

VARIATION IN COPING WITH EL NIÑO DROUGHTS IN NORTHERN COSTA RICA

By Sarah M. Otterstrom

In a small country like Costa Rica, the same climate event can affect neighboring communities in very distinct ways. In the summer of 1998, following an intense El Niño-related drought, I set out to examine how this event had affected small-scale farmers across northern Costa Rica. Surprisingly, there were large differences in coping abilities between farmers of the Caribbean and Pacific regions despite the overall small spatial scale at which my research was conducted.

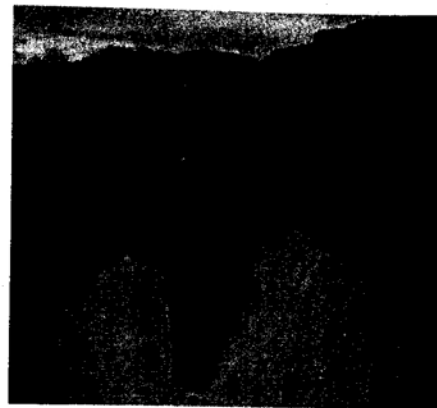
Given its small geographic area and colonial history, with the exception of minority indigenous and Afro-Caribbean populations, Costa Ricans are often considered to be culturally homogenous. Yet, my experience demonstrated that among *mestizo* farmers, strong cultural differences between regions do indeed occur, even across very small spatial scales. Much of the cultural variation observed in this study matches up with boundaries between climate regions where the historical climate patterns that local farmers have experienced across generations has likely played an important role in shaping subsistence practices. Anthropologists working to understand the relationship between climate and society need to learn to recognize fine differences in cultural practices across the landscape. In tropical regions where climate zones can shift dramatically with slight changes in topography, there is a great potential for diverse human responses to climate variability.

The research was sponsored by multiple institutions throughout the region. The Comité de Desarrollo Sostenible (CODES) of the Inter-American Institute for Cooperation on Agriculture (IICA), which has a special interest in the potential impacts that global change and climate variability

have on small-scale farmers throughout Latin America, provided essential logistical support. A grant by the Inter-American Foundation provided financial support for the research, including activities focusing on El Niño education and mitigation planning for the community in the Guanacaste province on the Pacific slope of Costa Rica.

El Niño Effects In Costa Rica

In Costa Rica, the El Niño-Southern Oscillation (ENSO) has historically manifested a strong signal through the occurrence of droughts along the Pacific lowlands. A weaker signal of heavy rains has been observed along the Caribbean slope. At the onset of the 1997-98 El Niño event, the Costa Rican government worked in coordination with the Consejo Regional de Cooperación Agrícola (CORECA) to draft a plan to ameliorate the effects of upcoming drought and floods. Action plans were developed from experiences gained during previous El Niño events where droughts along the Pacific slope posed the principal threat to the region's agriculture and where above-average rainfall only sometimes disrupted production along the Caribbean slope. Nonetheless, planners had not foreseen the unusual conditions of the 1997-98 event. This most recent event was unique in that the same drought that affected the Pacific slope also hit the Caribbean lowland plains in an unprecedented manner. My interviews with farmers throughout northern Costa Rica, suggested that planning efforts were mostly unsuccessful at curbing losses on small-scale farms. Institutional failures were not only due to the unexpected droughts along the Caribbean slope, but more likely because there was little follow-through of the measures to assist small-scale farmers as proposed by the action plans.



Sarah M. Otterstrom

In the summer of 1998, just after El Niño-related drought conditions had subsided with the onset of new rains, I began my research seeking to understand how small-scale farmers of Costa Rica had coped with its impact. During an average year, northern Costa Rica experiences a marked dry season. For the Guanacaste province (Pacific slope), the dry season is normally five months long, beginning in December and lasting until May, while throughout the Caribbean lowlands, in a region known as the Zona Norte, the dry season lasts two months, occurring from January until March. But during the El-Niño year, both Guanacaste and the Zona Norte experienced an extremely long period of drought lasting over six months. Especially in the Zona Norte, small-scale farmers suffered enormous losses to their crops and livestock, and even government organizations were caught totally off guard.

I was first interested in identifying the ways in which government agencies aided small-scale farmers during the drought month. I began my interviews with the officials from the Ministry of Agriculture in the capital city of San José. When asked what actions had been taken, the authorities disavowed any detailed knowledge of them. They

handed over their one and only file containing photocopies of newspaper articles describing farmers' losses and memorandums asking the president to declare a state of emergency. The officials at the Ministry, including the Director of Natural Disaster Planning, denied responsibility for the Ministry's inaction and their knowledge on the matter since they only recently assumed position following the establishment of the new presidential administration in early 1998, when El Niño drought conditions were already at their peak.

