

Spanish title: "Planificación Local Agropecuaria y de la Naturaleza"(PLAN)

## Livestock-Natural Resource Interfaces at the Internal Frontier

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### Narrative Summary

This project is working with communities in forested mountainous areas of Latin America to improve the quality of life for small land-holders through land use and livestock management that is sustainable at the family level and the community level and sustainable for the environment at the level of the watershed and the region. We are using livestock as a principal focus to find solutions to environmental problems in these regions. The project work is organized around four principal goals: 1) Identify the potentials and limitations within the community for sustainable management of natural resources and livestock, and improvement of quality of life. 2) Evaluate current practices of livestock and natural resource management and experiment with alternatives. 3) Generate local participation in planning, implementing, and monitoring current and alternative practices. 4) Establish long-term, on-going, local community-planning for natural resource and livestock management. Our first year the project has accomplished several actions needed to achieve our goals:

**Implementation of community autodiagnosics.** The community self-assessments (autodiagnosics) of their situation and livelihood and use of land and natural resources is a critical first step needed to involve and understand the target communities. The information from the autodiagnosics is needed to design the data collection and studies to follow as well as to build an effective participatory plan of work with the community members themselves.

**Characterization of effects of livestock on production and on landscapes.** The Mexican team implemented and established the first set of grazing plots and grazing exclosures to be used to assess and demonstrate impact of livestock on pastures and natural vegetation. The vegetation within the exclosures already show clear responses to the removal of grazing pressure. The exclosures serve as a method that can be simultaneously observed and assessed by the researchers and the local farmers. The results of the vegetation changes will be used as the means to introduce other studies and alternative livestock management practices.

**Experiments with alternatives to improve livestock production and reduce impacts.** In Mexico, an initiative to improve the quality of local pastures through use of local forage species is now in progress. Local community members are engaged in the collection of seeds of native forages and the creation of nurseries of seedlings to plant in local pastures to improve forage and create more stable ecological plant associations. In Ecuador, a local farmer experimenting with rotational grazing with dairy cattle more than doubled milk production in the first year without using his forested land for browsing. This farmer's example will be used to enroll other local farmers to work with this and

related alternatives. An adaptation of pasture rotation inserted into the local annual pasture/forest grazing/browsing cycle is being developed in Mexico.

## **Research**

### *Problem Statement and Approach*

This project is working with communities in forested mountainous areas of Latin America to improve the quality of life for small land-holders through land use and livestock management that is sustainable at the family level and the community level and sustainable for the environment at the level of the watershed and the region. We are using livestock as a primary target to integrate multiple approaches toward solution of environmental problems in these regions. The project work is organized around four principal goals: 1) Identify the potentials and limitations within the community for sustainable management of natural resources and livestock, and improvement of quality of life. 2) Evaluate current practices of livestock and natural resource management and experiment with alternatives. 3) Generate a participatory process for planning, implementing, and monitoring current and alternative practices. 4) Establish a long-term, on-going, community-planning process for natural resource and livestock management. The problem model and approach have not been changed; however, our perspectives on how to approach sustainability and alternatives on a community-specific basis are evolving.

The problem model and vision that we had developed gave us a goal that appealed strongly to our Latin American partners. The appeal was 1) in the recognition of a problem that was already very apparent to our partners and 2) in the goal of community-based planning vision and the step-wise approach as the way to achieve it. The structure and open nature of the collaboration and interactions with our partners built a strong, committed team.

### *Progress*

The start of the first year required a major restructuring of the work plan given a reduction in funding from a requested \$377,000 to \$100,000 (a later addition of \$20,000 was critical). The continued strong support of the University of Wisconsin-Madison made possible the participation of key researchers. Coordination within and among the three host country teams also required rethinking and reworking to achieve effective and efficient coordination within each country's team and to promote better, more effective coordination among all partners. All three teams have shown unprecedented levels of cooperation among their members and member groups. One early significant product of this project has been the development of this increased level of exchange which has served already to strengthen the capacities of all three groups to undertake interdisciplinary, integrated projects such as this one. The recent development of an email network has facilitated an open exchange of information among all participants to increase overall awareness of project activity and to enhance the interchange of ideas. The participation by a representative of each host country team in the annual SR/GL-CRSP meeting at Davis was an important element to facilitate and strengthen collaboration by each team. This equal participation will be continued at the second annual SR/GL-CRSP meeting in Africa with representatives from each team attending. An exchange of researchers with visits to other sites is serving well to increase mutual awareness among the host country teams, to build stronger linkages among these teams, and to favor the application of similar methodologies and approaches to data collection.

The plan for the first year will be to implement the following objectives of the Proposal.

**Objective 1.1.** *Implement a community autodiagnosics in all three sites: Mexico, Ecuador, and Bolivia.*

**Objective 1.2** *Collection of secondary and scientific data.*

**Objective 1.3.** *Store information in GIS databases.*

#### ***Targets***

Due to the limitations of funding for the first year, we set limited targets for each of these objectives: 1) Design autodiagnosics for all three sites and synthesize the two approaches of all three groups. 2) Implement the first round of the autodiagnosics in Mexico, Ecuador and Bolivia. 3) Collection of sufficient data to characterize the situation to support Objectives 2.1, 2.2, and 2.3. 4) Plan a database to store and retrieve the information to be collected (primary and secondary). 5) Set up a GIS database for a) Mexico, b) Ecuador, and c) Bolivia.

