



Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program

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Trip Report: Ecuador and Bolivia

22 March – 20 April 2010

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Ruben Botello and Ana Karina Saavedra (PROINPA, Bolivia), and Jorge Delgado (ARS)

Purpose of Trip: Review progress and present research results from prior CRSP in Bolivia and inform USAID about accomplishments and future work. Review and plan research activities in Ecuador and Bolivia.

Sites Visited: Ecuador: Guaranda, Chillanes, and the watersheds of Alumbre and Illangama
Bolivia: PROINPA headquarters and Tiraque watersheds, Cochabamba, and USAID, La Paz

Description of Activities

Summary: Alwang visited Cochabamba to review research from prior CRSP and present findings to PROINPA staff, local decision makers and stakeholders. Two half-day workshops were held at PROINPA headquarters in Cochabamba with participation of a broad spectrum of stakeholders. Visit to USAID/La Paz helped solidify linkages between USAID and SANREM. Workshops in Ecuador led to revisions to research program there. Visit to Bolivia (Cochabamba and La Paz) led to revisions to work plan and stronger linkages with the USAID mission.

Alwang visited Cochabamba to review research from prior CRSP and present findings to PROINPA staff, local decision makers and stakeholders. Two half-day workshops were held at PROINPA headquarters in Cochabamba with participation of a broad spectrum of stakeholders. Many comments were provided with the bulk of them focusing on the need for follow-up to the extensive community engagement conducted during the last CRSP. Stakeholders were also interested in continuing the watershed monitoring efforts.

Botello and Alwang visited USAID, La Paz to present findings from prior CRSP and coordinate activities in current CRSP with USAID. Meetings were held with Ricardo Roca and Holly

Ferrette. USAID noted that it is important that in the current phase, SANREM's impact could be enhanced if activities supported existing USAID projects. Discussions indicated that the most likely synergies could be found in the "Food Security Program (*Seguridad Alimentaria*)", on-going cacao programs and with the bio-inputs plant (supported jointly by USAID and SANREM) at PROINPA. Alwang agreed to facilitate contacts between Bryan Bailey at USDA's Perennial Crops Research Facility in Beltsville, MD, USAID/La Paz and PROINPA to promote bio-control development for cacao. Several key contacts were identified, with the most prominent being Fundacion Valles, the NGO engaged in the *Seguridad Alimentaria* program. Subsequently, Botello conducted a series of meetings with Fundacion Valles and PROINPA/SANREM where agreements about cooperation were discussed. Botello and Alwang met at PROINPA/La Paz with Bruno Condori to review and revise research publications.

Alwang visited Santa Cruz potato markets to finalize data collection for SANREM potato market research project. He interviewed 45 market participants and 5 key informants, including the administrative director of the market.

Alwang, Nelson and Victor Barrera (INIAP, Ecuador) participated in the IPM CRSP gender workshop held in Guaranda Ecuador to obtain information about potential gender activities for the SANREM team. Maria Elisa Christie (Virginia Tech) led the workshop.

The SANREM team underwent three days of intensive planning and field visits to create a research plan for current and subsequent years (April 11-14 in Guaranda, Ecuador). April 11 was spent reviewing the proposal, reviewing research design and progress in Ecuador and Bolivia, and discussing alterations/enhancements to research design. In particular it was noted that the team needs to establish a protocol for measurement of soil quality/soil health that is consistent with the needs of the project, of Dr. Delgado's nitrogen index and of the global cross-cutting soils initiative. The group agreed that the protocol could not be established prior to final decisions about the research design. The Ecuador and Bolivia research teams presented what had been done to date on setting up experiments. Discussion centered on alterations to existing activities. Dr. Flowers presented and discussed his efforts during the previous SANREM phase to monitor water quality using counts of macro-invertebrates. He explained that such measurement would be relatively inexpensive to continue and could be used to engage local stakeholders (particularly young people) in the project. The team agreed that such monitoring should continue as it would provide an indication of off-farm impacts. The team also agreed that efforts to monitor rainfall and other weather events and water flows should be continued. The prior phase of SANREM invested significant resources in instrumentation and this information is an essential project input.

