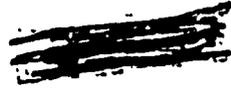


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ECODEVELOPMENT IN BOLIVIA: AN ALTERNATIVE LAND USE PLAN
FOR THE SAN JULIAN COLONIZATION ZONE*

by

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The small farmer, or campesino, of eastern Bolivia traditionally has engaged in a system of land use which makes use of successional slash-and-burn agricultural techniques. Under indigenous conditions of stable populations and a subsistence orientation, the land is cropped for two to three years and then permitted to return to high forest cover. This system provides for continuous high yields, minimal human migration and preservation of the ecosystem (Rappaport 1971; Harris 1972; Nations and Nigh 1978).

There is great concern today that destruction of large areas of forest, especially that in tropical regions, will have disastrous effects on world climate and ultimately on the food production capabilities in the temperate zones (Time Sept. 18, 1978:46). Unfortunately, much of the blame is often placed on traditional methods of agriculture such as that described above for destruction and eventual conversion of tropical rain forests to grasslands. Once again, under indigenous circumstances, slash-and-burn horticulture has provided a stable and ecologically sound system of land use. When subjected to population pressure and a market economy, however, this type of agriculture often results in semi-nomadic existence for the farmer and a highly exploitative land use system based on monocropping procedures. A more serious consequence of this type of land exploitation is that slash-and-burn agriculture is only an intermediate stage in the gradual conversion of the tropical forest to grassland as the result of expanding cattle interests (Denevan 1973; Parsons 1976). With regard to this problem in the tropics of Chiapas, Mexico, Nations and Nigh comment:

Relatively few individuals have recognized that swidden (slash-and-burn) agriculture, the traditional scapegoat of forest destruction, frequently is simply the intermediate step in the actual process of forest devastation. This process consists of replacing tropical rain forest with grassland in order to support export cattle business. It is this situation - the expansion of extensive cattle production - not indigenous food production, that must be halted if the rain forests of Latin America are to survive the next 20 years (Nations and Nigh 1978:1).

In the Bolivian case as elsewhere in the Latin American tropics, the campesino frequently becomes the sacrificial lamb in the big business of forest destruction. He is used as a land clearing device which in terms of cost-effectiveness has few competitors. Because of the pressures of a market economy, the swidden horticulturalist clears the land, plants rice or corn only and then moves on when fertility rates drop and weeds encroach to the point that the venture no longer is economical. Instead of letting this land lie fallow in a regenerative process, it is often bought up inexpensively by cattle interests or agrobusiness and put to pasture or mechanized crops which ultimately give way to grasslands. For the large farmer or cattle rancher, the costly process of clearing and felling has been borne by the campesino. Many large landowners are willing to allow spontaneous settlement on their lands knowing that after a few

years of cropping, the settlers will move on and the land can be used for cattle. Once the forest cycle has been broken, it will never again return to its previous state. In the southern area of Santa Cruz, for example, a region which borders on a semi-arid transitional zone, the removal of forest cover in concert with overgrazing practices have created an irreversible situation of desertification. As this drying out occurs, more productive land is lost to the ravages of wind erosion and soil depletion.

In addition to the negative ecological consequences of a system of migratory agriculture whose ultimate goal is pastureland, there are enormous social problems as well. As the campesino clears land which is then converted to pasture, he must move ever forward in search of virgin forest which will give him the monetary returns he demands. In a country which is still rich in tropical lands, little concern is given to conservation policies and practices or to a whole segment of the population which is forced into an unstable existence. As long as there is land to pioneer, the forests will be cut down indiscriminately and turned to grasslands. It is also unlikely that very few small farmers will ever make use of the lands they have prepared for pasture. Most campesinos cannot acquire either the large tracts of land or the capital necessary to make cattle ranching economically worthwhile. Thus the campesino is trapped in an economy of quick, short-term gains one year if the market is good, and economic disaster the next if it is bad.

The prospects of mechanizing the small farmer in order to make farming more profitable are also dim. Machinery costs in Bolivia are prohibitive. Replacement parts are difficult to obtain, and maintenance of equipment is always a problem for both small and large farmers alike. In a case reported from Honduras, farmers were organized into a cooperative and given credit for a machinery pool. The average down time for tractors was eight months and the cost of repairs often exceeded that year's harvest profits. After three years, most of the farm machinery was inoperative (Roberto Castro: personal communication 1978). In areas of Bolivia such as the San Julián colonization project there are additional factors to be considered. Transportation of fuel will be difficult and expensive. Then too, there is great probability that fuel prices will rise significantly. In the long run it may be doing the campesino a great disservice to involve him in a level of technology which he cannot sustain.