#### ***Progress***

Autodiagnosics have been designed in all three sites. Lastarria visited Ecuador and Mexico and has worked with collaborators from all three sites to coordinate approaches and information to be collected within the constraints and needs of each site. Lastarria, Wattiaux, and Moermond all participated in this process.

The first phase of an autodiagnostic was completed in Ecuador in fall 1997. Follow-ups and subsequent phases were planned in July 1998 in Ecuador and have been continued to the present. The first phase of an autodiagnostic was undertaken in Bolivia in summer 1998. Subsequent phases will continue during the coming year. Mexico has not yet been able to undertake the autodiagnostic at the target site due to local problems that need to be resolved first.

The collection of known and new information is allowing the building of a more complete picture and history of the situations at all three sites.

On overall database has yet to be completed. Digitizing thematic maps for the study areas at each site have been in progress. The work here is not complete, but moving ahead well within the constraints of the limited funding.

**Objective 2.1.** *Socio-economic-cultural evaluation of current practices; selection of alternatives.*

**Objective 2.2.** *Participatory evaluation of ecological processes and productivity of agroecosystems.*

#### ***Targets***

2.1: 1) Achieve a preliminary assessment of the socio-economic-cultural practices sufficient to guide the design of a more detailed assessment for Year 2. 2) Identify additional "candidate alternatives" to add to Objective 2.5 in Year 2.

2.2: Based on autodiagnosics and selected interviews, begin a preliminary assessment of the production and management systems to guide the designs of assessments under Objectives 2.1, 2.3, and 2.4.

## *Progress*

All three sites have accumulated more information for an preliminary assessment of socio-economic-cultural practices and have developed detailed questions for further investigation in year 2. While some potential "candidate alternatives" have been suggested, the understanding of differences in the basis and nature of local communities has raised the importance of designing "alternatives" that are "community specific." In particular, "sustainable use of ecosystems" will need to be reformulated in terms of local constraints and options and the development of attractive and tractable sustainable options. This direction is likely to be productive but will need more information and study and will need to be built upon a better understanding of local knowledge and perspectives. The framework of approach applied by Terranueva and HPI in Ecuador provides a particularly interesting model that can be shared and applied to the other sites.

One important area for assessment of alternative resources is that of non-timber forest products. The CDC has already made 120 collections of plant species with known or potential value. They are creating a database of species name, structure, habitat, distribution, and use of each species including details on the part of plant used and the form of use.

### ***Objective 2.3 Scientific evaluation of ecological processes and productivity of ecosystems.***

#### *Targets*

1) Achieve a preliminary assessment of ecological processes sufficient to guide the design of a more detailed assessment for Year 2. 2) Begin remote sensing and mapping to assess vegetation cover, land use, and setup of GIS in a) Mexico, b) Ecuador, and c) Bolivia. 3) Soils: Design of set of diagnostic tools for assessment of soils and watershed health. 4) Biodiversity: a) Assess preliminary native biodiversity, b) Identify keystone species candidates, c) identify and assess avian indicators of vegetation change: a) Mexico, b) Ecuador, c) Bolivia.

#### *Progress*

We have made selective progress in several of these targets.

2) Mapping of vegetation cover and land use are well underway at all three sites. For example, in Ecuador, the CDC generated a basic map of vegetation cover and land use and then digitized five other thematic maps:

- Vegetation cover and current land use,
- Conflicts of land use,
- Land use capacity,
- Soils and geo-morphology,
- Forest's functions,
- Zones of life

In Mexico, a UW M.S. student from IMECBIO, Cardenas, is carrying out an assessment of change in land use and land cover between 1971 and 1998 in the Ejido Zenzontla (the principal site of our project). His analysis provides one of the first quantified studies of land use change; his doctoral dissertation will focus on the factors that influenced the change in land use and current land uses in this area.

3) Polly Ericksen completed the design (and testing in Honduras) of a set of diagnostic tools to evaluate sustainability of agroecosystems in hillside agroecosystems. Her methodology will be useful in using to assess and monitor land use and livestock management practices in all our sites.

4) Preliminary assessments of avian diversity and identification of candidate keystone species for seed dispersal and indicator species for vegetation quality were carried out by Moermond, Bleiweiss, and two students, Erdmann and Hernandez, in Mexico and Ecuador.

**Objective 2.4. *Characterization of effects of livestock on production and on landscapes.***

**Objective 2.5. *Experiments with alternatives to improve livestock production and reduce impacts.***

***Targets***

1) Design and implement paired sets of grazing plots and exclosures in a) Mexico, b) Ecuador, and c) Bolivia. 2) Preliminary study of cattle follows to assess utility for Objectives 2.4 and 2.5.: Mexico.

