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PASTURE PREFERENCES: THE ECOLOGY AND ECONOMICS OF ANDEAN FARMERS' DECISIONS

What drives farmers' resource management decisions in fragile marginal environments? Are the subsistence activities of small farmers in tropical regions a major threat to tropical biodiversity? Can environmental and livelihood goals be reconciled and directed to preserving natural resources?

Early conservation initiatives often offered prescriptions for preservation that disregarded local people's needs and constraints. At times humans were seen as the main threat to biodiversity, with farmers taking a large share of the blame. Scientific arguments have been invoked as a rationale for regulating access to and use of natural resources by the state or other external agencies, to the exclusion of local stakeholders. But restrictions imposed in the name of environmental values are often resented and resisted by local people who depend on the land for their livelihood.

Effective programs to protect and/or improve environmental sustainability call for the full participation and commitment of local communities. As a first step, it is imperative to understand the reason why resource managers engage in land use practices that are assumed to be unsustainable as well as to test those assumptions in scientifically rigorous ways.

This brief illustrates how ethnographic research can provide insights into the criteria and processes that shape farmers' resource management decisions. The study focuses on selection of pasture grass species among Andean farmers in the SANREM CRSP Ecuadorian site. An analysis of farmers' statements indicates that their choices are the outcome of rational calculations that balance resource constraints and livelihood needs, and that the latter are not incompatible with maintenance of ecosystem functions.

BACKGROUND

The research setting is the Andean piedmont of Ecuador, and includes four communities Palmitopamba, La Perla, Playa Rica, and Chacapata in the Nanegal Parish, north of the Ecuadorian capital, Quito. The topographic complexity of the region creates varied climatic

ABOUT SANREM CRSP

SANREM's mission is to assist in the analysis, creation and successful application of decision support methods, institutional innovations and local capacity approaches to support participatory sustainable agriculture and natural resource planning, management and policy analysis at local, municipal, provincial and national levels.

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zones, providing the conditions to which make Ecuador one of the most biologically diverse countries in the tropics. The Nanegal area lies within the buffer zones of 4 major ecological reserves, which support dozens of endangered species of mammals and birds.

However, this rich biodiversity heritage and ecosystem integrity are being threatened by logging of primary tropical forests and by conversion of forest to farmland and pasture. SANREM data on land use shows that in 24 years, total forested land in the region has dropped by 40% and land in pasture has tripled. This conversion process is problematic because all land that is suitable for crop or livestock production is currently being used. Hence, expansion is only possible in fragile marginal lands, which could have negative ecological impacts.

Furthermore, local livestock pasture systems utilize several grass species, among which is a species of tussock grass (*Setaria sphacelata*) imported from Africa and locally known as *pasto miel*. Conservationists have claimed that *Setaria* exacerbates the problem of forest to pasture conversion by blocking both natural regeneration and hindering planned forest restoration efforts via its ability to out-compete native species. In addition, they have expressed concerns that *Setaria*'s poor nutritive quality induces farmers to clear more land and increase herd size to compensate for the reduction in milk and meat production.

METHODOLOGY

The methodology relied mostly on focused informal interviews, complemented with secondary data collections and analysis of SANREM land use data. A total of 36 interviews were conducted with 29 informants, selected on the basis of casual field encounters. Interviews revolved around a standard set of questions, which evaluated the following:

* Size of farm and how land was divided among crops
* Size of pasture areas and species of grass utilized and criteria used in making that decision
* Species of animals grazed on pastures, with what frequency and rotation schedule
* Estimated weeding schedule for pasture
* Estimated rate of milk production per animal and/or per hectare

RESEARCH FINDINGS

The primary source of livestock feed in Nanegal is pasture grass. Diversification of pasture grass use is a key strategy for reducing risk from pest outbreaks and climate variability and the work burden associated with maintenance of pastures. In fact, the large majority (94%) of farmers use two or more species and two thirds (62% used at least three species of grass in their pastures. Most preferred species, (except for *Escobilla)*, are non-native. But a preference ranking exercise revealed that the species used by most farmers are not necessarily those that are most preferred. For instance, *pasto miel*, which is used by most farmers, was ranked only fourth among preferred grasses (see Table 1).

Table 1: Preferred pasture grass species

Grass species	Scientific name	% farmers using (n=29)	Ranking
Elefante	Pennisetum purpureum	58	1
Brachiaria	Brachiaria decumbens	42	2
Gramalote	Axonopus scoparius	39	3
Pasto Miel	Setaria sphacelata	89	4
King	-	28	5
Saboya	-	17	7
Escobilla	Sida rhombifolia	9	6

Table 2: Criteria for pasture grass species preference

Criteria	% farmers using (n.29)	Ranking
Production (milk/beef)	91.4	1
Weeding frequency	82	2
Resistance to disease/insects	63	3
Availability/cost	53	4
Time to establish pasture	52,4	5
Resistance to drought	47.5	6
Production (forage)	23	7
Digestibility	9.2	8

Farmers explained their preference for different types of grass in terms of various factors (Table 2). Among them, economic motives, relative to revenues and expenses, were ranked highest. For instance, weeding frequency is a key factor affecting the profitability of the enterprise since labor is the main operating cost in pasture development and maintenance. To contain expenses, most farmers do most of the work themselves, with the help of family members and exchange labor groups. Wealthier farmers hire laborers and some large landholders engage caretakers (*cuidadores*).

Establishing and maintaining pastures is very labor intensive. First, if one does not already have forested land, it must be acquired through either purchase or lease.

