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Care for the Soil and Live Respectfully: A Cultural Model of Environmental Change in Andean Northern Ecuador

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Background and Site Description.

A decade ago, farmers interviewed in northern Ecuador listed climate change as the most prominent factor affecting changes in agriculture in the early 21st century (Campbell 2006). Indeed, glaciers on Mt. Cotacachi that rises above their farms stopped being permanent sometime between 1997 and 2004 based on longitudinal aerial photographs (Rhoades, Zapata Rios and Aragundy 2006). Since our interest in this project is in how weather, climate and environmental change are interpreted through the demands of daily production activities, this perception of, and concern about, climate change makes this group of people an interesting focus for research on cultural models of nature.

In the Cotacachi area, indigenous and non-indigenous smallholders mainly intercrop corn and pulses, and also grow potatoes, alfalfa for hay, peppers, and squash for household use and sale, a few pigs, cows, sheep and goats, as well as some vegetables and citrus for household use (see Figure 1). Up higher on Mt. Cotacachi, people pasture their animals and grow wheat and barley. Just under half of smallholders have access to irrigation for their fields, based on a survey by the local Peasants and Indigenous Association (Skarbo and VanderMolen 2014). Farmers are losing some traditional crops, while adding some crops (Skarbo 2006) like Cape Gooseberry for making raisins for urban consumption and export, plus quinoa.



Figure 1. A typical, small herd of cattle pasturing in a plot along a fence on the side of Mt. Cotacachi.

The current research involves a single village to the north of the city of Cotacachi in the state of Imbabura in north-central Ecuador. The village stretches westward up the slopes of Mt. Cotacachi from close to the north-flowing Alambi River. The lar-

ger canton or county of Cotacachi lies between the two Andean ranges in a valley 2500 km above sea level in north central Ecuador, where average temperatures have historically had a narrow range, yearlong, at 15-20 degrees Celsius. The region was conquered by the Inka, but not much later was conquered and settled by Spaniards in 1544. The city of Cotacachi itself currently has around 9,000 residents, and is known for its colonial architecture, its leather crafts, the annual festival Inty Raymi, and as a tourism destination due to its crafts, colonial architecture, and farm-dotted landscape between two dormant volcanoes an hour and a half north of Ecuador's capital city Quito.

This research occurred as part of the project "Cultural Models of Nature across Cultures: Space, Causality, and Primary Food Producers".¹ The project conducts research in over a dozen countries, with at least one investigator per country, to understand how primary producers understand nature and environmental change. One basic assumption of the project is that human agency in nature has spiritual, moral and behavioral facets. While each investigator is using the same data collection techniques, the interests and concerns of the people resulted in different coverage of the topics in each country. In Ecuador, what was most important to the informants was how much more difficult agricultural production is these days compared to the past.

As a precursor to the current research, I was part of the multi-year interdisciplinary Sustainable Agriculture and Natural Resource Management-Andes project from mid-1990s to mid-2000s led by the late Robert E. Rhoades. In that work, we compared Andean Cotacachi with other human-inhabited ecological zones in terms of people's perceptions of the landscape and the role of migration in creating rootedness and agricultural continuity (Rhoades, Martinez and Jones 2002; Flora 2006; Jones 2002). We found a type of rootedness in Cotacachi that was associated with circular migration, compared to the stepwise and chain migration to the Ecuadorian agricultural frontier, and the permanent outmigration from a relatively densely populated rum-producing rural area that had been an agricultural frontier a generation before the other one. The type of connection to place in Cotacachi appears to be associated with a strong and salient beliefs about various facets of the biophysical environment, which subsequently led me to choose this site for the current study on cultural models elicited by environmental change. As one of the 12 sites we studied in order to understand how local cultural models of nature were involved in interpreting ecological changes, a 40-home village outside of Cotacachi represents agriculturalists who speak a non-dominant language and who have lived in a place for hundreds of years.

Methodology

Data Collection. A resident of the village Alambuela and I conducted this research with Quichua-speaking farmers in Alambuela near the city of Cotacachi. We conducted interviews about daily activities—particularly related to food production—with 23 individuals from different families out of the roughly 40 households. All of these families engage in farming activities, although farming is not the only productive activity for some of the families. We stratified the sample by the following character-

istics and attempted to have equal numbers of each: irrigated and not irrigated, young and old, male and female, and smaller vs. larger landholdings. These are relevant for the following reasons:

- irrigation is likely to be affected by climate-induced hydrological changes (Viviroli et al. 2010), and because water distribution is unequitable;
- age is a proxy for cosmopolitan interests, greater desire for cash/money, and loss of ecological knowledge;
- gender is a basis for a moderate division of labor in agriculture in this area, plus men are more likely to work off-farm for pay;
- land size is a proxy for degree of financial investment in agriculture and also for financial resources for dealing with change.

