulnerability as a starting point, which favors the "bottom-up" evaluation of impact. In this manner, the goal is to identify what the system is exposed to and its existing capacities to handle change. Even though

predicting is an important aspect, research is focused on considering relevant community variables.

To this end, work begins with an interest system and, for example, exploring the climatic aspects that matter to the community, how does the community handle stressful events, how do individuals face up to their day to day activities. This can provide a vulnerability estimate in the community specially by assigning relevance to the perceptions and experiences of the groups evaluated (C-CIARN, 2004).

Following this last approach, the project proposes, as a starting point, first hand knowledge of impacts and the relevance of climate change on a specific community. To this end, its focus is psycho-social impacts of climate change in the community.

For Martin Beristain y Doná (1997), when you work with a psycho-social approach, reference is made to the way you understand behavior, emotions and thoughts from individuals and groups experiencing complex issues, without alienating them from the social and cultural context these occurred in.

Within the context of climate change, the psycho-social approach gains relevance insofar as it facilitates the understanding of behaviors and reactions among the affected population, and provides alternatives to understanding the mechanisms and actions of mutual support undertaken by individuals. Consequently, it allows the community to articulate joint development and action plans, as well as problem prevention important to it.

A brief description of climatic events is next described. These occurred in rural communities in the Venezuelan Andes. Our aim is to attempt identifying and understanding the behavior, perceptions and experiences of a specific community in the area.

From February 07th to 13th, 2005, the area of the Mocotíes River Basin experienced intense rainfall which peaked for four to five consecutive hours on 11th February. As a result, several Mocotíes River tributaries significantly increase their water levels

causing the loss of human lives and severe damage to infrastructure: houses, communication roads, irrigation systems, etc. Numerous families found themselves homeless (Laffaille, Ferrer y Rincón 2005).

According to Zambrano (2005), the natural causes of this phenomenon are related to global climate change and internal variances in the regional climate system. Thus, anthropogenic causes related to human activities in the area, such as deforestation and changes in the way the land is used, are relevant to the cause.

The phenomenon had negative effects in the lives of individuals in the region. The communities were submitted to an unforeseen and very stressful event. Prior vulnerabilities and the effects of constant rainfall generated a socio-cultural disaster.

Even though they were dealing with a major event, the communities involved gave immediate response to such and adverse situation and, today, after two years, they continue to develop local strategies that allow them to face up to the negative effects of climate change.

Given the said circumstances, this research attempts to explore which are and have been the responses given by the community in order to cope with the consequences of climate change; as well as the adjustment strategies developed to prevent future negative effects.

This research stresses the psycho-social approach thereby dwelling on climate changes and the interaction among individuals, institutions, community resources and processes.

II. METHOD

Aim

This project aims at identifying the psychosocial impact of climate change in the community of El Guayabal (Mocotíes Valley) and the ways in which the communities are responding to and coping with the consequences of such changes.

Objectives

To identify how the community perceives the impacts of climate change in their personal lives (subjective well-being) and social relations.

To understand the different intended actions taken by individuals and organizations based on their own abilities, in order to respond and influence the consequences of climate change today (Resilience).

To explore existing and potential assets, capabilities and community practices which would enable communities to prepare and recover from climate change impact.

To recognize current community psycho-social needs related to climate change impact: information, safety, instrumental, educational-training support and organized community participation.

To identify communitarian strategies, processes, resources and participants (individuals, groups, families, private organization and government) to be prepared in case of negative changes in climate.

Research

This is a qualitative research, which can be identified as an attempt to capture the underlying sense of what we say about our actions; an explanation, elaboration and

systematization of the meaning of an identified phenomenon; and the meaning representation of a topic within a delimited problem (Parker, 1994).

For Martínez Mígueles (2004), a qualitative research is about identifying the deep origins of human realities, their structure, the motive for their behavior and its manifestations. Thus, qualitative research is the study of an “integrated whole” that makes something what it is: a person, a group or a company. The most relevant aspect of this approach is to consider the relations that confer significance to that unit.

González (2000) states, that qualitative research is oriented to understanding the subjectivity of different elements. These elements are involved in a variety of processes as part of the “unit as a whole” and they change by means of context and the subject’s history. This makes the richness and plasticity of the subjective phenomena evident.

In sum, qualitative research enables the researcher to gain empathic understanding of social phenomena; facilitates recognition of subjective aspects of human behavior and experiences meaningful to those concerned. (Njeru, 2004)

In qualitative research, procedures are oriented to discovering the personal or group structure, making it necessary to consider the forms which reveal or express said structures. The most common techniques focus on spoken language. However, observation may be the more powerful instrument.

The Information Collection Techniques employed in this study will be defined next, making specific mention of the Project’s particularities.

Techniques

Participant Observation

It is, by far, the classic primary technique most commonly used by qualitative researchers in order to obtain information. To this end, the researcher gets involved with

individuals and groups researched, sharing their way of life and experiences (Martínez Mígueles, 2004).

With this technique, the researcher takes part in the communities' common day activities, making detailed notes of places and facts. In this manner, the researcher is able to respond to questions such as who, what, when, where, when, how and why something was done. Consequently, the observer must pay close attention to, not just daily events, but special events that might take place in the community with which she is now becoming familiar.