***Progress***

1) Ten paired sets of grazing plots and exclosures were established in Mexico in August 1997 and have been monitored monthly since. Moermond, Wattiaux, and Langstroth all visited these plots over the past year. Sanchez and his team have already reported obvious and interesting results from these plots. In June 1998, Langstroth and Sanchez (the lead scientist on the plots in Mexico), visited Ecuador to guide the selection and establishment of a similar series in the Cosanga area. Three sets have already been established there and the remainder are expected to follow soon. The establishment of these plots in Bolivia is expected to occur during the second year. Analysis of livestock impact in the Mexican plots which contain 20 shrub species and 18 tree species is underway.

2) The cattle follows, being carried out by a CUCSUR student, Juan Pablo Esparza, for an undergraduate thesis has been very useful with the following preliminary results:

- Establishment of the study area covering four types of habitat: Dense tropical deciduous forest, open tropical deciduous forest, riparian vegetation, and perennial tropical forest.
- Identification of the main routes followed by cattle and the areas for resting.
- Quantification of the number of animals located in the site.
- Collection of 36 species of foliage and 15 of other plants. Observations on abundance for both groups, and records of frequency of consumption for the foliage species.
- Preliminary recordings for characterization of 110 micro-sites (2 m in diameter).
- Training in the use of the radio-telemetry technique.

The success of this mini-project will be used to replicate it with appropriate students in the other sites.

3) In addition in Mexico, an additional approach was applied to describe vegetation units used by livestock and the effects of their grazing. Local farmers identified forest vegetation used in wet and dry season. 50 point-quadrants were established in four sites

to assess tree species diversity: the richest site provided 43 tree species in the sample emphasizing the high biodiversity of these grazed forests. Native forage plants are identified and assessed in terms of nutritive value, distribution, and abundance in the management unit to evaluate the potential grazing productivity in different vegetation types.

### **Objective 2.5a. Optimal mix of forage species.**

#### ***Targets***

Set up a participatory project of native forage selection and propagation as step one to improve production value of pastures and biodiversity health of pastures:

#### a) Mexico

This project, led by Sanchez and Louette in Mexico, was a participatory search for agroforestry options for the enhancement of pasturage and improvement of soils. The required the determination of appropriate native plant species and associated agroforestry techniques for their use in pastures in order to reduce the negative effects of cattle grazing and to provide additional options for feeding domestic animals. Nurseries and pilot experiments were carried out in collaboration with local farmer/community members. The preliminary results are very promising:

a) Propagation of arboreal species for multiple use selected with the help of local inhabitants through informal talks. Seeds of several species were collected, including "mezquite" (*Prosopis laevigata*), "guazuma" (*Guazuma ulmifolia*), "guamuchil" (*Pithecelobium dulce*), "capiri" (*Sideroxilum capiri*), and "parota" (*Enterolobium cyclocarpon*). Statistical analyses of the treatments were also carried out. At these time, there are three pre-germinating treatments for species with potential to feed cattle and to build "living fences."

b) Production of trees for multiple-use and pasturage enhancement. This activity consists on two phases: Production of plants in a greenhouse, and through extension. In the first phase, local farmer/livestock producers continue collecting seeds. 8000 "mezquites", 1200 "guamuchil", 2000 "guazimas", and 5 "capiris" have been produced. Approximately 8000 trees already have been distributed among the Ejidos Zenzontla, Mezquites, Ahuacapan and some privates land-holding. Trees are being planted in parcels as "living fences" and are utilized also as forage.

### **Objective 2.5b. Rotational Grazing**

#### ***Targets***

1) Identify and begin preliminary assessment of local farmers who are using rotational grazing: a) Ecuador, b) Mexico. 2) Establish participatory support for implementation of rotation experiments as a "candidate alternative" in a) Mexico, b) Ecuador, and c) Bolivia.

#### ***Progress***

In all three countries, there are possible alternative grazing patterns that will reduce ecological damage AND enhance cattle production. One example reported by FUNAN in Ecuador was of one dairy farmer who initiated rotational grazing on his pasture instead of cycling through his forests. He reported that the rotational grazing resulted in more than

double his milk production in one year. If study of this farmer's success is confirmed, the next step is to work with him and his neighbor's to improve and spread the adoption of this practice. The problem is not in identifying technological improvements; the problem is to find practices that are appealing and practical to local farmers to meet their needs.

In Mexico, Louette and Sanchez have developed a plan to enroll livestock producers into experiments to determine modifications of grazing cycles that will improve their cattle production and reduce the degradation of the environment in terms that are clearly visible to the producer. This plan has been adopted to be put into action by the Regional Program for Sustainable Development carried out by the Ministry of the Environment in the same area.

**Objective 2.5d. To improve the genetic stock of local livestock.**

***Targets: Ecuador***

- 1) Assess the situation for feasibility of embryo transfer experiments.
- 2) Determine available facilities, participating people and agencies.
- 3) Set up initial facilities, procedures and training.
- 4) Begin initial experiment.

***Progress***

Appropriate and feasible communities and producers have been identified as potential sites for a pilot project. Laboratory work in preparation for this has been proceeding at the UW. Limited funding has greatly slowed this initiative. Nevertheless, the techniques necessary to apply this approach successfully continue to be refined.

