EXTERNAL EVALUATION PANEL REPORT 2002

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INTRODUCTION

The External Evaluation Panel is an integral component of the Collaborative Research Support Programs. Established as a mechanism for ensuring long-term scientific integrity and independent and continuous evaluation, the EEP plays an important and essential role in the CRSP projects.

This year's EEP report is an in-depth review of the following projects: Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America (Spanish Title: Planificacion Local Agropecuaria y de la Naturaleza -- Project PLAN); Livestock Development and Rangeland Conservation Tools for Central Asia (LDRCT); Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa (LEWS); Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa (POLEYC); and Improving Pastoral Risk Management on East African Rangelands (PARIMA)

The Management Entity and the project's Principal Investigators provided project publications and documents to the EEP. In addition to the paper review, EEP team members participated in a 9-day site visit to Kenya and Southern Ethiopia for the review of the East African research program. The Latin American research program was reviewed through a 4-day site visit to Ecuador. The Central Asian research program was reviewed through a day of presentations and discussions between the EEP and project team members based in the U.S

Teams of two EEP members conducted the reviews. The External Evaluation Panel for this report were Dr. Thomas Thurow, University of Wyoming who serves as Chair of the EEP and as team leader for the site visit to East Africa; Dr. Ahmed Sidahmed, IFAD, who served as team leader for the site visit to Latin America and for the review of the Central Asia project; Dr. Bernard Engel, Purdue University, EEP team member for East Africa and Central Asia and Dr. Keith Moore, Virginia Polytechnic University, EEP team member for Latin America.

The EEP is guided by a scope of work developed jointly by the USAID Program Manager and the Program Director. The Scope of Work as well as the itineraries and agendas, project funding history, a complete list of materials provided and project team members is located in the Appendix. Project Principal Investigators are invited to respond to the EEP report and the responses are located in the Addendum to the report.

LATIN AMERICA RESEARCH PROGRAM

This report is the outcome of the External Evaluation Panel mission to Ecuador. The EEP team members were Dr. Ahmed E. Sidahmed, Technical Adviser/Focal Point, Livestock and Rangeland Systems Technical Advisory Division, International Fund for Agricultural Development (IFAD) and Dr. Keith M. Moore, Program Director, Office of International Research and Development, Virginia Polytechnic Institute and State University. Dr. Sidahmed served as team leader for the mission to Ecuador. The EEP reviewed the "Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America" project (Spanish Title: Planificacion Local Agropecuaria y de la Naturaleza – PLAN). The mission participated in a full day presentation of the progress made by PLAN in each country and an overall analysis by the lead Principal Investigator, Dr. Timothy Moermond. This was followed by two days of field visits to farmer's fields and pastures, watershed areas, and a farmers' organization. Discussions were also held with officials at the Baeza municipality. The last day was reserved for a wrap up meeting in the morning and a closing meeting in the evening where we discussed the preliminary summary of our findings and received feedback from the PLAN team. (See Appendix for detailed itinerary).

A great many people contributed to the success of this mission. The team in Ecuador deserves special recognition for the high standard of organization. The EEP wishes to thank Ms. Kattya Hernández and Ms. Monica Navarrete, Heifer Project International – Ecuador; Gustavo Mosquera, Isabel Murillo and Alex Leguizamo, FUNAN; Marcia Peñafiel and Armando Castellanos, JS/CDC; and Fabian Calispa, Fundacion Terranueva. The EEP also wishes to thank Arturo Moreno, Project PLAN representative from Mexico and Timothy Moermond, lead Principal Investigator. The EEP is appreciative of all the community members and officials of the municipality of Baeza who took time to meet with us. A very special thanks to Estalin Molina and the members of APROPAL, the Association of Producers of Las Palmas, for allowing us to tour their farms and patiently responding to our inquisitive questions. The EEP encourages PLAN to better brief community groups on the purpose of the EEP site visit in the future. And finally, the EEP extends its heartfelt thanks to Carlos Vacaflores, Coordinator Project PLAN - Bolivia who had the unenviable task of translating for the group. The EEP acknowledges the complexity of the research programs and commends Dr. Moermond and the team for a job well done.

