SECTION 8

Conclusions and Implications for Policies of Rural Development

8.1. Past Interventions

The indigenous farmers of the Sierra of Ecuador have not always been a "marginal" group. Prior to the Inca and Spanish conquests, they had access to the best land and controlled the key cultural institutions. They used sophisticated systems of raised-field and canal irrigation agriculture to support populations locally more dense than those in existence today.

As a result of centuries of colonization and manipulation, current indigenous farmers find themselves on the worst land, with the least access to resources or political influence, of the various Ecuadorian ethnic groups in the highlands. The problem, therefore, is not one of instituting policies affecting indigenous people, but of undoing the effects of past conscious or *de facto* policies; of unshackling the potential of indigenous farmers to use their traditions and skills to shape their own futures.

As discussed in the first section of this case study, few institutions are concerned with monitoring or helping indigenous agriculture. There is no general extension service, no adequate monitoring system for yields, no information on hunger or famine, and no information on the impacts of droughts or downpours. There has been no effective national agency concerned with indigenous people, athough this may have been a blessing in view of the lack of trained personnel to staff such an agency. There have been a few trial projects to help traditional farmers, sponsored by the US Agency for International Development, the Ecuadorian government, the Catholic Church, and others. For a number of years now, the Ecuadorian government has channeled foreign researchers into Chimborazo Province. It is safe to say, however, that despite a bewildering profusion of reports and suggestions, the province remains desperately poor and without much to show in the way of improvements.

In this context the present study constitutes perhaps just one further compilation of information and listing of suggestions. It has the merit, however, of

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being the first to consider the potential impacts of climatic variations on traditional crop yields and distributions and to suggest policy responses to such impacts.

8.2. The Components of the Case Study

Good long-term meteorological data exist for the Quito Observatory meteorological station. Analyses of these data in Sections 2 and 5 indicated that some global climatic processes (particularly the Northern Oscillation) do have significant connections to Ecuadorian highland climate. Long-term scenarios of precipitation change were generated to reflect these processes.

Apart from long-term change, short-term variations of precipitation are also important in Ecuador. Scenarios of short-term precipitation change were generated using rainfall data from Riobamba and Palmira in Chimborazo Province.

Chimborazo Province was chosen as an appropriate subregion of the highlands for more detailed study. This province has a large population of poor, ethnically indigenous peasants who are ostensibly vulnerable to both long-term and short-term variations of climate.

The study of climate impacts involves a "chicken-and-egg" problem. The delimitation of significant environmental problems requires a knowledge of local adaptive strategies, while the study of local adaptation requires at least an initial guess as to the significant environmental problems. One solution to this quandary is to ask the peasants themselves what the significant problems are. Such an approach was followed in Section 3, the ethnographic portion of the project. The interviews conducted for this portion of the project also enabled collection of data on cropping practices and yields. These indicated the significance of nonagricultural strategies, such as temporary labor migration, to maintain resilience in the face of an uncertain environment. The farmers made it clear that low prices were a fundamental disincentive to commercial agriculture, and that farming was useful primarily for maintaining a low family cost of living.

Another approach is to attempt to correlate yield data with various environmental parameters (elevation, slope, temperature, precipitation, etc.). Unfortunately, the only time series of yield data that are currently available are for large rather than for small farms, and there are few even of those series. In this quandary agroclimatic modeling based on models developed elsewhere is an intriguing alternative, and the trial presented in Section 4 may serve to whet our appetite. Of course, such models at present are vulnerable to the frequently poor quality of meteorological data and the enormous spatial variation in climatic parameters in mountain environments. In addition, while soil fertility is seldom given much attention in developed country agricultural systems analysis (it being assumed that chemical fertilizers are readily available and relatively cheap), in Ecuadorian small farms fertility is the single most important limiting factor to increased production. In many cases, small-farm potato and maize yields could be increased many-fold with supplementary fertilization.