**Objective 2.8. Preparation of educational and training materials.**

***Targets***

Although the detailed preparation of education materials will not take place until year 2, a strategy and preliminary plan for this preparation and implementation will be made in year 1.

***Progress***

CIEC, the lead group in developing the education strategy was unable to begin on this strategy until funding and priorities were worked out. Since that time CIEC organized a three-day workshop at our site in Tarija in Bolivia with participation of CER-DET, PROMETA, AND ZONISIG and with additional attendance of delegates from communities in the area of the project. This workshop took into account the following aspects to develop an educative strategy to be applied to all three country sites:

- Creation of the educative proposal according to the project's goals.
- Definition of primary educative needs that justify the implementation of the educative component.
- Identification of potential receptive communities for the educative program.
- Consideration of topics and educative contents to be considered by the program.
- Appropriateness of possible didactic support material to be produced.

- Prioritization of the activities to be carried out in a short term, according to the advance of the rest of the components, along with responsibilities and a tentative schedule.

A similar workshop is now being organized in Ecuador for November, 1998. A Mexico workshop has yet to be set up.

#### **Objective 4.4. Outreach to and exchange with other communities in the region and in the U.S.**

##### ***Targets***

We plan to initiate a "farmer to farmer" exchange of information by inviting U.S. farmers who are involved in environmental and water issues of management to attend our year end meeting/workshop to talk to local researchers from all three countries and to talk to local farmers in the host site of the conference. The first conference will be at the beginning of the second year; however, arrangements for the visits by farmers will be made through Heifer Project International's U.S. and Canada Program.

##### ***Progress***

The limited funding for both year 1 and year 2 have forced us to delay this planned "farmer to farmer" exchange. Nevertheless, we still find this idea exciting and worthwhile; we will attempt to look for additional funds for a possible exchange toward the end of year 2.

#### **Additional Objective A1.1. To develop evaluation criteria and procedures appropriate to 1) the workplan objectives, 2) host country organizations, and 3) university researchers.**

##### ***Targets***

1) To agree upon criteria for self-assessment of progress and success of the project using criteria appropriate to the project and its participants. 2) To implement the evaluation and apply the selected criteria at the end of the first year.

##### ***Progress***

We have not yet set up a self-assessment of progress of the project itself. We had hoped to work through this as part of our first annual meeting. We now do not have funds for an annual meeting. We have moved this item to the agenda for year 2.

## **Gender**

### **Gender, as targets and participants.**

Our project is aimed at community-planning with an emphasis on local producers and the family level. In this, our final goal is to include families in their entirety, including all men, women and children. We have begun to work with local community structures and farmers' organizations which are typically dominated by men in these Latin American countries. Nevertheless, our auto-diagnostics are done in cooperation with representative samples of local communities to take into account critical factors such as gender, age, ethnicity, and income. The auto-diagnostics, which are critical stages for understanding local communities and for beginning the process to achieve subsequent objectives, must

include women explicitly to be able to understand and include their perspectives in the assessments and planning of the four main objectives.

### **Gender, as project team leaders and collaborators.**

Within our teams, a number of women are included at several levels: At UW-Madison, 3 women scientists are included within the local team of 15. In Mexico, one of the two co-coordinators is a women and 2 women are included in the team of 10. In Ecuador, women are directors of three of our four partner organizations and 4 women are in the team of 11. In Bolivia, no women lead any of our four partner organizations; however, 2 women are included in the 12 team members. Overall, among the 50 participants, 12 are women. We hope to increase the training and participation of women in the future. Note that 3 of the 7 students whose research was supported through this project are women.

### **Policy**

Local community area leaders have been informed and brought into the process at the earliest stages in seeking authorization, cooperation, and support in initiating and developing the project in target communities in all three countries. Their positions of influence and responsibility will be respected and incorporated so that the project develops in step with the interests and timetable of local communities. We are far from the policy contributions that are expected to arise out of local community planning, which is scheduled for beyond year 3.

### **Outreach**

#### **Farmers, Farming Families, and Local Community Members.**

Outreach is an implicit element in the approach and objectives of this project: Objective 3: "to generate a participatory process for planning, implementing, and monitoring," and Objective 4: "to establish a long-term community planning process for natural resource and livestock management," require education and open exchange of information and ideas from the initiation of the project. To accomplish this, our Bolivian partner, CIEC (Interdisciplinary Center for Community Studies) designed a strategy to guide the development of outreach/education components for four key target groups: 1) authorities and local leaders, 2) farmers, producers, and resource users, 3) families (parents and children), and 4) local teachers and students. Lack of funding has delayed the incorporation of education components; nevertheless, CIEC and Pilar Lizarraga worked closely together to arrange the first workshop to delineate an explicit educative strategy for the Bolivia site. This workshop, held in Tarija, Bolivia on October 13-15, included not only participants from our three partner organizations (CER-DET, PROMETA, and ZONISIG) but also delegates from the communities found in the area of influence of the project. This educative strategy took into account the following aspects:

- Creation of the educative proposal according to the project's goals.
- Definition of primary educative needs that justify the implementation of the educative component.
- Identification of potential receptive communities for the educative program.
- Consideration of topics and educative contents to be considered by the program.
- Appropriateness of possible didactic support material to be produced.
- Prioritization of the activities to be carried out in the short term, according to the advance of the rest of the components, along with responsibilities and a tentative schedule.