While some institutional discontinuity may be expected when a new presidential term begins, this case was particularly unfortunate in that the change in administration occurred at a time when farmers were in greatest need of government intervention and assistance. To some extent, responsibility for failing to adequately follow up the drought mitigation plans, which had been drawn during the previous administration, can be attributed to the reorganization, both of personnel and institutional structures, that was brought about by the political change. This points the important relationship between the realm of national politics and the microlevel impacts of natural disasters, exemplifying how political shifts can have a profound effect on the ability of rural communities to prepare for or cope with disaster, even in areas that are far removed from the political transitions occurring in the capital.

Newspaper articles described tragic losses, mostly in the Zona Norte, where farmers were faced with huge crop failures, and where cattle were dying in large numbers. Given the dire circumstances, the President was forced to declare a National Disaster for both the Zona Norte and Guanacaste in May of 1998. Dry conditions began in both regions in early November 1997. Meteorologists explained that while the drought was severe in Guanacaste as well, its impact on farmers was particularly devastating in the Zona Norte, because a six-month drought was totally unexpected in that area. Missions that came from the capital of San José to

assess the situation also stressed that the severity of the impact was exacerbated by the fact that institutions in the Zona Norte were caught unprepared and that local farmers had no established cultural practices for dealing with a drought situation.

After my brief visits with Costa Rican institutions in San José, I headed out to the hard-hit regions of Guanacaste and the Zona Norte. My objectives were to gain a better understanding of how farmers had coped with drought, how it had affected their livelihoods and in what way the farmers perceived the events to be related to El Niño phenomenon. While it is clear that the drought caused major hardships in both regions, remarkable differences between them in terms of farming practices and attitudes in coping abilities became apparent in the course of the research. I carried out interviews with (both male and female) heads of households with small holdings of less than 15 ha. whom agricultural extension agents helped me identify and get introduced.

Drought in the Zona Norte

Upon entering the Zona Norte, I was immediately struck by the bald hillsides, which were not only denuded of trees, but also devoid of plant life: not a typical scene in the Caribbean lowlands where average annual rainfall is nearly 2,500 mm. At the time of the interviews, the rains had just begun and vegetation was barely beginning to grow after the six months droughts. Grazing tenuously on the new sprouts along the hillsides were an assortment of gangly livestock, emaciated by the lack of forage during the months of drought. Most small-scale farmers who owned cattle had lost at least some, if not all, of their stock due to dehydration and starvation. Several farmers explained that their cattle were now suffering from severe diarrhea because the starving animals had eaten too much and too fast once the grass had begun sprouting back. The losses were particularly distressing since the cattle had recently been obtained through a

small loan program intended to provide local families with dairy products for consumption as well as meat for cash revenue (inexperience with livestock husbandry may have contributed to losses).

Damages were as severe for traditional crops as for newly introduced ones, even if farmers might have had greater knowledge of how to manage the former in adverse conditions. Beans are the principal cash crop for the region's farmers, and nearly all those interviewed reported losses of up to 100% of their crop. Alternative crops that had been introduced in recent years, such as *pejibaye* (heart of palm) and ginger-root, likewise suffered failures due to lack of rain. Adding to the harvest failures, wildfires also spread through dried up wetlands destroying both crops and buildings.

Given the seriousness of these failures and losses, it was puzzling to observe the dearth of attempts to prevent or mitigate them. Admittedly, given that many wells had dried two months before the end of the drought, there was little for farmers to actually do. Besides, as an outsider, it was difficult for me to assess what they should have done, especially given the economic and logistical constraints they faced. Nevertheless, I found their inability to propose and implement solutions disheartening. Farmers admitted that they did not begin seeking aid from the government until losses were at disastrous levels, possibly because of distrust of the government institutions and of doubts about their ability or readiness to provide any tangible assistance.

Most people had heard about the oncoming drought mostly from the news on the radio and television, but had doubted that it would last so long. Given that droughts were uncommon to the region, it was hardly surprising that farmers would disbelieve a drought forecast. In my interviews, they would typically respond that the Zona Norte had only experienced natural disasters due to excessive rain rather than insufficient rainfall. While the Zona Norte is a region of recent agricultural

frontier expansion, most farmers interviewed came from older settlements along the same Caribbean lowlands, where climate conditions are similarly moist throughout the year. For farmers from these humid regions, drought does not hold a space within their cultural memory and therefore responses to drought are not within the domain of their habitual coping responses.