In order to access explicit knowledge (e.g., facts, details, stories), as well as implicit knowledge (e.g., general perceptions, senses of things) and unconscious knowledge, our research into cultural models of nature employs several data collection techniques. This report only contains data collected through the semi-structured interviews. The team members used the semi-structured interview guide in each of the sites, but tailored the interviews to follow up on issues important to locals as well as additional interests of the investigators in each site. My colleague conducted all but one of the interviews in Quichua, and I conducted the other interview in Spanish. We digitally recorded the interviews, and my colleague also transcribed the interviews and translated them into Spanish so we could compare our understandings of their responses.

Data Analysis. To capture the most important facets of these Cotacacheños' understanding of environmental change, I conducted thematic and causal analysis. I counted themes present in the interviews. I mainly counted themes from the questions covering changes and challenges in agriculture, the effects of weather changes, the nature of weather changes, and agency of humans. For any identified theme, I counted each individual a maximum of once per theme; thus, the maximum count for each theme being expressed is the same as the total sample size (n=23). I mainly report on themes counted among at least 10 of the 23 informants. In a few cases, to be illustrative, I included some subthemes that are not present in 10 or more interviews when the overarching theme was present in at least 10 interviews.

The sections "Perceived Environmental Changes" and "Local Interpretations of the Changes" are the more descriptive parts of the manuscript in an attempt to report summary data without my interpretation. The sections "Hypothesized Cultural Model of Nature" and "The Structure of Causality" rely on my analysis of these data in seeking to capture a cultural model and to synthesize the major causal statements made by the informants.

Perceived Environmental Changes.

Without fully defining what is part of the environment in the minds of these Quichua-speaking highlanders, I want to note that environment is my analytical concept, not theirs, and that we sought to get them to talk about—in relation their agricultural activities—how they think about the six pre-selected domains of in-

terest to our larger comparative effort, which were plants, animals, weather, landscape features, supernatural, and people. Through the semi-structured interviews about agriculture and the changes in their lives, the broad kinds of things about which they talked were weather, plant/animal pests, people (knowledge, labor, symbolic activities), chemicals, soil, fire, the mountains (dormant volcanoes), and the wild grassland on Mt. Cotacachi.

In discussing changes in agriculture and problems with these changes, people's dominant focus was that the soil no longer produces like it used to, with a few people more graphically referring to the soil being worn out or tired. Thinking of production somewhat more broadly, and including this concern about soil, people noted changes as:

- soil has decreased in productivity;
- a greater lack of water;
- more extreme weather (heat, cold, rain, wind each mentioned several times);
- an increase in microbial and insect pests;
- and shifts in the timing of the weather.

Local Interpretations of the Changes.

When the interview conversation covered why these changes were occurring, the informants provided a variety of answers but almost exclusively regarding human behaviors. Again, these are approximations or summaries of the informants' statements rather than interpretations of mine.

Human Agency in Environmental Change. Factors producing environmental change include:

- cutting down trees that would otherwise hold back desertification;
- burning trees and grassland and crop residues, which all protect soil moisture;
- factories and cities are polluting the planet;
- the use of agrochemicals poisons humans, animals, soil and water, although agrochemicals are beneficial by supporting good levels of production.
- people are disposing of waste and garbage into the waterways and on the ground.

Interviewees also discussed the more moral side of human agency in environmental change. This is what I characterized in the title as living respectfully. "We are to blame," or some version of this refrain, was offered by almost everyone in the sample as to why climate and other environmental changes were occurring. Not everyone characterized this moral blame in the same way, however. More specifically, a few to several people claimed each of the following were at play in the environmental changes they were experiencing:

- we have been lazy;
- we are egotistically doing whatever we want;
- we are teaching children poorly;
- we are getting on poorly with others;
- we have not been treating mother nature well.

While less than 10 people stated so, I also found it worth noting that a few people said, “only our God knows why these changes are happening.”

Hypothesized Cultural Model of Nature.

This cultural model relies on analysis of the data from the semi-structured interview, particularly utilizing those sections of the interview discussed above. These are the primary cultural truths to the people of this village, at least in relation to the way they talk about their daily lives and the food production that daily life entails.