One may also question the efficacy of introducing large scale mechanization to a country which suffer high rates of underemployment and unemployment. If tractors replace hand labor, what is to become of the displaced farm laborers? As yet Bolivia does not have an adequate industrial base to absorb the excess labor which could accompany rapid and extensive farm mechanization.

The San Julián colonization project because of its initial progress in dealing with spatial aspects of the settlement process and human factors in coloniza-

tion offers an excellent opportunity to resolve some of the questions posed above. Unfortunately, the Instituto Nacional de Colonización (INC), the Bolivian entity in charge of the settlement of the area, still talks in terms of converting the area to cattle ranching. If the dream of the INC is realized, a large expanse of tropical forest will have been destroyed and most of the original settlers will have been forced to move on in search of new farmland. Even if each colonist were to convert his 50 ha. parcel to rangeland, the carrying capacity of the pasture together with range management problems would make economic survival difficult if not impossible. Dairying is a possibility which could be explored, but until present transportation problems are overcome, it is not within the realm of feasibility.

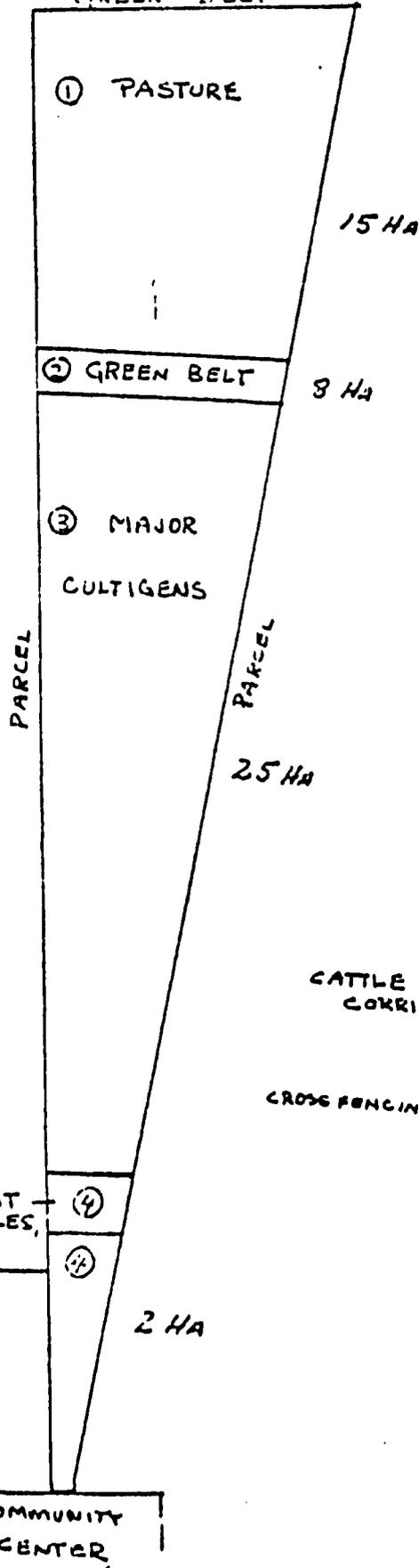
I would appear then, that if the San Julián colony is to attain socio-economic stability which sacrifices neither the campesino nor the ecology of the region, an alternative to present land use patterns will have to be devised and implemented. In response to this urgent problem, such an alternative is presented. It is suggested that a diversified land use system could preserve some of the original ecology, provide a steady farm income not based on one or two major crops and prevent the area from being "grabbed" at some future point by agrobusiness interests.