This comprehensive strategic and participatory approach to education is rarely incorporated explicitly and effectively into development projects. The planning for a second workshop with CIEC and our Ecuador partner organizations is now underway.

## **Communities and Farmer Planning Groups in the U.S.**

Outreach with other communities in the regions of our target communities was scheduled to begin in the second three years of the project. We had, however, originally planned with Heifer Project's U.S. and Canada program to sponsor participation of delegates from Hispanic farmer planning groups in New Mexico and Texas at our annual project meetings so that they could witness the approach and experiences we are having with sustainable natural resource and livestock planning with the rural farming communities of our sites. The first meeting originally had been planned for the end of the first year in Mexico. Reduction in funds forced us to delay this meeting until the beginning of the second year. With even less funds for year 2, we are now in search of funds to hold an annual meeting. The U.S. farmers would have had an opportunity to see our approach in action and would have been able to exchange ideas and experiences directly with host-country farmers. The experiences of U.S. farmers participating were intended to be communicated among the 40 groups of farmers in the Heifer Project's U.S. and Canada program. We think that this type of exchange would be valuable for farmers on both countries, but need additional funds to make this connection feasible.

## **Developmental Impact**

### **Environmental Impact and Relevance**

#### *Biodiversity*

All three of our sites are in areas that are in buffer zones of nature reserves with international significance in terms of uniqueness and value of their biodiversity. Better land use practices in these areas will play a direct role in enhancing the stability and security of the nature reserves as well as contribute to conservation of biodiversity of the sites themselves, thereby enhancing the prospects of conservation of valuable biological resources on a regional scale.

#### *Ecosystem services*

The approach to sustainable land use promoted by our project would contribute directly to reducing erosion and to maintaining ecosystem services within the watersheds of the study sites. The water from these regions is critical to the surrounding regions in all three countries where there are simultaneously problems of water shortage and flooding due to watershed degradation at similar sites within these regions.

### **Agricultural Sustainability**

Our project is designed to incorporate the concepts of ecological sustainability by focusing on land use practices and how they change the productive and service options of the land. Conditions, changes, and trends in key properties of different soil and vegetation types under particular land management practices will be monitored. By using appropriate indicators whose interpretation and applicability is clear to both farmer and scientist, farmers and their communities will have the basis for making decisions that

would lead to sustainable land use to maximize the long-term productive options available. Defining and evaluating sustainable management strategies for these tropical sites cannot be a single time prescription. Sustainable use will require a farmer/community monitoring system that is cheap and easy and that provides practical feedback to guide individual and community planning. This said, these indicators and monitoring system were scheduled to begin in years 2 and 3. Reduction in funds in years 1 and 2 will reduce the scope and timing of identification of indicators and implementation of a pilot monitoring system.

### **Contributions to U.S. Agriculture**

Our approach, including indicators of sustainability and a farmer/community-based monitoring system, would be of use and interest in aiding farmers to achieve a more ecological integration of natural forest systems and agricultural and livestock production. Our direct attempt at establishing this link was through a "farmer to farmer" exchange arranged through Heifer Project's U.S. and Canada program. As described under the section entitled Outreach, the U.S. farmers would have had an opportunity to see our approach in action and would have been able to exchange ideas and experiences directly with host-country farmers. The experiences of U.S. farmers participating were intended to be communicated among the 40 groups of farmers in the Heifer Project's U.S. and Canada program.

### **Contributions to Host Country**

The host countries will benefit from 1) conservation of unique natural systems and associated biodiversity, 2) reduction in further degradation of ecosystem services and water quality and stability in critical watersheds, and 3) enhanced quality and stability of life for rural communities in areas of poverty and instability. Sustainable management of natural resources and livestock production at the scale of the watersheds of our project will directly contribute to these benefits. At the end of year one, however, we are at the very earliest stages of understanding and assessing the situation and at early stages of enrolling local farmers and communities in the project and its goals and approach.

### **Linkages and Networking**

This project has already fostered and strengthened linkages among the partner organizations in Ecuador and Bolivia. Two of the local environment/development NGO's in Tarija CER-DET and PROMETA which had never worked together before this project are now collaborating closely and effectively.

With sites in three widely separated countries with differences in biotic and cultural situations, we have been working to enhance both the quantity and rapidity of exchanges via a email link "PLAN" which allows information to be posted to all main participants including those from other universities and groups outside the project countries. We have worked to generate a real partnership in a common project with input from all partners. All three project country teams have now chosen their own country coordinator and manner of coordination, and they have also chosen who will represent the group at conferences and workshops. CRSP. We also have established valuable linkages among the four main teams in Wisconsin, Mexico, Ecuador and Bolivia. We have already had an exchange of a researcher between Mexico and Ecuador and have others planned including exchanges between Mexico and Bolivia and Bolivia and Ecuador. This emerging network of interaction will provide a more fertile basis for entry of other interested participants and organizations. The initial and ongoing policy of frank, open sharing of information

and mutual trust has played no small part in building a strong, committed multi-country partnership with a shared vision.