The participant observer records everything she/he sees, hears and feels in the field. She/he becomes familiar with language variations in the community, understands what is important to people, what makes sense to the group and what individuals want. As the researcher becomes a participant observer, she/he is in a position to verify if people are "saying what they want to say and want to say what they are actually saying". (Schwartz y Jacobs, 1984)

During the course of the project, the researcher had a six week opportunity to share with the community of El Guayabal daily activities typical for some of the families, as well as experience especial events such as sports competition, parties and community meetings. This allowed her to observe the behavior of community members regarding their environment and listen to the ideas expressed regarding climate change experiences in the region.

Interviews

In general terms, an interview is a conversation between the interviewer and the interviewed, for a specific purpose. It is a verbal interchange that allows the collection of data during the encounter, private and affable, whereby one person addresses the other and tells her story, gives his own version of the facts and answers questions related to a specific problem (Nahoum, C. 1985; cp. Sierra, 1998).

In focused or semi-structured interviews, the conversation follows a pre-defined interest. The interview seeks answers for concrete aspects, such as, most influential stimuli, meaningful effects, and different perceptions of individuals submitted to the same experience (Ruiz Olabuenaga e Ispizua, 1989).

For this project, semi-structure interviews were conducted focused on the personal impact of climate changes on a day to day basis and the individual perceptions of individuals and the community's ability to respond to these phenomena.

Even though the interviewer had prepared a series of topic related questions, during the interviews the participants were at liberty of relating to other aspects considered meaningful. Likewise, questions were adapted to the kind of response obtained from the interviewee, the language she/he was more familiar with and the order in which certain contents were approached.

On occasions, even when the interviewer's intent was to obtain information from one person at a time the conversation included spontaneous inputs from other community members. This is why some of the registered conversations involve more than one speaker. At any rate, the collected information is considered of great importance, in terms of the objectives defined for this project.

Focus Group Discussion

According to Martínez Miguélez (2004), the focus group technique has communalities with both Interviews and Participant Observation. It is usually conceived as a means of listening to people and learning from them. A focus group is a work group; it has a specific task and seeks to achieve specific objectives. With this technique, the researcher aims to discover the structure of a shared concept through the participant's contributions.

A group is focused insofar as it targets on a specific study or research topic, of interest to the group. The discussion seeks to garner information through an interactive interchange and the contrast of opinions among group members. To this end, it is worth

pointing out that a focus group is a form of collective research centered on plural, rather than individual, experiences, perceptions and attitudes from the participants. All is carried out in a relative short period of time.

For Njeru (2004), the ideal group size is 10 participants, but it can vary from 5 to 12. A standard session takes about one to two hours. The discussion is generated by a moderator through pertinent issues, making it interesting, encouraging non-speakers and controlling dominant individuals.

In the selection of social groups, some expert recommend separating them, in order to pertinently capture and reflect the views and experiences of particular social categories such as gender and age groups. However, in this case, focus groups were made up of neighbors from different social categories of study that experienced, more or less, the same problems and considered themselves as part of the same community. On occasions, family members also took part in the same focus group session (father, son, brothers).

The debate generated within the focus groups allowed the participants to share their experiences, contrast their beliefs, desires, and fears regarding climate change and natural disasters. At the end of the session, participants were dealing with new information, making commitments and short term action plans among them giving the problem and their possible solutions a different dimension.

The Community

This study was conducted in the rural community of El Guayabal, one of the rural populations found in the Mocotíes River valley, located in the Mérida ranges of the Venezuelan Andes.

This population has developed around the Guayabal stream that originates from a beautiful waterfall and constitutes one of the Mocotíes River tributaries. Geopolitically, it is located south of the state of Mérida, in the Antonio Pinto Salinas Municipality. It is a small rural village with some 120 families, in total. They are disseminated along

several country houses among family groups and in terms of the geographical proximity: La Cascada, La Primavera I, La Primavera II, El Guayabal parte Baja, Los Algarrobos y San Rafael del Guayabal.

At present, many young adults from El Guayabal work in Santa Cruz de Mora or in the city of Mérida, in third sector activities. Yet, many families live off agriculture and livestock specifically from coffee growing and green banana crops, citric fruits, corn and farm animals such as poultry and porcine.

The village is located nearby populated centers and it may take their inhabitants 20 minutes to an hour to arrive at the center of the largest town in the municipality which is Santa Cruz de Mora; and an additional hour and half to reach the capital city of the state. This proximity facilitates economic interchange with larger populations, generally, with the sale of farm produce in order to purchase manufacture goods from commercial networks nearby.

The families located closer to the main road enjoy the benefits of water, power and sewer systems, and limited transportation services. The farther away houses are located from the main roads public services become scarce. Community members may attend two elementary schools located in the lower side of El Guayabal and in La Cascada. A medical clinic and sports area are available. La Cascada is also a tourist attraction, as well as a recreational area for local inhabitants.

Finally, it is worth noting that El Guayabal is a rural community economically dependent, almost entirely, on its relationship to the ecosystem. Recently, its inhabitants suffered a severe impact from climate change evident through natural disasters, specifically, the flood of February 2005. This event and the ongoing climate changes have put their response capacity to the test and imposed adjustment in life conditions. This is the main reason the community was chosen for this project.

