ARRESTING DEFORESTATION IN THE AMAZON

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Abstract

This article describes research completed by Mr. Speicher for his Master's thesis under the supervision of Drs. Wilson and Etling. He determined how cattle farmers manage their resources (land, labor, cattle), so that he could evaluate their current practices and make appropriate recommendations for improved practices. As a result of the study he recommended a "silvopastoral" system which included fast growing, shade tolerant grasses, leguminous trees serving as live fences, and rotational grazing. Implementation of this system has great potential to counteract deforestation in areas of the Amazon Basin where cattle ranching is the dominant land use.

Introduction

Deforestation is one of the major environmental issues of our time. The impact of deforestation in the Amazon has been heavily publicized and discussed. The most widespread practice that has led to deforestation among all Amazonian countries is cattle ranching (Hecht, 1981). Cattle ranching remains the dominant land use in the Amazon Basin because of: (1) its low labor intensity compared to raising crops, (2) government incentives, (3) high rates of inflation, (4) an increasing demand for beef, (5) a stable price for beef, and (6) the maximization of short term gains (MacLean-Stearman, 1983; Fearnside, 1985; Hecht et al., 1988; Browder, 1988). If future deforestation is to be prevented, two questions must be answered. Is deforestation inevitable for cattle ranching? What alternatives can be offered to ranchers to counter deforestation?

Purpose of the Study

In order to answer those two questions, the purposes of the study were to determine how cattle farmers manage their resources (land, cattle, labor), to evaluate their present practices, and to make appropriate recommendations. The objectives were: (1) to describe practices and attitudes of cattle farmers in Morona Santiago, Ecuador related to management of land, cattle, and labor; and (2) to identify specific steps to improve the cattle ranchers' resource management and production efficiency.

Site Selection and Description

Morona Santiago, Ecuador was selected as the study site because of its location in the Amazon, its widespread cattle industry, and because of one of the researchers' familiarity with the region. Morona Santiago is one of the five provinces located in Ecuador's Amazon Region and is the leader in cattle production among the
five provinces (Cento de Reconversion Economica del Azuay, 1988). Cattle ranching is the primary economic activity in the province which occupies 90% of the forest areas cleared for agriculture or roughly 338,900 hectares (Sistema Estadistico Agropecuario Nacional, 1991). Cento de Reconversion Economica del Azuay (1988) estimates that 225,000 head of cattle are present in the province. The major effects of cattle ranching in the province have been deforestation and the depletion of soil resources.

Method

A purposive sample of 44 individuals involved in cattle ranching in the area was selected for interviews. A random sample was not possible due to constraints including distances, accessibility by existing roads, lack of information on the total population, expense, and the farmers' unwillingness to divulge information to strangers. Selection criteria for 37 of the 41 ranchers included in the sample were: (1) physical availability, (2) a willingness to participate in the study, (3) farm size of 50 hectares or less, (4) herd size of 50 head or less, (5) cattle production was the main income activity, (6) the rancher or his family directly cared for the cattle on a daily basis, and (7) the rancher owned the land. The remaining four ranchers were selected because they were participating in an agroforestry project sponsored by CREA-DDMS, a governmental agency similar to agricultural extension. These four ranchers were interviewed to compare their resource management practices to the other ranchers who utilized the "traditional" system (animals are tie grazed, little preventative health is practiced, feed supplements are administered sporadically or not at all, genetic advancement is lacking, management is labor intensive, and agency assistance is lacking).

The last three members of the sample were the director and two employees of CREA-DDMS. They were interviewed for their assessment of the problems facing the ranchers and for their recommendations. All members of the sample were selected by one of the researchers who was familiar with the area and the population after investing three years in Morona Santiago as a Peace Corps Volunteer specializing in livestock problems of small-scale ranchers.

Data were collected using a cassette tape recorder and a descriptive survey instrument developed by the researchers. The instrument consisted of 49 questions divided into five sections: (1) background information on the rancher, (2) land management practices, (3) cattle management practices, (4) amount and type of labor used, and (5) sources of knowledge and technical information.

Background information included name and age of respondent and the location of the farm (canton, parish). Questions on land management practices included types, ages and uses of pasture plots, soil types, grass and tree varieties used, and effect of cattle on the pastures. Cattle management questions included number and breed of livestock, use of fencing, method and frequency of the administration of water, salt, minerals, and preventative medicine, breeding techniques, age and weight of calves when weaned, and maintenance of records. Labor management questions asked for number of people employed plus family members who work on the ranch, hours per day spent on livestock care, types of tasks performed, and time required for each task. Under the category "sources of knowledge and technical information," respondents were asked about how they originally learned to care for livestock, who they consult for problems, their degree of satisfaction with their current system of cattle production, and reasons for any changes made in the system.

Results

Land management basically deals with pasture grasses and trees. Most of the ranchers (80.5%) had deforested greater than 70% of their land for pasture. Three grasses, shown
in Table 1, were grown. These data came directly from the interviews. The data were verified by the researcher's experience in the region and by government professionals who work directly with the ranchers.

Imperial grass was the most common pasture used (95.1% of the ranchers), yet this grass was the least productive and very time consuming to maintain. Setaria, a relatively new grass in the area, was used by a minority of the ranchers (31.7%). However, these ranchers reported that setaria grass is easier to maintain, does not decrease in quality or quantity over time (with proper management) as the other grasses do, and does not degrade the soil. The reasons for the reported differences between these grasses will be explained in the following paragraphs.