## **Other Contributions**

### **Compliance with Mission Objectives**

At the USAID Missions of both Ecuador and Bolivia, we were informed that our project coincides closely with the Mission's objectives and that, in both countries, our sites are in areas of high priority.

### **Concerns for Individuals, Democracy, and Humanitarian Assistance**

The goal of our project is to increase the quality of life of families of poor rural communities and to foster community-based planning of sustainable land use. The majority of our clients are small producers and many of the people in our regions came as colonists from resource-poor areas. This project is direct assistance to these farmers and their communities. Our goal of participatory community-based planning is an activity that will directly enhance decision-making abilities of the local people at the scale of their communities. This is promoting and effecting democratization.

### **Leveraged Funds and Linked Projects**

We have obtained substantial funds from the University of Wisconsin-Madison well beyond the matching funds. In addition, we have been actively applying for other grants as well as applying resources from other grants when possible. Three examples are detailed below. In addition, our target country partners have been able to accomplish some of their objectives with funds for other projects with overlapping, compatible objectives.

#### **·USIA "NAFTA" Grant for a U.S., Canada, Mexico exchange**

*P.I.s:* Thomas Yuill (UW-Madison), Eduardo Santana C. (CUCSUR, U. de Guadalajara), and Michael Moss (U. of Guelph).

*Title:* "Partnership for Environmental Stewardship"

*Amount of Award:* ~\$5,000 allocated for work on this project (visits of Lastarria and Wattiaux to Mexico) as well as additional trips in the second year to be covered. (The concept of the livestock-natural resource project was originated under this "environmental partnership" in 1995.)

#### **·UC MEXUS- CONOCYT**

##### **Collaborative Grant**

*P.I.* John W. Menke, Agronomy and Range Science, UC-Davis

*Co-P.I.* Lazaro Sanchez, IMECBIO, CUCSUR, Universidad de Guadalajara

*Title:* "Sustainable livestock management in forest ecosystems in the Sierra de Manantlan Biosphere Reserve."

*Amount awarded:* \$14,999

*Time of award:* 1 October 1998-30 September 1999

**•Babcock Institute for International Dairy Research and Development, University of Wisconsin-Madison**

*P.I.* Jack Rutledge

*Title:* "Cross-breeding to improve dairy cow genetics in Ecuador"

*Amount of Award:* \$15,000

## **Training**

The following students have been funded or partially supported by our project for thesis studies useful to the objectives of the project. The first to complete her degree, Polly Ericksen, did her field work in Honduras; however, her methodology for evaluating sustainability in agroecosystems will be directly applicable to this project.

Juan Pablo Esparza, Ecology and Natural Resources: Habitat use for livestock in Zenzontla, Sierra de Manantlan Biosphere Reserve, Mexico, IMECBIO, CUCSUR, University of Guadalajara.

Oscar Cardenas-Hernandez, Conservation Biology and Sustainable Development: Land use changes in a protected area in western Mexico., Institute for Environmental Studies, University of Wisconsin-Madison.

Sarahy Contreras-Martinez, Conservation Biology and Sustainable Development: Conservation of birds in the Sierra de Manantlan Biosphere Reserve, Mexico. Gap analysis, Institute for Environmental Studies, University of Wisconsin-Madison.

Yoyi Hernandez, Conservation Biology and Sustainable Development: Abundance and distribution of birds in grazed habitats of Zenzontla, Sierra de Manantlan Biosphere Reserve, Mexico., Institute for Environmental Studies, University of Wisconsin-Madison.

Polly J. Ericksen, Soil Science: Evaluating sustainability in hillside agroecosystems., Dept. of Soil Science, University of Wisconsin-Madison

Hong Hseng Men, Animal Science: Control of maturation of oocytes in cattle, and cryopreservation of oocytes in cattle., Dept. of Animal Science, University of Wisconsin-Madison.

Joshua Erdmann, Zoology: Ecological interactions of keystone fruit-eating bird species and fruiting plants in Ecuador., Dept. of Zoology, University of Wisconsin-Madison.

## **Collaborating Personnel**

### **Ecuador**

Baez, Sara, Terranueva, Director of Terranueva. Lawyer, Anthropologist.

Ballesteros, Hector, HPIHeifer Project International-Ecuador, Veterinarian. Animal Science. Will assist in implementation of livestock genetic improvement with J. Rutledge of UW-Madison.

Castillo, Marco, Terranueva, Agronomist. Assist farmers in development and implementation of crop management systems.

Castillo, Mauricio, FUNAN Fundacion Antisana, Agronomist. Will coordinate project implementation in agricultural management area.

Chancusig, Edwin, HPI, Agroecologist/Technical Assistant. Will characterize existing production systems and develop models of sustainable use of available resources.

Guevara, Marcelo, CDC Centro de Datos para la Conservacion, Geographer. Geography, remote sensing, GIS, GPS. Mapping and creation of GIS database for study sites.

Hernandez, Katty, HPI, Sociologist. Working with community auto-diagnostics and environmental perspectives.