Procedures

The Project began with the identification of objectives, which were agreed on by the *Siembraviva* Association; followed by a bibliographical review on theories and methodology, whereby cases of similar experiences had been documented. The zone of the Mocotíes Valley had been previously identified to conduct the research.

Nonetheless, the specific community had yet to be identified. In order to this, contact was made with different persons related to community work and environmental protection in Venezuela. The first contact made was with professor Maximina Monasterios, who has an extensive record on community work in rural areas of the Andean ecosystem.

Not only did she provide information on the characteristics of the Andean region, the general problems faced and some of the university projects designed for the zone, but professor Monasterios also served as liaison with Ylva Suárez, a member of the Ministry of Environment and Renewable Resources in Mérida, who was conducting, at the time, activities for the Andes University.

As part of this government entity, Ylva Suárez was involved in providing support to the communities affected during the floods of 2005. Ylva, besides officially working in the environmental protection area, is a Santa Cruz de Mora native, the capital city of one of the municipalities that suffered the impact of climate change in the area.

After a personal interview with Ylva in the city of Mérida, telephone contact was made with Marilú Chacón, geographer and community leader in zone of El Guayabal, in the Antonio Pinto Salinas Municipality. She was informed of the project objectives and a personal interview was set up. She expressed her interest in the research project and, later, introduced the researcher to community of El Guayabal. On that occasion, early February of 2007, arrangements were made in order to begin work with the community.

During the first week of March of 2007, the researcher visited the El Guayabal community and stayed there for six consecutive weeks. She was lodged in home of the

Chacon family, located in the town's main road. This allowed her to share different experiences with the community, introduce herself to its members and explore, through observation and some informal conversations, aspects related to the objectives of this research.

She was informed of the creation of Community Councils during the first visit paid to the community. These are participation, articulation and integration bodies of the different community organizations, social groups and citizens, which allow the organized population to exercise their direct right over public policy management and projects aimed at satisfying the needs and aspirations of their communities.

The community of El Guayabal has four Community Councils legally established:

El Guayabal lower side and Los Algarrobos,

Primavera I y II

La Cascada

San Rafael del Guayabal

These associations were key elements in the collection of information and activity organization within the community. Through them contact was quickly made with its different members.

An interview script was drafted, with information registered during the first week using the language most familiar and understandable to the community. At first, community leaders pertaining to the so called Community Councils were interviewed, as well as individuals related to environmental management. Later, these leaders facilitated contact with other standing persons in the community, the traditional productive activities of which were farming or livestock.

Finally, a total of 30 individuals from the community of El Guayabal were interviewed, also from the town of Santa Cruz de Mora. In addition, there was an opportunity to interview government representatives from a local co-op which produces agricultural organic inputs.

Most of the interviews were recorded with a portable tape recorder, with the agreement of those interviewed; very few were caught on film, yet, some people interviewed refused to be recorded at all. In these cases, only note making was possible during the session.

After sharing four weeks with the community, planning of the focus groups began. Members of the community councils were involved during the organization of such activities. In this regard, a focus group for each community council was set up in El Guayabal. A total of three focus groups were arranged, each one lasting about 1 hour and 30 minutes. Specifics are indicated below:

Community Council	Number of Participants	Register Form
Guayabal lower side and Los Algarrobos	8	Video
La Primavera I y II	7	Voice record
La Cascada	12	Notes

Attending the focus groups was a voluntary action and all community neighbors were invited to participate. Initially, the community was consulted on the creation of focus groups according to age, gender or productive activity, but they openly expressed that they would rather have everyone participate as representatives of the community.

It is important to note, that the community itself made meeting areas readily available. All the materials used and refreshments offered were provided and prepared by the community.

During the second week of field work, the researcher addressed the local mass media (community radio and TV network) in order to introduce the project and inform them of the types of activities undertaken. With the local TV network we consider the possibility of making a video out of some of the experiences registered and the most important local initiatives, in response to climate change and natural disasters.

As of the fourth week of field work, some of the interviews were recorded on video and group activities initiated. Members of the community participated in the video recordings and intended to play them on the local TV network. At present, these recordings are in the editing process.

After sharing this activity with the community, the local TV and radio stations opened a public debate on matters such as environment and adequate management of crop zones.

III. RESULTS

The following paragraphs give an account of results obtained after analyzing the information compiled through observation, the semi structured interviews and the focus groups created in the community of El Guayabal.

The information was organized by topic as a derivation of the contents provided by individuals and the behavior observed within the community. These categories were made based on the different meanings expressed by participants.

Firstly, a description of climate changes undergone in the community in the last years was made, as well as the effects these changes have had in the community's daily activities. Subsequently, the participant's perceived relations in regards to recent climate change and local and global actions.

Secondly, the responses given and implemented on a short term basis by individuals and organizations followed by a deeper notion of the strategies adopted by the community in order to prepare themselves for the possible negative impact of such changes, on a long term basis. This section is about the initiatives developed locally in order to increase the community's resilience in the face of climate change and its negative effects.

Finally, an analysis is made of the series of psycho-social needs found in the community within the context of climate change. These are what community members perceive and feel is necessary, in order to achieve a subjective well being which doesn't necessarily respond to satisfaction in the case of normative or evident needs for outside observers. In this regard, the needs identified should prove a helpful guide for the development of future joint interventions with community.