Farmers are aware of pasto miel's role in eroding the productivity of livestock pasture systems, particularly daily milk production.

Then trees and vegetation must be cleared, and pasture grass planted. Pastures are mostly planted by hand from 'starts' – clumps of grass and roots taken from established pastures of the same species, although some wealthy farmers plant from seed.

While planting pastures is a one-time cost, weed control calls for recurring expenses. Weeding is done by hand with a machete: on average it takes one man 15 days to weed 1 ha of pasture. Depending on various factors (species, weather, work quality, proximity to forest, number of animals, duration of grazing, time of year, shade tree retention elevation, slope, orientation of pastures) pastures may need weeding from 1 to 10 times per year. It is not surprising, therefore that farmers opt for a grass like *pasto* miel that has low weeding requirements. The cost of weeding other pasture grasses is at least twice (or three and a half times in the case of King and Elefante grass) that of weeding *pasto miel.* Therefore, the main reason farmers use *pasto miel* is that it represents a considerable savings in labor and money.

Table 3: Average reported weeding frequency per grass species

Pasture grass species	Average weeding interval (wks)	Average times weeded (per yr)
Brachiaria	9.8	5.3
Elefante	6.2	8.4
Gramalote	6.7	7.8
King	5.9	8.8
Pasto miel	20.9	2.5
Saboya	6.4	8.1
Average	8.25	6.8

While *pasto miel* needs to be weeded far less often than other grasses, it does have to be weeded, contrary to the belief professed by several studies that its dense, cover excludes new growth of other species (Table 3). At first, most (87%) farmers interviewed said they used *pasto miel* because they 'never' have to weed it. But field observations and further prompting revealed that 'never' was meant a relative term, when comparing the infrequency of weeding *pasto miel* with the weeding requirements of other species. When the question was reformulated as "how often do you weed *pasto miel?"* the number of farmers who reported never weeding *pasto miel* fell to 8%. The fact that, if left unattended, even *pasto miel* pastures would be overtaken by weeds and brush raises the question as to whether it prevents or simply delays natural regeneration. Clearly, more research is needed to test these hypotheses.

Farmers are aware of *pasto miel*'s role in eroding the productivity of livestock pasture systems, particularly daily milk production. Most farmers (88%) said that using *pasto miel* lowers milk production by one to two liters per day. This is a considerable disadvantage given that most farmers who rely heavily upon the daily cash flow generated by milk sale. Cash on hand is limited, household capital being mostly invested in property and livestock. A comparison between *pasto miel* and *Brachiaria* (which also has the second lowest labor requirement among common pasture grasses) shows that, for most farmers, the loss in milk revenue offsets the labor savings ensured by *pasto miel.*

The negative balance was greater for small landholders (with an average of 5 ha), while for large landholders (with an average of 20 ha) *pasto miel* retained a small advantage. But wealthy farmers, who originally introduced *pasto miel* in the region as a way of containing operating expenses, are less dependent on milk sales for revenues. Therefore, despite the reduction in milk production, they can take advantage of *pasto miel* to reduce labor costs.

Due to the decrease in daily milk production that results from *pasto miel* use, 81% of the farmers interviewed reported their intention to shift to other grasses as soon as time and money allowed. An increase in local milk prices was inducing even the large landholders to

reconsider their use of *pasto miel*. Overall, very few farmers anticipated planting more *pasto miel* on their lands.

Conservationists' fears that farmers may decide to clear more land and increase herd size to make up for loss of revenue caused by the low nutritional value of *pasto miel* seems to be exaggerated in light of information elicited during fieldwork. In fact, very few farmers have the necessary resources for clearing new land and increasing herd size, given that it takes a lot of work to develop and manage pastures and given that the average price of one cow exceeds 40% of yearly household income.

Analysis of land use data in the SANREM CRSP site challenges the assumption that establishment of pastures accelerates soil erosion (Calispa and Castillo 2001). The evidence shows that erosion rates in pastureland are far lower (10 t/ha/yr) than those for land cultivated with short cycle crops (100 t/ha/hr) and with sugar cane grown with chemical inputs (and 80 t/ha/yr). Erosion from pastureslands appears even lower than for primary forest (20 t/ha/yr).

CONCLUSIONS

This study of pasture selection decisions in Nanegal showcases the potential of ethnographic methods in understanding natural resource management by rural producers. It also shows that researchers should avoid taking respondents' statements at face value. Rather, triangulating information by reformulating questions and comparing data from different sources seems to yield more reliable data.

The research points to the need to decipher the motivations behind farmers' strategies and to identify the resource constraints that limit their options. In this case, lack of labor and capital lead to decisions that curtail the profitability of pasture livestock operations as well as farmers' ability to expand such operations.

Farmers' responses and field observations also suggest that *pasto miel* use may not constitute the serious threat to the integrity of the Andean landscape that have been previously assumed. Besides the above-mentioned constraints to expansion, there are indications that *pasto miel* may slow down but not prevent natural regeneration and that permanent grass coverage protects pasture land from severe erosion.

Reference

Calispa F. and M. Castillo. "Sustainable Agronomic Management of Sugar Cane in a Fragile Tropical Landscape" in Rhoades ed. 2001.

This brief draws from an article by Bret Diamond in *Bridging Human and Ecological Landscapes: Participatory Research and Sustainable Development in an Andean Hillside Frontier*. Edited by Robert Rhoades, Kendall/Hunt, Dubuque, Iowa, 2001.

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