Following site visits to the lower (Alumbre) watershed (April 12) and upper (Illangama) watershed (April 13) discussion centered on specific alterations to the research design. Objectives for lower watershed research include: 1) Identification of suitable perennial hedgerows appropriate for maize/beans-based rotations in the area; 2) Creation of annual crop systems that are less reliant on purchased inputs; 3) Development of improved cover-crop management regimes; 4) Introduction of additional perennial crops such as avocados, citrus, guava, grape and higher-valued woody tree species. In the lower watershed, land-holdings are relatively larger (compared to the rest of Bolivar province), but soils are highly degraded and

susceptible to further erosion. Means are needed to increase soil retention, improve soil health, while increasing food security, diversifying agricultural systems, and increasing returns to agriculture. Blackberry has particular promise as a relatively high-valued crop, but faces serious disease conditions because of high rainfall during the rainy season. The mayor of Chillanes indicated that he was interested in exploring the potential for value-added processing of blackberry in the area (Chillanes currently has more than 1,200 of Ecuador's total land area of 6,000 hectares in blackberry). Such an investment would improve returns to blackberry producers and thus make conservation agriculture more profitable in the region.

For upper watershed research, the team agreed about the following specific objectives: 1) Means of intensifying the pasture component of the potato-pasture rotation to get more out of potato; 2) Means of intensifying the annual crop rotations which include quinoa, faba and oats in rotation with potato and pasture; 3) Means of increasing available phosphorus to improve potato yields; and 4) Addition of appropriate perennial strips planted on contour, interspersed with annuals to improve soil retention. In this watershed, land-holding is relatively low, and many of the innovations of the prior SANREM project have been widely adopted. Improved pastures have increased returns to milk production and potato yields have grown as a result of improved potato varieties such as INIAP's late blight-resistant *Fripapa*. Steps are needed to intensify production within existing rotations and increase diversity in annual crop rotations.

The group agreed that carbon content in the upper watershed was not a problem and that efforts to increase carbon retention were likely to fail. This finding was due to the volcanic nature of the soil and its already-high 14% estimated organic content. Instead of carbon, the group agreed that the research should focus on making limiting nutrients (mainly phosphorus) available and retaining soil on fields.

On April 14, the morning was devoted to a detailed presentation to local, regional and national authorities about the accomplishments of the prior SANREM project.

Dr. Delgado joined Gallagher, Botello and Saavedra for a visit to research sites in Bolivia. They met with stakeholders in Cochabamba and Tiraque, inspected the current and proposed research sites and conducted detailed discussions with scientists. The strategy in Bolivia to address soil fertility and pathogens directly was confirmed. Gallagher also visited Ricardo Roca at USAID/La Paz.

Observations:

- 1) Water monitoring (quality and intensity/flow) and weather monitoring will continue under the new phase of project. These activities were started in the prior project phase and the team decided that they would provide essential inputs into the evaluation of impacts of CAPS. They have also been used to engage citizenry. Flowers agreed to develop a system for school-based monitoring of water quality using aquatic macro-invertebrates.
- 2) Existing pine plantations in upper watershed are not being efficiently managed. There is a need to improve management to increase returns for uses such as firewood and to optimize the erosion control associated with exotic species. Stakeholders are not

enthusiastic about the use of exotic species (such as pine and eucalyptus) but many recognize that these could play a limited role in erosion control and income diversification. The project research will focus on native species which have high values and are appropriate for erosion control. Some highly vulnerable areas in both watersheds should be reforested for erosion control. Many of the reforested areas can not be harvested economically and will remain in conservation uses for the foreseeable future.