Climate change and its impact on the community

In the main, climate changes perceived by members of the community of El Guayabal refer to periods of intense rainfall and drought, in recent years.

More recently, drought periods last longer and temperatures have risen significantly. Consequently, streams and rivers have experienced a reduction in water levels. In fact, the community members report a reduction in water levels each year, during the dry season. Earlier on, rainfall was experienced in the zone, even during the dry season; which was a positive aspect for crops.

Intense and prolonged drought impacts crops, especially, coffee trees. *“Now, the bean becomes ripe when it is still very small, during the dry season.” “If you don’t have an irrigation system, the crop just doesn’t make it.” “Those who don’t have an irrigation system are at risk of losing their crop.”*

Likewise, during the rainy season, continuous rain is experienced for days. This means a sudden increase in stream water levels, as well as occasional landslides. *“The earth is so dried up in the summer, and with the steep slopes; God forbid, there can be many landslides.”* This was the case during the floods of 2005. After days of continuous rainfall during an unexpected time of the year, landslides did away with houses and other infrastructure.

These cycles of intense rainfall and droughts generate conditions for pest reproduction and fungus such as the Monilia, in cacao crops and coffee pests. During this study, in the lower slopes of the mountains, coffee crops were being attacked by coffee pest. Some farmers relate the appearance of pests to climate change, as well as to wrongful use of the land and the indiscriminate use of chemicals.

In addition, people have reported a reduction in wild birds or rodents: *“Since things have changed so much here; it used to be cold, cool; now, you can’t even hear the birds or see any familiar animals, not like before.”*

For some, these changes have become evident for, at least, a decade. Yet, for others, changes seem more significant as of February 2005, when the natural disaster took place: *“As of then, the dry season lasts longer. The sun seems hotter, there’s a lot more heat.”*

An important aspect made explicit by people, one which has created restlessness especially among those who directly work with the land, refers to how less likely to be they are able to predict the weather, the rainy or dry seasons: *“You can’t trust the weather anymore, not like you use to. Before, we would plant the seeds in August and September because it was dry season; and November and December was rainy season. That can’t be done, now. November was summer, October was summer.”*

What is happening today is, that the traditional rain periods are now longer or the opposite, the dry season goes on for more months. This was happening in the El Guayabal area. By March, already four months of intense drought had gone by. Rain is usually expected during November and December: *“Before, people would say: I am going to plant my seeds this week, because we will have rain this week; now, unexpectedly, you get wind or rain.”*

Decreasing Resilience

The community believes climate change is mainly related to environmental damage and pollution. Firstly, its members pointed out the existence of global problems which have generated changes in climate, or so they perceive.

“Pollution from powerful countries, the United States doesn’t want to sign an agreement of whatever; it’s them polluting the most. Such a powerful government, the least it could do is co-operate, do something so that other countries, smaller ones, would follow. Yet, they keep on polluting.”

“I understand that this (climate change) is due to United State’s oil consumption; scientists say that it’s about energy squandering. But that’s the way it is; almost everywhere is the same. Here in Santa Cruz, there are times when you just can’t walk down the street, so many cars.”

“I’ve heard that the poles are melting because of something called warming.”

Just as some members are aware that certain global conditions are contributing to climate change, others relate such changes to the negative effects caused by “damage” done to the community’s environment. They reported “harmful ways” which the community itself identifies as dangerous to the integrity and strength of the ecosystem.

For instance, the community identifies indiscriminate forest fires and tree felling on the river sources, which not only “dries it out”; it also refers to the threat felling waste, left around the fountainheads, represents to the community once strong rain begin.

Some people undertake felling for specific economic purposes: it is very lucrative and immediate economic benefits are available. Felling is usually done under no planning, in slopes, close to the rivers. Others, those into cattle raising have cut down trees for grazing purposes; likewise, people in transition from one long-cycle kind of crop—such as coffee—to short-term cycle crops, such as vegetables. To this end, they cut down the forests on deep slopes in order to plant potatoes, carrots or tomatoes which affect the terrain.

“The indiscriminate cutting down of trees which some Council members carry out, a business with National Guards, police officers, the mayor, the priest...”

“Deforestation, I’ve seen, just recently, the fires up high by the fountainheads; already dried up and they are still burning the forest.”

Another harmful practice which affects the ecosystem and, consequently, makes the community vulnerable, is the use of chemical fertilizers for crops in the zone. “Some crops have too much chemicals and that harms the environment, the air, and it all ends up in the streams.”

“Well, here in San Isidro we have people using DDT everywhere. These people have no conscious when they are using DDT. They know DDT is active for thirty, thirty five years. You apply it today and thirty years later it is still active, killing everything.”

Wastes management in the community may be a daily problem for inhabitants of La Cascada, in the village of El Guayabal. As a result of the floods, the access road is restricted to 4x4 vehicles. Because of this, the community has only three ways to dispose of organic waste: carry the waste themselves for 40 minutes to where vehicles may have access, burn the waste or throw them in the ravine.

This is considered a priority in terms of preserving the environment and community safety. The community fears that burning waste may have a direct negative impact on families and the environment. They also believe it to be risky, to throw waste into the ravine since it is highly polluting and because they, again, might end up with the same flood results, when natural water ways were blocked.