1. Humans depend on nature, but specifically humans are given everything by Mother Nature and/or God;
2. Mother Nature responds to care of the earth, but specifically soil must be recharged and cared for and respected;
3. God responds to care of the earth and right living;
4. Sometimes Mother Nature and God are the same, sometimes they are not;
5. Taking care of family is the most important reason for living;
6. This specific region is protected by Mother Mt. Cotacachi and Father Mt. Imbabura;
7. Agricultural production is untenable, unlike in the past;
8. We are to blame for the situation with agriculture and nature.

The cultural model suggests not only causality, as taken up in the next section, but it also indicates some potential overarching dimensions of importance. One dimension is that of ‘give and take.’ People take from Mother Nature, the soil, and God, and they give back through respect, ritual and soil-enriching practices. Another potential dimension of the model is that of ‘wet and dry.’ Seasons are categorized by wet and dry, and great attention is paid to the timing of the rains, the shift in their timing, and the amount of rain that falls.

One of our goals was to capture how plants, animals, landscape/non-biological features, weather, supernatural beings/activities and people interacted within and/or outside of nature. In other words, which of these things are in nature and which are outside nature. These six domains are ours as scientists, and used to improve the systematicity of the research such that even coverage occurs in each of our sites. My preliminary understanding is that plants, animals, landscape and physical entities besides celestial bodies, all weather, some spirits, and rural-dwelling humans are inside nature. Some saints and bogie men-type spirits probably lie outside of nature, and it appears that urbanites are also considered as outside of nature. The next section deals more directly with the relationships between the specific players in these six domains.

The Structure of Causality

Taking the themes from the above sections on environmental changes and people’s perceptions of those changes, I created a summary graphic of the causal relationships (Figure 2). The soil is affected by lack of water—because of burning crop residues and cutting trees and lack of organic matter because of burning—and the soil is affected by pollution. Factories and pollution seem to be cited to some degree

as part of the more global dialogue on climate change, but also based on the idea that people are disrespecting the earth, Mother Nature and soil through pollution. However, agrochemicals are cited directly as killing microbes in the soil through pesticides, reducing organic matter through herbicides, and more generally poisoning the soil. Finally, both the timing and the extremeness of weather have changed. These may or may not directly affect soil fertility to the informants, but are noted as decreased output—some say because their prior farming knowledge is now less useful because of the changes.

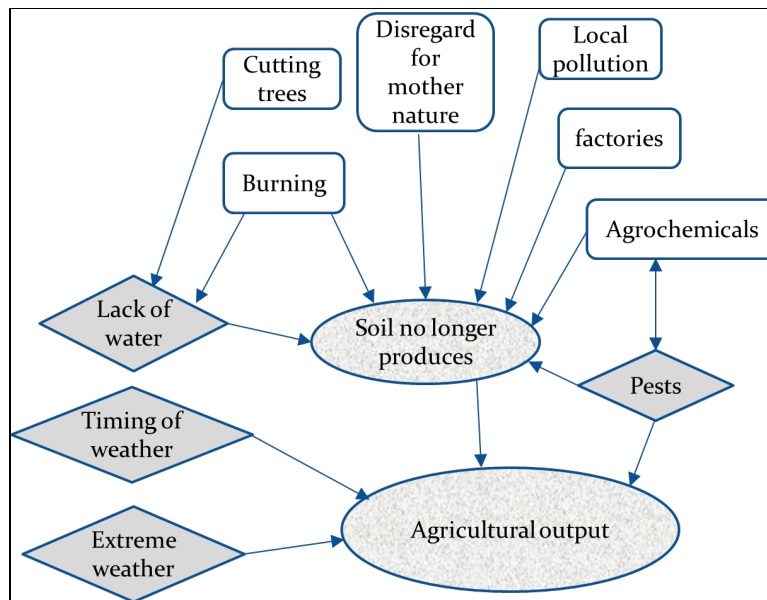


Figure 2. Graphic Model of Causal Relationships.

Human behaviors (in white rectangles) larger impact soil productivity. Soil productivity is accompanied by nature's generation of water, temperature and pests (grey diamonds) to impact people's food production.

Following on the model of causal relationships, my goal was to create a very general understanding of how people viewed the relationship between the six domains of animals, plants, other environmental things, weather, supernatural and people. I subsumed each of the enclosures in the above model into one of these six domains, and collapsed the duplicative lines/ties between domains into a single line. Since the six domains are the scientists' domains, I have altered the domains in Figure 3 to fit local conceptualizations by splitting the spirit world into two parts (God and Mother Nature), splitting humans into two parts (rural dwellers and urbanites), and lumping plants and animals together in Figure 3, resulting in seven locally-responsive domains (i.e., enclosures) instead of the scientific six chosen for our comparative project.