50 HA.

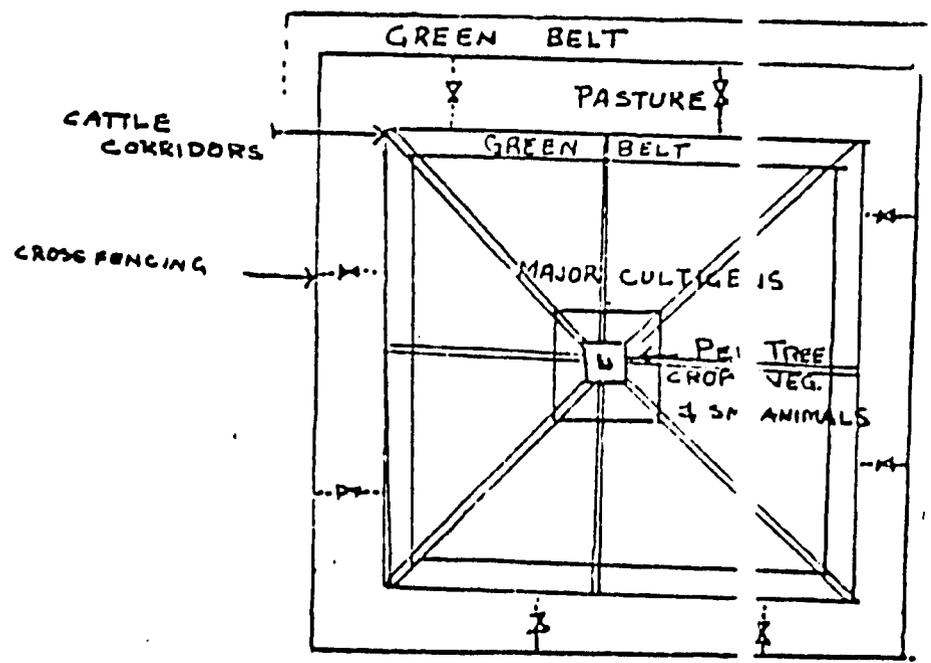
INDIVIDUAL PARCEL
GREEN BELT

LAND USE PLAN FOR SAN JULI

(NOT TO SCALE)



2000 HA Nucleated settlement
40 families @ 50 I.A. EACH



DIVERSIFIED FARM PLAN FOR SAN JULIAN

Sector One: 15 hectares

Pasture: Fifteen hectares of improved pasture with a carrying capacity of 15 head of cattle or less. The grazing area would form part of a communal pasture of 600 hectares which would be crossfenced in six to eight places. In addition, six to eight cattle corridors would run from the grazing area to the central settlement. Cows would be herded back and forth and quartered in corrals at the settlement for watering, milking and examination. Communal grazing and crossfencing at intervals would enable better range management and at the same time reduce individual fencing expenditures. It has also been suggested that a herd of goats be run ahead of the cattle to keep down undesirable shrub growth. This pasture area should be commenced as soon as possible during the pioneering phase, perhaps beginning with a one hectare belt cleared with chain saws. This could then be expanded each year as necessary until the 600 ha. maximum is reached.

Sector Two: 8 hectares.

Green Belt: A one-hectare wide buffer zone between the pasture and area of major cultigens is proposed for the following reasons:

- a) to prevent grass invasion of cultivated areas
- b) to prevent wind erosion
- c) to provide an area where hardwoods could be planted for future selective cutting and replanting.

Sector Three: 25 hectares.

Area of Major Cultigens: The use of this area will take some experimentation in alternative appropriate technologies and crop use. Some possibilities include:

- a) a combination of animal traction and hand labor
- b) use of legumes such as MUCUNA to keep down second growth in certain areas so that land can be farmed continuously in a rotational cycle for longer periods of time.
- c) keeping areas in natural forest or rotating areas of high second growth to retard pest invasion, weed proliferation and to act as a deterrent to large farming interests who would otherwise see the area as desirable for mechanized agriculture or cattle ranching.

Sector Four: 2 hectares.

Perennial Fruit Crops, Vegetables and Small Animals: Two hectares of land contiguous to the homestead to be used for the production of fruits, vegetables, chickens, ducks and hogs for both home consumption and sale. If confined, the animals will provide manure for continuous vegetable cropping. In addition, manure from the cattle penning area can be collected and used for the trees and vegetables. Attempts at composting this material could also be tried. Some use of herbicides and pesticides might be necessary, but the small land area under cultivation would not ecologically or financially preclude their use.

REFERENCES CITED

CASTRO, ROBERTO.

1978 Personal Communication.

DENEVAN, WILLIAM M.

1973 Development and the Imminent Demise of the Amazon Rain Forest. The Professional Geographer 24:217-222.

HARRIS, DAVIS

1973 Swidden Systems and Settlement. In Ruth Tringham (ed.), Ecology and Agricultural Settlements: An Ethnographic and Archeological Perspective.

NATIONS, JAMES D. and RONALD B. NICH.

1978 Cattle, Cash, Food and Forest. The Destruction of the American Tropics and the Lacandon Maya Alternative. Culture and Agriculture. University of California at Davis. No. 6, August.

PARSONS, JAMES J.

1976 Forest to Pasture: Development or Destruction? Revista de Biología Tropical 24 (Supl 1): 121-138.

RAPPAPORT, ROY A.

1971 The Flow of Energy in an Agricultural Society. In Energy and Power, A Scientific American Book. San Francisco. W.H. Freeman and Company.

TIME MAGAZINE.

1978 - Science..September-18:..46..Time Magazine, Inc., New York.....