Response to climate change effects

Today, individuals and communities are responding in different ways to the effects of climate change. Even though, at the time of the flood, immediate actions were taken by individuals and the community in order to deal with the emergency situation, this study focuses on the responses given on a short-term basis and the projections made into the future, in terms of preventing negative impacts in light of climate change.

Immediate response to coping with climate change

The immediate responses to the negative effects of climate change tend to be individual ones. This sort of reaction depends on the impact these changes have on the productive activity carried out by the individual.

The farmers who harvest their crops on the lower side of the mountain have felt the need to produce specific responses, in order to reduce the impact of climate changes. This is because they have suffered greatly the increasing temperatures during dry season.

On the contrary, coffee growers, on the highest sections, have reported that the activity is now less complicated because temperatures which were usually low have now risen, which makes it easier for them to harvest the coffee beans. In this case, recent changes in weather have become an opportunity in terms of their immediate production capacity.

One answer to unexpected climate changes has been crop changing. In some cases, the tendency is changing to less water consuming crops. In addition, farmers have begun to harvest crops with a shorter production cycle than coffee, for instance, which gives them greater flexibility when deciding when to plant, and considering climate variations.

In some areas, farmers are rescuing cacao crops, which demand less water than coffee and allows growers to maintain certain production standards with fewer workers. One family can take care of cacao crops without having to hire more people. In addition, the cacao tree provides shade, thus, making it possible to grow other products that need moisture.

When possible for the producer, because of land extension or because she has the support of family members, they move to higher lands where the temperature is lower than lands in nearby villages.

Those keeping coffee crops have changed some of their harvesting practices in order to diminish negative effects, especially during the dry season or droughts. For instance, we were able to observe that banana plants, which provide shade and prevent fast water evaporation, can now be found near coffee crops. *“Before, during the times of chemicals, experts would tell us that it was best to remove the trees; that the coffee plant should be out in the open. Now, with the drought, we must provide shade, instead.”*

Until recently, one of the common activities was to remove weeds and dry leaves from the base of the coffee plants, in order to prevent the plant from rotting owing to moisture. Today, however, those who harvest in the low lands are leaving this type of natural residue at base of the plant in order to preserve moisture. *“Now, I don’t clean*

up. Before you would clean thoroughly to prevent rot; but, now, I leave it alone because it helps fight this intense drought.”

In addition, they are now more flexible about the stages of the productive process. That is, in terms of changes in weather, stages can be anticipated or postponed. Although these can often alter the quality of the product, to strictly follow the process with respect to “conventional” schedules may mean the loss of the entire crop.

One other response, deals with changing from agricultural products to livestock. In some cases, farmers, as an alternative, are beginning to raise pork and poultry in light of the difficulties in crop growing and water management. In this case, tending to diverse productive activities reduces the negative impact of climate change.

Responses with long term implications

This section describes group responses, from the community or organizations, which have taken place in the long term and answer to a prevention strategy and preparation for climate changes. Especially, these projects resulted from the natural disaster of 2005 and are still in place, with projections into the future.

The first action taken in response to the disaster of 2005 was the mobilization of families exposed to the river’s high water levels to move to safer grounds. In order to do this, the families lend their co-operation, as well as the rest of the community, state institutions and other private entities. Some families were even lodged by neighbors for the time it took government to provide safe housing.

Today, the areas closest to ravine and rivers are free of inhabitants. The community makes sure no houses are build in the areas and respects and safeguards that condition, which turned into a community rule in order to guarantee the safety of everyone in the future.

One other commitment established by members of El Guayabal was to keep fountainheads clean, as well as the different Mocotíes River tributaries. Although this is

a commitment hard to comply with, the community is alert and intervenes constantly to maintain the riverbeds clean, as necessary.

An intervention by state agencies (Ministry of Environment, Ministry of Infrastructure and the Mayor's Office) was channeling the ravine and its tributaries, which during the flood of 2005 overflowed and destroyed facilities.

Although the concrete channels made were done under protest from some community members, at present they are still in construction under the supervision and approval of community organizations. Besides being a source of employment, these channels and retaining walls should operate as safety devices, in case the flood experience is relived.

Recently, a proposal was made under the name of Early Alert System. It is a local proposal introduced initially by a member of the community of El Guayabal (Marilúz Chacón), which has gain the support of national and international organizations.

The objective is to develop an alert system for early risk detection with participation from the community. The organizations will facilitate material resources in order to install a communication system.

The relevant aspect is that the inhabitants have the possibility of identifying water levels in ravines and rivers, which may represent a threat to the community; and notify their findings to the rest of the families and relevant institutions. This is, definitely, one of the strategies which stand out as a great instrument for the community to prevent and prepare against disasters.

Other protection factors generated by the community include the use of bamboo trees alongside the El Guayabal ravine and the use of the Vetiver system, as a natural way to stabilize slopes.

The bamboo trees were planted by zone students alongside the El Guyabal ravine, as a means of reducing landslides owing to an increase in water levels. With a simple technique, hundreds of trees were planted among rocky sediments left after the flood.

The plants grew rapidly and the roots formed a net which stops the soil near the river from loosening.

The Vetiver system works with a plant, similar to grass, but eatable by animals. It was planted in steep slopes near houses and social areas and it naturally and at a very low cost stabilizes the areas. The roots of these plants can reach up to eight meters deep. Thus, these plants work as a retaining wall highly effective.