Josse, Carmen, CDC, Director of CDC. Plant ecologist. Conduct monitoring of vegetation dynamics and forest regeneration. Manage data collection.

Larrea, Fernando, HPI, Coordinator. Director of HPI-Ecuador. Anthropologist. Will conduct analyses of community production strategies and impacts of social and cultural aspects on sustainability. Will aid in developing community diagnostic methods.

Mosquera, Gustavo, FUNAN, Technical Director. Biologist. Will direct projects related to resource management around the Reserva Antisana.

Penafiel, Marcia, CDC, Botanist. Monitoring of plant populations and database management.

## **Bolivia**

Arnold, Ivan, PROMETA Proteccion del Medio Ambiente Tarija, Biologist, Park Director.

Castro, Miguel, CER-DET Centro de Estudios Regionales para el Desarrollo de Tarija, Director of CER-DET. Lawyer. Legal aspects on land tenancy.

Chavez, Freddy, PROMETA, Social psychologist. Community organization and autodiagnosics.

Erazo, Orlando, CER-DET, Forester. Assisted in design of project proposal. Forest resources, non-timber forest products.

Espinoza, Linder, ZONISIG Proyecto Zonificacion Agro-ecologica y Establecimiento de una Base de Datos y Red de Sistema de Informacion Geographica en Bolivia, Forester. Forest resources, non-timber forest products. Land use evaluation.

Jung, Jorge Eduardo, CIEC Centro Interdisciplinario de Estudios Comunitarios, Environmental Education. Conduct environmental education programs and group management. Evaluation and follow-up of education programs.

Lizarraga, Pilar, CER-DET, Anthropologist. Design and conduct community auto-diagnostics.

Montano, Blanca, CER-DET, Psychologist. Will assist in autodiagnosics and community planning.

Roth, Erick, CIEC, Director of CIEC. Environmental Education. Will design and plan education strategy, educational materials and audiovisuals for all three countries.

Ruiz, Jorge, ZONISIG, Director of ZONISIG. Agronomist, GIS Specialist: Will direct and coordinate GIS applications and cartography of the Tarija site. Will be coordinator for Year Three.

Vacaflares, Carlos, PROMETA, Agronomist, Research Coordinator-Tarija. Direct research on forest-community-cattle relationships. Will be Coordinator for year 2.

Valdez, Alipio, CER-DET, Anthropologist. Will work with community auto-diagnostics.

## **Mexico**

Carranza, Arturo, IMECBIO Instituto Manantlan de Ecología y Conservación de la Biodiversidad, Agronomist. Will study the impact of livestock in the watershed.

Carranza, Mario, IMECBIO, Agronomist. Will study the effect of livestock on vegetation and management alternatives.

Cuevas, Ramon, IMECBIO, Botanist. will work with plant taxonomy, livestock forage and vegetation change.

Dario, Ruben, IMECBIO, Soil scientist. Will work conservation of soils and watersheds.

Iniguez, Luis, IMECBIO, Zoologist. Radio-telemetry. Will study feeding habits and movement of livestock and roles of key species in seed dispersal.

Jardel, Enrique, IMECBIO, Ecologist. Management of natural resources. Will study dynamics of vegetation change, landscape ecology, land use changes, GIS applications.

Louette, Dominique, IMECBIO, Agronomist. Coordinator. Community development, autodiagnosics, livestock farming system management.

Martinez, Luis Manuel, IMECBIO, Soil scientist. Will work conservation of soils and watersheds.

Pineda, Maria del Rosario, IMECBIO, Ecologist. Will study effect of livestock on vegetation in dry forest and cloud forest.

Sanchez, Lazaro, IMECBIO, Botanist. Co-coordinator. Will study vegetation dynamics and impact of livestock on vegetation change.

## **United States**

Bleiweiss, Robert, University of Wisconsin-Madison Department of Zoology, Zoologist. Will conduct research and investigate potential for community production of medicinal plants.

Cooperband, Leslie, University of Wisconsin-Madison Department of Soil Science, Soil scientist. Will study affect of livestock management on soil quality, manure management in grazed vs. confined systems.

Fristrup, Kurt, Cornell Laboratory of Ornithology Bioacoustics Research Program 159, Biophysicist, Ethologist. Will provide technical support for radio-tracking of livestock

and acoustic censuring of birds.

Hester, Alison, MacCaulay Land Use Research Institute, Craigbuckler, Aberdeen, UK, Agronomist, Range Scientist. Will advise on methodology of forest grazing systems.

Kelley, Gene, Colorado State University, Professor of Soil Science, Department of Soil and Crop Sciences. Will work on modeling the terrestrial carbon cycle.

Langstroth, Robert, Wisconsin Division of Safety and Buildings, Geographer/Botanist. Environmental Analysis and Review Specialist: Will design, conduct, and supervise research on vegetation dynamics and range/pasture management problems in collaboration with local investigators.

Lastarria, Susana, University of Wisconsin-Madison, Land Tenure Center, Land Tenure Specialist. Will participate in community autodiagnosics and assess land tenure related constraints to sustainable production.