Imperial and elephant grasses had a long regrazing time since they were predominately grazed in a reproductive stage, while setaria had a much shorter regrazing time since it was grazed in a vegetative stage. Imperial and elephant grasses were not grazed during the vegetative stage to avoid problems such as poor intake of the grass, pasture depletion, and diarrhea. On the other hand, these problems did not occur with setaria grass, thus it was grazed during the vegetative stage to prevent a decline in nutritional quality. Cattle ranchers reported that maintaining imperial and elephant grasses in a productive state was a very time consuming process since weeds and secondary regrowth were cut back manually on a daily basis to guarantee pasture survival and longevity.

Ranchers utilizing setaria grass did not encounter these problems, therefore no maintenance was required to keep setaria in a productive state.

The production declines of imperial and elephant grasses and the more stable production levels of setaria grass can be explained by the three grasses' shade tolerance. Imperial and elephant grasses have a very low shade tolerance growing best in open areas, while setaria grass grows best in well shaded areas, as shown in Table 2.

Because of imperial and elephant grasses' low shade tolerance, ranchers reported leaving very few trees in their pastures. Given the average age of these pastures (20 years), and the lack of trees, their yields would be expected to decline (due to soil degradation) in the absence of inputs such as fertilizer or nitrogen fixation, as described by Sanchez and Salinas (1981) and Fearnside (1980).

Since setaria grass grows best in well shaded areas, the potential for planting trees exists. All ranchers reported leaving trees standing for purposes such as shade, lumber, and firewood when establishing a new pasture. However, only four ranchers, those working with CREA-DDMS, were actively planting trees in conjunction with setaria grass. Their principal reasons for planting trees were for nitrogen fixation, living fences, forage, and lumber.
Table 2

Pasture Preference to Light Intensity

<table>
<thead>
<tr>
<th>Grass</th>
<th>% Open areas</th>
<th>% Partially-shaded</th>
<th>% Well shaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperial</td>
<td>66.7</td>
<td>33.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Elephant</td>
<td>57.9</td>
<td>36.8</td>
<td>5.3</td>
</tr>
<tr>
<td>Setaria</td>
<td>0.0</td>
<td>15.4</td>
<td>84.6</td>
</tr>
</tbody>
</table>

Cattle management mainly consisted of tie-grazing the cattle. The main reasons reported for tie-grazing were: (1) to prevent pasture damage and eventual loss, (2) since it was customary, and (3) since no fences were in place to restrain the cattle. Only two of the 41 ranchers maintained their cattle loose within fenced pastures of setaria grass. These two ranchers provided salt, water, and minerals free choice. The other ranchers provided these necessities sporadically if at all. Less than 50% of the ranchers treated their cattle for internal parasites. Only 30% of the ranchers kept any records at all.

Labor management for the two ranchers using setaria grass and fenced pastures was relatively easy. For the other ranchers labor intensity was much higher since the cattle had to be moved frequently and the pastures maintained by cutting back secondary growth and weeds on a daily basis. Salt, water, and minerals had to be administered directly to each animal.

Technical assistance received from government agencies was nonexistent for 88% of the ranchers. For most ranchers technical assistance came primarily from family members or neighbors. Only the four ranchers working with CREA-DDMS reported assistance from a governmental agency. These four were satisfied with their current production systems while 78% of the ranchers were not satisfied. The most common changes desired were to improve the pastures and the breed of cattle.

Other interesting data were collected as a part of this study. Only the data directly pertinent to the purposes of this article are reported here.

Conclusions and Recommendations

The researchers concluded that the "silvopastoral system" being tested by CREA-DDMS and the four ranchers should be implemented on a wide scale. This system includes (1) planting fast growing, shade tolerant grasses such as setaria or dallis grass (Paspalum dilatatum); (2) planting leguminous trees to allow for live fences, nitrogen fixation, improving soil physical properties, providing for shade, and allowing for diversification of production; and (3) implementing a rotational grazing program where parcels could be rested and regrazed to improve pasture production and reduce soil compaction.

To supplement this system the researchers recommended other management steps including (1) free access of cattle to water, salt, and minerals; (2) regular deparasitation; (3) animal treatment areas and restraining chutes to make treatment easier; (4) record keeping; (5) proper calf care practices; (6) regular weight estimation using a tape measure; and (7) introduction of better quality reproductors into the herds. These steps should be implemented with the support of CREA-DDMS, Peace Corps Volunteers, and The German Agency for Social and Technical Cooperation, agencies that are already working in the Province but could strengthen their efforts through cooperation.
**Educational Importance**

The silvopastoral system and the recommended management steps have already been introduced on a small scale in Morona Santiago. The practices are appropriate for the ranchers, economically feasible, culturally acceptable, environmentally sound, and can arrest deforestation in Morona Santiago. If ranchers can more efficiently use their existing pastures, they will have less pressure to clear new parcels for pasture. The researchers have also observed other sites in the Amazon Basin (in Ecuador, Bolivia, and Brazil). They believe that this silvopastoral system, or a variation, has the potential to arrest deforestation in these areas as well. For other areas outside Morona Santiago, the researchers recommend the same process of small scale introduction, evaluation, adaptation, and diffusion by cooperating agencies.

**References**