Finally, at the time this study was being completed, the organized communities of *La Cascada* of *El Guayabal* and the villages *La Primavera I y II* were designing, out of their own accord, an air irrigation system which takes irrigation water from a nearby fountainhead to the producers' lands.

Women and men, following their own initiative, sought technical assistance and requested from the government the opportunity to recycle the lines of cable cars to build the needed structure. This community irrigation system will serve water to many farmers, who will now be able to irrigate their crops even when under the effects of intense droughts.

Diminishing vulnerabilities

Besides the immediate and more long-term individual and community responses generated to face and prevent the consequences of climate change in the area, a series of events within the community have also taken place aiming at strengthening response capacities in adverse situations. Local initiatives which have made the ecosystem and the community more resilient are included.

The community organized

Currently, all across the country, by governmental disposition, what has been denominated "Community Councils" are being created. These councils comprise members of a community. That is, families or citizens which inhabit a determined geographical area, share the same background, interests, use the same services and share

similar needs and potential. The most important aspect is that the concept refers to people which relate to each other on a daily basis, consider themselves part of the community and voluntarily have decided to formalize their relationships by means of a community council. This is about being an organized community.

The community council has different functions, among which we find:

- Draft development plans for the community.
- Assess public policies which impact the community.
- Create co-operative organizations and community enterprises.
- Exercise social control over all activities undertaken in the community, of a local, state, private or public nature.
- Create work groups in order to solve problems with the means and resources of the community itself.

Internally, the community councils are integrated by a social controller unit, a financial management unit and an executive body. The executive body is made up of several working committees, whereby community members are dedicated to identifying opportunity areas for development and implementing intervention projects bored and carried out by the community.

During the time this study was in progress, within the community of El Guayabal there were four community councils legally established. These were beginning their work and its members had doubts about how to go about their development plans in favor of the communities they represented.

Still, each one of these groups had identified, within their frame of interest, the problems associated to environmental issues in the light of which certain work groups focused on the topic.

These communities are not obliged to create work groups to find answers to or follow up on any issue they deem relevant within their reality. The fact, though, that there are work groups dedicated to control, development and evaluation of environmental

problems is an indicator of the existing interest within the community to preserve the environment.

During the undertaking of field work for this study, two concrete actions were executed by the community councils to denounce indiscriminate tree felling near sources of water. The complaints were made before the Ministry of Environment and Natural Resources, which took the necessary action.

Usually, community members do not undertake this type of initiative out of fear and the possibility of “*gaining an enemy*”. What would traditionally happen was that some of the individuals felling trees or starting indiscriminate forest fires for that same purpose, made a profit from such activities and the neighbors, although aware of the impact of such activities, would “*keep quiet out of fear*”. Eventually, the authorities would attend to the complaint only to find great damage had already been done.

Even though actions taken are intended to reduce the negative effects of inadequate environmental practices, the organized community has already recognized the importance of maintaining a favorable relation with the environment and, as a group, it is slowly acquiring strength. When a complaint is made by the community council, they are dealing not just with an individual opposed to activities that threaten his/her integrity; they are dealing with the community as a whole.

In addition, the Community Council of La Cascada, faced with the problem of waste management, organized itself and published a formal notice for the Mayor whereby they made the problem public. After three years without a Rural Waste Management system, the Community Council obtained special transport so that the waste previously stored by the community could be disposed of.

In this and other cases, the community council constitutes a social support network not only destined to formalize complaints against potential threats to the community, but also as an entity which can generate innovative proposals and adapt them to the reality of the community in order to make the environment less vulnerable.

Next, I will comment on two initiatives that with the support of the community councils, state bodies and co-operative organizations, are taking shape; in fact, proposals that will reduce vulnerabilities in the ecosystem and the communities it depends on.

Organic crops and other conventional practices

For more than 30 years, farmers in the Mocotíes Valley, specifically in the village of El Guayabal, have used chemicals to fight pests and fertilize the land.

As a response to the concerns of certain community members and, also, as part of the governmental movement to initiate the use of biological crop management, several local initiatives have emerged in order to sensitize and train farmers in the use of organic pest controls and fertilizers.

A co-op organization, from a nearby municipality, is responsible for the production of organic and biological pest controls. They distribute their certified products in the Andean region, but, more importantly, they simultaneously carry out the task of sensitizing and training farmers to that effect. One co-op members is responsible for teaching the benefits of organic crops to producers who so want it. The organization hosts the communities and organizes technical visits to producers who wish to and acknowledge the need to change their farming methods.

For this organization, the most important task is to rescue traditional ways and technologies lost with the arrival of chemicals decades ago. Within the region, many elderly farmers are familiar with environmentally friendly crop management, which represent no risks to families, and consumers or farmers themselves.

Previously, in this area, aromatic plants were used such as parsley or glaucus to control pests, as well as corn fences to impede pests from passing. Mixed cropping and inter-cropping was also practiced, that is, different crops could be harvested in the same land to avoid exhausting the land. That, too, is a form of pest control the co-op is now attempting to rescue and transmit to other farming groups.

In the El Guayabal community, specifically, in the village of La Cascada, there are farmers who have directly learned of the benefits of harvesting organically. However, many still depend on the use of chemicals and fertilizers to maintain the production levels needed.