- 3) SANREM research has had high levels of exposure at national levels in Ecuador. On April 10, the President's weekly radio message focused on achievements of the SANREM/SENACYT project in increasing adaptive watershed management. Barrera has successfully submitted to SENACYT a project proposal (for \$5 million) expanding the process to three highly sensitive watersheds in other areas of Ecuador.
- 4) The government is interested in reducing upland erosion as a means of limiting downstream flooding. The coastal regions are annually afflicted by flooding. This damage implies high rehabilitation costs, part of which could be reduced by less run-off related siltation.
- 5) The prior SANREM project identified several options for soil conservation on steeply sloped fields. These include: contour plowing, live barriers, banded planting, diversion ditches, natural terracing, intercropping annual and perennial crops in strips. Field observations show widespread adoption of these practices, especially in the upper watershed. These practices need to be incorporated into CAPS.
- 6) Available nutrients represent a significant barrier to increased productivity in all watersheds. Phosphorus availability is constraining in the upper Ecuador watershed; nitrogen and potassium constrain production in the lower Ecuador watershed.
- 7) Substantial participation by producer groups and local government in our research has led to wide-spread uptake of our recommendations. For example, local governments in both the upper and lower watersheds and the Provincial Government of Bolivar Ecuador are now engaged in land-use planning exercises that use SANREM research as a basis to make decisions.
- 8) There are some big problems in the Bolivia site concerning erosion potential, removing crop residue and impacts to soil and water quality. Given limited fertility in the area, the current cropping systems will not be sustainable and, in the long run, the productivity will be lowered if these problems are not addressed. The project goals of cover crops and potato systems fit well and have strong potential to increase yields and develop sustainable systems that will be important for Bolivia and the Andean region.

Suggestions and Recommendations:

- 1) Penn State will develop a final proposal for CAPS research design for Ecuador which combines a mix of ongoing research activities and new ones identified during field visits and group discussions. This will be shared during the May meetings in Blacksburg.
- 2) Based on this proposal, a final protocol for soil health measurements will be created. This protocol must be economically efficient, consistent with the cross-cutting soil health minimum data set, and consistent with Dr. Delgado's need for data inputs for the nitrogen index. Soil analysis will be conducted in-house in Ecuador (at INIAP's soils lab), but PROINPA will need to sub-contract this analysis.
- 3) Flowers will prepare protocol for measuring soil health using populations of insects; this protocol will be similar to the biological measurement of water quality.

- 4) The team will incorporate CAPS components into the small-scale erosion trials established by the prior SANREM project. These trials were created to provide erosion information to feed the soil erosion modeling efforts under the old project; they can be adapted to provide information about the impacts of CAPS components on soil and nutrient loss.
- 5) The larger-scale field trials already established will be modified and expanded based on the results from suggestion 1 (above). The Ecuador team has sufficient resources to expand these activities (within reason).
- 6) Nelson will provide inputs into design of agro-forestry experiments, will research growth rates and economic values of alternative species, will prepare a module on pine plantation management, and will examine alternative means of seed and vegetative propagation of native species.
- 7) INIAP and PROINPA will identify suitable candidates for long-term training.
- 8) INIAP and PROINPA will create mechanisms for regular contacts with USAID to enhance consistency between SANREM activities and USAID programs. Barrera and Botello will meet at least every 6 months with USAID staff and will pursue linkages between USAID projects and SANREM.
- 9) Barrera will investigate means of linking the current SANREM project participants into his expanded (see above) adaptive watershed management program. In particular, there is need for expanded training and data collection as a part of this expansion. This might expand the resource base for CAPS research in Ecuador.
- 10) Alwang and Backman will pursue linkages between USDA's Sustainable Perennial Crops lab and USAID/PROINPA interests in Bolivia.
- 11) Barrera will incorporate a series of questions about adoption of conservation agriculture practices into the IPM CRSP baseline survey. As the IPM CRSP is just beginning to work in the area (on blackberry, tree tomato, maize and beans in the lower watershed; and on potato disease control in the upper watershed), a baseline survey will be conducted with funds from the impact assessment global theme (led by Dr. Norton, Virginia Tech). SANREM will add a limited series of questions to measure the current spread of adoption to create a project start baseline. Alwang will assist Barrera.
- 12) Alwang and Barrera will work to ensure that SANREM benefits from IPM CRSP research and that the SANREM research is as relevant as well as feasible for the IPM program.
- 13) Alwang will set up a scholar site to facilitate information exchange among team members.

List of Contacts Made:

Name	Title/Organization	Contact Info (address, phone, email)
Juan Arevalo	Fundacion Valles (USAID Food Security project)	Cochabamba, Bolivia
Osvaldo Lopez	Adivsor and economic development specialist, Municipality of Chillanes	Chillanes, Ecuador
Ramiro Trujillo	Mayor, Chillanes	Chillanes, Ecuador