In studying the impact of climate anomalies, I am particularly interested in identifying ways whereby farmers might better cope with El Niño events in the future. When farmers were asked how they could have responded differently and more effectively, most replied that what happened had been God's will. It is plausible that, because drought was so beyond their realm of experience, it defied their ability to both understand its causes and manage its consequences. The only area where they expressed an inclination towards preparing for drought was with respect to forage grasses and cattle husbandry. Several farmers stated that they would like to obtain drought resistant forage grasses from Brazil, which the agricultural extension service had begun promoting after the droughts and was to be provided at no cost by the Ministry of Agriculture (but it is possible that the presence of extension agents during interviews might have biased their replies).

Yet, there were exceptions that contrasted with the prevailing situation of devastation and despair. Two recent migrants to the region that had come from the neighboring Guanacaste province claimed to have been spared the losses other farmers suffered during the drought. Both of them explained that having grown up in the Guanacaste province, where drought was a recurrent event, had helped them cope with the situation. For instance, they had continued implementing practices that were common in Guanacaste and that helped them in coping with lack of rainfall, such as growing supplemental forage for cattle and planting only small plots that could be watered by hand during the dry season.

Drought in Guanacaste

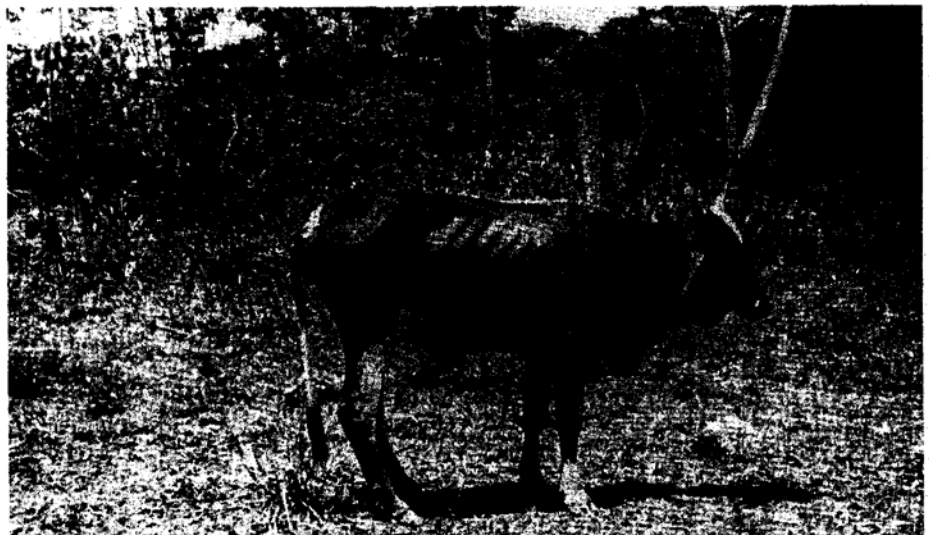
Guanacaste was the second region where I conducted research. Guanacaste is only a short distance from the Zona Norte, but is separated by the Guanacaste volcanic range that is 2,000 meters high, creating a climatic zone division. The Guanacaste province is subject to a monsoon climate regime, where even in the absence of an El Niño event, extremely dry conditions persist for almost six months of the year. Native vegetation exhibit adaptations to these conditions, through deciduous leaves and thick bark. Farmers and communities have likewise developed adaptive behaviors to cope with drought. For instance, unlike the Zona Norte, most communities in this area have more than one well so that when one goes dry, an alternative source of water for human and animal consumption is available.

Although the El Niño drought in Guanacaste was more severe than what was experienced in the Zona Norte, it was not as devastating to farmers since a marked dry season is consistent with normal weather patterns and farmers already have a repertoire of ways for mitigating the impact of drought. For example, farmers who own cattle cultivate hay and sugarcane that could

supplement available grasses during the long dry season. Farmers also sell as much as half of their cattle early in the dry season to avoid the cost of feeding them during such period.

Assessing drought-related damages in the Guanacaste province was more difficult compared to the Zona Norte. This is because in the latter farmers could estimate their losses in terms of crop output (i.e. half of their rice, all of the beans, etc.), while in Guanacaste, they had not planted yet during the months of the drought. The major impact there was due to the delay in planting caused by the unusually extended dry season, which meant that farmers were unable to realize two planting cycles as usual. But when asked to quantify their losses, Guanacaste farmers only described their losses according to what had been planted, but not according to what was lost for not being able to plant two full crop cycles.