Having both God and Mother Nature seems to fit with another aspect of the local cosmo-vision—that the region is protected by the volcanoes Mama Cotacachi and Tata (father) Imbabura. This parallel between parental male and female gods and the mother and father volcanoes reinforces people's emphases on parenthood and caring for family. The split between urbanites and rural dwellers does not result in a

shared duality that is displayed by the gods, however. These rural dwellers did not make any connections between themselves and the people who live in big cities—even though many of the people who live in big cities are family members, and even though there is a tradition of circular migration to and from the cities as well as a tradition of commuting to the nearby city of Ibarra.

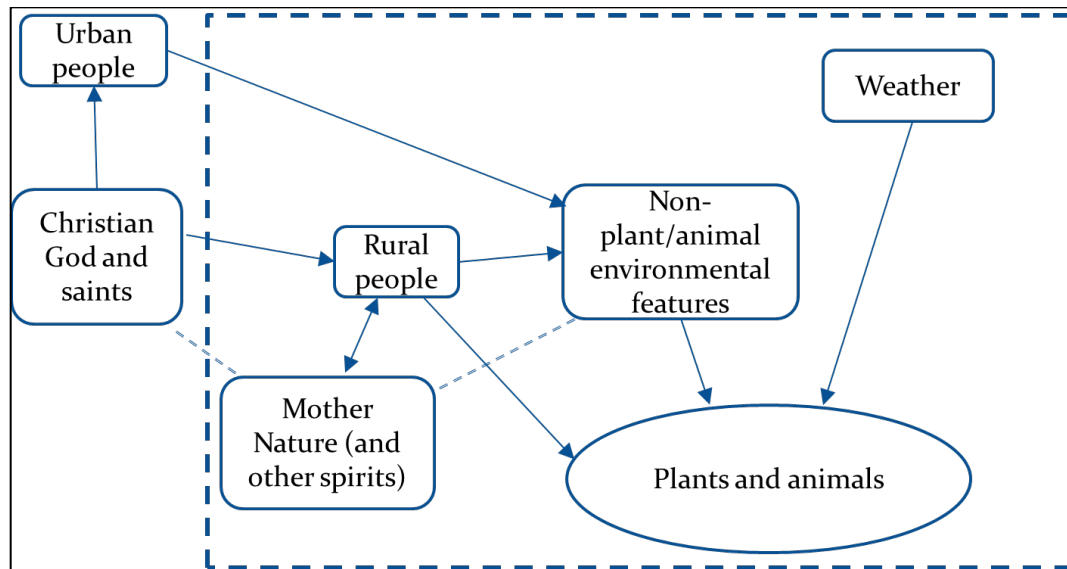


Figure 3. Summary Cultural Model.

Depicted are the relationships between the general domains of nature based on the causal logic in Figure 2.

My analysis of the interviews leads me to think that the local cultural model holds that urbanites and God are often outside of nature. However, sometimes God and Mother Nature seem to be one-and-the-same to some of the interviewees (designated by the dotted line between them). Additionally, God provides for people, which might make this deity part of nature in some ways. I did not connect Mother Nature with the other entities of plants, animals, and weather, as Mother Nature is often equated with the soil and the earth (thus the dotted line) and thus influences the plants and animals through the soil and earth. Weather did not seem to be related to Mother Nature much, and thus it stands on its own. Mother Nature is not equated with humans in the same way that Christians sometimes say that God is in people. They do see themselves as part of the earth and as part of nature but Mother Nature is not in them, she is never manifest in people.

Conclusion

This hypothesis of a cultural model contains both 1) causality that occurs in nature, and 2) dimensionality of the essence of life. At the foundation of this research—of exploring these domains—the question was: In the minds of our informants, can nature exist without each of the six domains we chose. In this case, preliminary results suggest that nature can exist without cities, and nature can exist with the Christian God. This splitting of the spirit world between Christian spirits and

Mother Nature (and other spirits), as well as the splitting of humans into urbanites and rural dwellers undoubtedly creates some cognitive dissonance, and may partially be influenced by the common Christian and Western/urban dualisms. However, these differentiations between kinds of spirit worlds and kinds of human worlds also gives the opportunity for people to be able to switch from one life to another, or to identify their existence with the cultural model that is convenient or appropriate at a given time. This perhaps occurs in many or all societies, but may also be indicative of the social and ecological changes these informants are experiencing.

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Note

- 1 The project is led by Giovanni Bennardo, but the specific award for the Ecuador portion of the research is NSF-BCS 1330070.