These types of initiatives find support in government institutions that are promoting these practices in the Andean region and across the country. There is one laboratory that provides technical assistance to producers on infection and pest control by means of biological products with low ecological impact. This laboratory is located in Santa Cruz de Mora and the producer may use the diagnose services, solutions and materials they promote. Still, many members of the community of El Guayabal ignore - or are simply unaware- of the scope of benefits associated to this type of service.

Psycho-social needs of the community of El Guayabal

A recurrent theme among members of the community regarding climate change and its effects is the need to sensitize the community as a whole. For them, this is directly related to informing the community, in general, of some of the daily practices that may directly harm or alter the environment.

There is general concern over the changes taking place especially after having suffered the consequences of the social disaster in the region. However, they expressed the need of making an explicit relation between climate change and human actions; in particular, that the community may recognize what types of materials and procedures are really harmful to their environment.

“I for one didn’t know that plastic took so long when you just leave it around... you know chemicals can cause damage because they even smell terrible, but you are doing something wrong and you don’t know it.”

“Look, I can tell people what is not good, tell them not to do it, but sometimes they don’t believe me. Instead, if someone like you comes along, right, and tells them, maybe it will get them to think about it.”

Another concern is sensitizing and teaching children and young people from the village. Besides teaching them ways to adequately relate to the environment, it is important that young people and children realize the potential the land has for productive activities, with which they can have a dignified and satisfying life.

But the reality in the community is different. Many young adults move away to work in the towns or cities. More and more, less people work the land or livestock, and children participate less in experiences of this sort.

After the flood, with all the infrastructure works in the region, many abandoned the crops to begin working in construction and bricklaying. What seems so worrisome for the community is what will follow after construction work is over: *“Are they going to return to work the land and find that it is useless, especially because of the drought.”*

Concerns over the long term future exist, regarding climate change and deterioration of the environment. During group activities, people voiced their fears of a negative future for them and their children, the next generation, because of the disappearance of animal and vegetable species, as well as scarce natural resources, in general.

“If things continue in this manner, what are we going to give to our children?”

“Every time, you see that a ravine has less and less water; how will it be in a few years?”

“I fear my son, in time, will not even be able to recognize a faro (large rodent that inhabits the zone).”

On the other hand, they explained that they are vulnerable to unexpected climate changes that may generate another natural disaster. Even though certain measures have

been taken in order to improve the community's responses they are, namely, referring to the capacity to foresee and warn all members of the community of any such similar situation.

"They say it will happen in 50 years, but what if doesn't, what if it happens before?"

"Look, it's really hard for me to get some sleep when it is raining. I think of my house, my children...it really is an enormous feeling of anxiety."

In one group session, in *La Primavera I y II*, women commented on the possibility of creating an alert system within the village. They acknowledged their ability to identify the rising level of water from the river and the sound it makes indicating a dangerous situation for the community. But, they also admitted not knowing what to do in case of an emergency situation such as that.

Not knowing how to respond in disaster situations was a common concern in all three discussion groups and the people interviewed expressed their interest in having the organized community design specific action plans for such cases.

Finally, but extremely important, is the need to rescue traditional local knowledge on the environment as part of an educational program for children and adults. Traditional tales with environmental references, songs, life experiences from families working the land, animals and plants; are all valuable sources of information.

Individuals and discussion groups interviewed agreed on the need to transmit the knowledge base on natural resources of elderly found in the area, their knowledge about the weather, ravines and, above all, the way families used to harvest and raise animals.

"We used to listen to grandparents, who are very wise on how to listen to the river, how to handle the animals and how to harvest the land without damaging it."

This kind of knowledge is perceived as a useful tool in order to prevent and prepare for natural disasters. *“Before, people —just by the way rocks came down from the river— knew what was coming.”*

In this same manner, it is all related to organic crops, that is, the use of “traditional technology” in order to produce without negative effects on the environment. *“In the old days, people did not use any chemicals; when companies arrive to sell us all that, everything else was forgotten.”*

Nonetheless, farmers seem to associate “ecologically friendly” practices to a drop in productivity. The use of chemicals is historically associated to massive crop production. This is why, even though many farmers have received training in organic crop growing, they do not apply such knowledge. The problem, then, is how to keep high crop yields without harming the environment.

CONCLUSIONS

The members of the Guayabal community have identified recent weather changes which have had an impact on productive activities especially in the case of coffee and vegetables harvests.

Although the community members do not have a generalized and systematic knowledge of the causes and consequences of such weather phenomena, some understand that certain global practices have contributed to these changes and many relate them to local negative actions.

Some practices considered harmful to the environment and a “problem” for the community are indiscriminate felling and burning of trees, the use of chemical fertilizers in agriculture and inadequate disposal of organic and inorganic waste.

Several responses have been provided in the face of climate change; immediate individual reactions to consequences brought on by such changes and, on the other hand, strategic responses (preparation and prevention) which involve, on a medium and long term, the participation of community members.

The tragedy experienced by the community in 2005 generated the necessary awareness among its members, which have since become sensitized to environmental issues. The event made evident the direct relation between negative local practices and a reduction of the socio-ecosystem’s capacity to deal with climate changes.