In Guanacaste, farmers do not normally plant crops during the dry season, but they take time to engage in cash earning activities. Irrigated sugar cane and rice plantations located nearby provide important sources of employment for harvesting. Farmers also derive food and income by fishing in nearby coastal or peninsular waters. On



Emaciated Cattle in Zona Norte Two Months after the End of the Drought

the other hand, few opportunities for employment exist in the Zona Norte, where farmers face competition by Nicaraguan immigrants who are willing to accept lower wages to work on the existing plantations. Farmers in Guanacaste also take advantage of the dry season to rest and to engage in social and cultural activities. For instance, in most Guanacaste communities, patron saint festivals take place during January and February when they have less work to do on the farms.

Understanding Variability across the Landscape

Differences in coping abilities between the Guanacaste and Zona Norte areas could partially be attributed to differences in forecast dissemination, particularly their lead-time and the accuracy of initial forecasts. The Costa Rican Meteorological Institute disseminated the forecasts via television, radio and newspaper reports during the early months of the phenomenon. Forecasts issued in September 1997 announced the drought conditions that were to begin in October for Guanacaste and November for the Zona Norte. National media accounts focused on the potential El Niño effects throughout Guanacaste province and Pacific Central region, but little attention was given to the Zona Norte. The official Meteorological Institute forecast issued in September of 1997 via the internet (which however is unlikely to reach farmers) had correctly called for drought in Guanacaste, but was inaccurate for the Zona Norte in that it called for an above-average rainfall in the Caribbean lowland plain areas. Meteorologists had used historical data from the sparse weather stations surrounding the Zona Norte to develop their forecasts for this particular event. They had only one station located within the Zona Norte on which to base their forecasts. Although failures in forecasts could be attributed to the insufficient number of weather stations and short weather record, meteorologists also pointed out that imperfect forecasts can always occur, especially given the unusual magnitude of this El

Niño event. The forecast for above-average rainfall for the Zona Norte was not corrected until January 1998, at which time a forecast for drought conditions was issued.

Meteorologists also carried out workshops aimed at explaining this climate phenomenon and its corresponding forecasts to farmers in each of the countries regions. According to CORECA officials, farmer participation in these workshops was high, but the number of workshops conducted was probably insufficient to educate a representative portion of the rural population. Workshops were mainly aimed at explaining the phenomenon and its effects on weather in Costa Rica and did not focus on providing farmers with potential coping strategies. No particular efforts have been made to reach the poorest farmers: rather participation seemed to favor the better-off. The only farmer among those I interviewed who had participated in these workshops was also one of the wealthiest among them. After the workshop, he was able to put into use the information acquired by building water wells for farm use. A more extensive educational program that is directed at farmers across all economic classes and that addresses coping strategies as well as the meteorological aspects of phenomenon could greatly improve farmer preparedness for climate anomalies in the future.

Despite differences in forecasts between the two regions, my discussions with farmers indicate that actions taken responded to their own assessments or prior experience with drought rather than to the forecast itself. Farmers often said they knew about an El Niño from the radio or television, but they perceived what they were experiencing on their own farms as a separate and independent event from the phenomenon that was occurring and causing catastrophes around the world. Farmers would mention El Niño in reference to disastrous floods in far-off places like China, but they would talk about their experience with the drought without making the connection with El Niño.

It is no wonder then that farmers do not perceive local weather dynamics to be the result of complex global phenomena. Farmers have an in-depth understanding of climate patterns at the local level, for this is the scale of their experience. Some farmers used their own forecasts, based on signals in their surrounding environment to predict the end of the drought. Their forecasts used indicators such as bird calls, cloud density over the volcano tops, monkey behavior, and wind patterns to determine the timing of weather shifts. Not surprisingly, knowledge of local forecast methods was more elaborate in Guanacaste, where farmers annually await the onset of rains in order to begin planting.

Farmers in the two zones responded differently to scientific forecasts. Of the twenty-four farmers I interviewed in Guanacaste, twenty said they had known that there would be a drought, and four had heard of the drought forecast but had not believed it. Most of those who had known about the drought indicated that they had heard about it through the radio and television broadcasts. In several cases, farmers indicated that they knew about the drought based on their own forecasts. In the Zona Norte, there was a greater variation in response. Seven farmers said they had known there would be a drought, eleven said they had heard the drought forecasts but did not believe them, and three claimed to have been completely taken by surprise by the drought. Many of the farmers in the Zona Norte also said their information came through the news media. Given that the official forecasts were not adjusted to call for dry conditions in the Zona Norte until January, it was not clear whether they interpreted drought forecasts for the Pacific slope that were broadcast through the national media to also apply to the Zona Norte.