McSweeney, Kevin, University of Wisconsin-Madison Department of Soil Science Director, School of Natural Resources, Soil scientist. Will direct research on soil-landscape-hydrological modeling.

Menke, John, University of California-Davis, Department of Agronomy and Range Science, Range ecologist. Will advise on design of field range vegetation.

Moermond, Timothy, University of Wisconsin-Madison, Department of Zoology. Chair, Conservation Biology Sustainable Development Program, Principal Investigator and Principal Coordinator. Zoologist. Will coordinate the overall project. Will direct studies of livestock foraging and changes in vegetation and biodiversity.

Moen, Ronald, University of Minnesota-Duluth. Professor of Biology Natural Resources Research Institute, Wildlife ecologist. Will adapt and apply a spatially explicit livestock foraging/energetics model to livestock nutrition and nutrient distribution.

Nordheim, Richard, University of Wisconsin-Madison, Department of Forestry and Statistics, Will coordinate the experimental design and statistical analysis, particularly with respect to indicators of sustainability.

Pastor, John, University of Minnesota-Duluth, Professor of Biology Natural Resources Research Institute, Range ecologist. Will advise study of changes in vegetation and livestock nutrition using a mathematical model.

Rutledge, Jack, University of Wisconsin-Madison, Department of Animal Science, Animal Scientist. Will evaluate between and within species crosses in the genus *Bos* for milk production and adaptation to tropical conditions.

Wattiaux, Michel, University of Wisconsin – Madison, Department of Animal Science, Animal Scientist. Will evaluate feeding patterns and forages of livestock and will participate in extension/education and preparation of education materials.

Yuill, Thomas, University of Wisconsin-Madison Director, Institute for Environmental Studies, Animal Scientist/Wildlife Ecologist. Will assist in livestock production by advising on animal health assessment and surveillance and with wildlife ecology.

Zepeda, Lydia, Food and Agriculture Organization EASE, Italy, Economist. Will study

household and small-holder farm economy, will study income distribution and gender issues, will model local farmer/market system.

## **Collaborating Institutions**

### **United States**

University of Wisconsin-Madison

International Agricultural Programs

240 Agriculture Hall

1450 Linden Drive

Madison, WI 53706-1562

Phone: 608-262-8633

Fax: 608-262-8852

University of California-Davis

(collaboration through Dr. John Menke, see Leveraged Funds above)

University of California-Davis

Department of Agronomy and Range Science

Davis, CA 95616

Phone: (530) 468-5351

Fax: (530) 468-5654

### **Mexico**

Instituto Manantlan de Ecología y de la Conservación de la Biodiversidad (IMECBIO),  
CUCSUR, Universidad de Guadalajara, Mexico

Av. Independencia Nacional #151,

Autlan de Navarro, Jalisco.

C.P. 48900

Mexico

Phone: 52-338-1-11-65/03-53

Fax: 52-338-1-14-25

### **Ecuador**

Heifer Project International (HPI)

San Ignacio 134 y 6 de Diciembre,

3er Piso, Oficina #8

Quito, Ecuador

Phone: 593-2-504-496

Fax: 593-2-504-496

Centro de Datos para la Conservacion (CDC)

Alfonso de Lamartine #175

Casilla 17-21-1332, Quito, Ecuador

Phone: 593-2-257-680

Fax: 593-2-245-189

FUNAN (Fundacion Antisana)

Av. Mariana de Jesus s/n y Carvajal

Quito, Ecuador.

Phone: 593-2-433-851

Fax: 593-2-433-851

Terranueva (TE)

Calle Mallorca 440 y Coruna

Casilla 17-12-14

Quito, Ecuador

Phone: 593-2-226-291

Fax: 593-2-507-865

## **Bolivia**

Centro de Estudios Regionales para el Desarrollo de Tarija (CER-DET)

Calle Virginio Lema 0-173

Casilla 83,

Tarija, Bolivia

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Fax: 591-66-3-34-54

Centro Interdisciplinario de Estudios Comunitarios (CIEC)

Calle Belisario Salinas No. 228, 2<sup>nd</sup> piso, Casilla 159,

La Paz, Bolivia

Phone: 591-2-432-630

Fax: 591-2432-662

Proteccion del Medio Ambiente Tarija (PROMETA)

Mendez 172, Casilla 59

Tarija, Bolivia

Phone: 591-66-4-58-65

Fax: 591-66-3-38-73

Proyecto Zonificacion Agro-ecologica y Establecimiento de una Base de Datos y Red de Sistema de Informacion Geographica en Bolivia (ZONISIG)

Oficina Regional Tarija

Calle Padilla esq. A. del Carpio Casilla 502,

Tarija, Bolivia

Phone: 591-66-4-46-44

Fax: 591-66-4-56-59

## **Abstracts and Presentations**

- T. Moermond, University of Wisconsin-Madison, 16 July, 1998,
- Symposium on "Conservation where there will be no parks: Approaches through watersheds, sustainable resource use, and local communities."
- Society of Conservation Biology International Meeting, Sydney, Australia. "The watershed as a key scale for the integration of conservation and agriculture: Community planning of natural forests and livestock in Latin America."