Almost three years later, the tragedy is still a strong indicator that the community must take responsibility for the care and strengthening of the ecosystem. The stories of personal and material losses in the community are a reminder of the importance of preserving the surroundings.

Thus, the organized community has generated and supported proposals which currently constitute an opportunity to reduce the eco-system’s vulnerability; the more known initiatives are related to community control mechanisms in order to impede

indiscriminate felling and fires, as well as the implementation of organic harvesting techniques.

As the community becomes more aware of the implications of climate change, concerns have risen among its members in terms of the future action courses that may guarantee the well being of its members. They made it clear that to promote changes regarding the way productive activities are undertaken they need to promote the safety of the environmental and that of the community.

These changes depend, firstly, on the community's understanding of which routine techniques are harmful to the ecosystem. It is important for them to be able to work with experts that can indicate which techniques may be used and which should not.

It implies modifying the way people perceive their relation with the environment. To date, the ecosystem has been perceived as "tolerant" to any type of human intervention and, in some way, the relation between the community and its surroundings has developed into a strictly productive bond.

What ranchers and farmers expect from the land is to maximize their production capacity at any cost. On the other hand, those who do not depend directly on the land have detached themselves from their natural environment and are now unaware of the meaning these environmental changes may represent.

A notion repeatedly expressed by the people is the return to traditional practices as the best possible action in order to change their way of relating to the environment; return to practices lost when farmers began resorting to chemical products as part of their production methods and people began to work in the cities. The key aspect is the idea that farmers may be able to combine productivity with traditional harvesting techniques.

It seems necessary to develop, jointly with the community, a training program in traditional harvest management whereby the facilitators would be members of the community with have knowledge on how the land was worked earlier on. If feasible, it

is important to “rescue” this way of work “where the land adapts to the production needs of the families in the area.”

At the same time and with the support of the local elderly, an awareness campaign could be sought among the community regarding cultural values derived from local practices. In such case, the emphasis lies in the “conventional knowledge of nature” as a community way of adaptation, preparation and prevention in the face of climate change.

LITTERATURE CITED

Adger, N. (2000). Social and ecological resilience: are they related? *Progress in Human Geography* 24:347-364

Berkes, F. and Jolly, D. (2001). Adapting to climate change: social- ecological resilience in a Canadian Western Arctic Community. *Conservation Ecology*. 5(2):18. Available online at <http://www.consecol.org/vol5/iss2/art18>

C-CIARN. (2004). *Canadian Association of Geographers Annual General Meeting*. Moncton, NB.

Community Project Team. (2000) The Community Resilience manual. *Making Waves*. 10 (4). CCE

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C., Walker, B., Bengtsson, J., Berkes, F., Colding, J., Danell, K., Falkenmark, M., Gordon, L., Kasperson, R., Kautsky, N., Kinzig, A., Levin, S., Mäler, K., Moberg, F., Ohlsson, L., Olsson, P., Ostrom, E., Reid, W., Rockström, J., Savenije, H. and Svedin, U. (2002). *Resilience and sustainable Development: Building adaptive capacity in a world of transformations*. The Environmental Advisory Council to the Swedish Government.

González, F. (2000). *Investigación cualitativa en Psicología*. México: Thomson.

IISD (2003). *Livelihoods and Climate Change: Combining disaster risk reduction, natural resources management and climate change adaptation to reduce vulnerability and poverty*. Canada.

Kasperson , R. and Kasperson, J. (2001a). Climate Change, vulnerability and social justice. Stockholm Environment Institute. Stockholm.

Laffaile, J., Ferrer, C. and Rincón J. (2005). Antecedentes históricos de eventos meteorológicos ocurridos en el valle del río Mocotíes y su impacto geomorfológico. *Revista Geográfica Venezolana*. Número Especial: 297-311.

Martín, B. y Doná, G. (1997). *Enfoque Psicosocial de la Ayuda Humanitaria*. Textos Básicos. Universidad de Deusto: Bilbao-España.

Martínez, M. (2004). *Ciencia y Arte de la Metodología Cualitativa*. Trillas: México

Njeru, E. (2004). Bridging the Qualitative-Quantitative Methods of Poverty Analysis. Available online at: <http://www.saga.cornell.edu/saga/q-qconf/njeruws.pdf>

Resilience Alliance (2001). *Resilience Alliance Program*. Available online at: <http://www.realliance.org>

Ruiz Olabuenaga, J. (1984). *Estilos de vida e investigación social*. Editorial Mensajero: Bilbao.

Schwartz, H. and Jacobs, J. (1984). *Sociología Cualitativa. Método para la reconstrucción de la realidad*. México:Trillas.

Sierra, F. (1998). Función y sentido de la entrevista cualitativa en investigación social. In L. Galindo (Ed). *Técnicas de investigación en sociedad, cultura y comunicación*. Pearson: México.

Taylor, S. and Bogdan, R. (1984/1987). *Introducción a los métodos cualitativos de investigación*. Barcelona: Paidós.

Tompkins, E. and Adger, N. (2004) Does adaptive management of natural resources enhance resilience to climate change? *Ecology and Society* 9(2): 10. Available online at: <http://www.ecologyandsociety.org/vol9/iss2/art10/>

Zambrano, E. (2005). *Informe del Caso Mocotés*. Kis-nacuy: Mérida.