Attitudes towards the drought also differed between the two communities. When discussing the El Niño drought, Guanacaste farmers commonly used the word "*verano*," that is a regular season of the year, as opposed to the term "*sequía*" or drought, that is an

anomalous (deficit) event, which was more commonly used by those of Zona Norte. Guanacaste farmers described this particular dry season as one of the worst in the last twenty years for both duration and intensity of the heat, but certainly not the worst they had ever experienced in their lifetime.

Guanacaste farmers mentioned that droughts were a relatively common occurrence in the area, while, while Zona Norte had no recollection of a similar event. For them, floods rather than drought was a normal part of life.

Although one might be inclined to relate variation in coping ability on educational and economic differences between the two regions, it should be noted that farmers from the Zona Norte had more education and access to land than those from Guanacaste, who nonetheless prepared and coped better with the situation. Farmers in the Guanacaste region had a significantly lower education level, at an average of one-or-two years of primary education, while farmers from the Zona Norte averaged four years of primary education. While most Zona Norte farmers had private ownership of their lands, many farmers in Guanacaste were involved in cooperative farming or renting. One might hypothesize that landlessness has induced Guanacaste farmers to develop social networks to better cope with seasonal scarcity and natural disasters. For instance, cooperative members in Guanacaste mentioned sharing surplus grains among families who belonged and alternative wells on cooperative farms were available for use by all families during the crisis. By contrast, in the course of interviews in the Zona Norte, farmers lamented the lack of cooperation among neighbors during the crisis.

One factor that may have also given Guanacaste farmers a marked advantage over those from the Caribbean slope, was their greater access to cash. Many of the Guanacaste households had family members working in the capital city, while this was rarely the case for those in the Zona Norte. Moreover, unlike Zona Norte, Guanacaste province

has experienced considerable development from the tourism industry. Although there are large rice and orange plantations throughout the Zona Norte, these are also dependent on climate conditions and they provide little employment to local communities because they mostly use cheaper immigrant labor. Improving the region's economic development to include activities that are non-climate dependent could potentially increase alternative sources of cash income for rural households and thereby their ability to cope with climate variability.

Conclusions

This case study has important implications both at practical and theoretical levels. Because of their experience of direct interaction with farmers and observation of field conditions, anthropologists can make a substantial contribution to enhancing drought preparedness and coping strategies. Based on my experience working with farmers of both Guanacaste and the Zona Norte, I would recommend that on-farm water conservation and reforestation along watersheds be priority domains of intervention. Farmers may also benefit from the introduction of drought resistant crop varieties and improved animal husbandry by government extension and NGOs. For instance, farmers could be trained in monitoring dehydration in animals and in growing and storing forage. The Ministry of Agriculture has already begun distributing several exotic drought resistant forage grasses as a preventive measure against future droughts. However, the potential ecological ramifications of such measures also need to be carefully considered.

Outside of farmers' domain of operation, attention has to be directed to improving the accuracy, the diffusion, and the understanding of forecasts, which would improve their reception by farmers. Expanding the network of weather stations to include previously neglected areas, involving agricultural extension agents in delivering forecasts

to farmers in remote area and from all economic backgrounds, and increasing participation in educational workshops would contribute to moving in this direction. This may call for a reallocation of resources within the Ministry of Agriculture, to enable regional level offices to adequately train and equip extension agents for this task.

At a more theoretical level, conducting research in two regions, both of which were affected by the drought but whose communities demonstrated completely different responses also enabled me to understand some subsistence and farming practices as adaptive to drought rather than as normal characteristics of the cultural landscape. Cross-regional comparisons, at a variety of scales, can give social scientists insight into how climate variability can affect regions differently depending on the coping experience and capability of various groups.

The extent to which a community is able to cope with climate variability will depend in large part on the normal climate regimes to which they are accustomed and the frequency at which anomalous climate events occur. Anthropologists can make an important contribution to climate research and policy making by identifying those regions that are less culturally and materially equipped to deal with certain kinds of climate anomalies, that is areas for which such anomalies fall outside of farmers' realm of experience and cultural memory, and where adaptive practices and attitudes have not developed.

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