Upper left: Members of APROPAL, the Association of Producers of Las Palmas; Upper right: Bridge built by APROPAL tourism project, supported by the municipality of Baeza. Left: Arturo Moreno and Sailor Erazo discuss alternative productions systems during a farm visit.

Above left: Fabian Calispa of Terranueva. Above, right: Tour of greenhouse experiments with from right, Estalin Molina, Extensionist, Carlos Vacaflores, PLAN Coordinator - Bolivia and Keith Moore, EEP member. Below Right: Gustavo Mosquera, FUNAN, Ahmed Sidamed, EEP team leader and Arturo Moreno, PLAN Representative - Mexico.

Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America (Spanish Title: Planificacion Local Agropecuaria y de la Naturaleza -- Project PLAN)

Report by Dr. Ahmed E. Sidahmed, International Fund for Agricultural Development (EEP Team Leader) and Dr. Keith M. Moore, Virginia Polytechnic Institute and State University

Summary

The PLAN project is based on a sound partnership and consensus building approach that has set the foundation for a process which should lead the teams to develop an interactive, problem solving action research program. The EEP is of the opinion that this move should be developed and fine-tuned during the remaining time of this phase (until September 2003). However, development and implementation of full-fledged systematic participatory action research capable of addressing the attributes of the problem model at the local, national and regional levels would require the extension of the project to a second phase. Therefore, the EEP is strongly supportive of an extension of the PLAN project into a second phase.

Research Program

The project PLAN, like all GL-CRSP projects, is focused on a problem model. The Problem Model (PM) for PLAN defines a process which aims at the improvement of Latin American forested ecosystems endangered by poor natural resource management practices. The PM is quite clear and its development has matured as reflected in the change of project title from "Livestock-Natural Resource Interfaces at the Internal Frontier" to "Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America". This problem model is scientifically sound from a disciplinary perspective: do not encroach on the forest, improve soil fertility, improve pasture, improve livestock management (less animals, higher quality), minimize shifting cultivation, and consequently, sustainable livestock-based forest ecosystems are possible to maintain. The research has evolved towards an interactive and community based problem solving approach. (See Box 1).

Holistic Approach

The EEP acknowledges and appreciates the effort being made to develop a holistic multi-activity research program. The project strives to understand the physical, ecological, economic, social, cultural, and political context of the

Box 1: Description of the PLAN Problem Model Approach

The Project PLAN Problem Model provides a process for describing, studying, planning, implementing, and monitoring the integration of livestock, agriculture and natural resource uses in natural forest ecosystems in order to achieve sustainable livelihoods through four step-like components. The PM is supporting a scientifically sound approach which is operationalized by an iterative participatory process involving problem definition, individual experimentation, and community application. The four steps around which the processes are organized in Ecuador were examined as detailed below:

- **identifying potentials and limitations**- soils are poor. Encroachment of cropping and livestock raising on the forested areas is causing degradation and mud slides. The situation has been deteriorating as a result of deforestation caused by the shifting cultivation and pasture production. Conflict over resource access and poor social integration/bonding among a recent migrant population provide little social capital on which to build a sustainable planning process. However, water is plentiful, there is a rich diversity of flora and fauna, and a younger generation of farm families who are seeking the means to develop a sustainable livelihood in the area.

- **evaluating current practices and experimenting with alternatives**- management is not rationalized to maximize production outputs, but to minimize investments of capital, management and labor. Farmer/researcher experimentation focuses on intensifying exploitation of existing farm resources and reducing infringement of the forest through rotational grazing with fewer livestock, improved pasture management, and alternative crop production.

- **generating a participatory process**- farm family production and livelihood concerns are and have been identified through a participatory diagnostic process involving researchers, local NGO representatives, and farming community members. This iterative process targets the development and testing of solutions compatible with local objectives.

- **generating a community planning process**- through the use of an NGO-supported "extension" agent within the local population, some farm families have formed an association seeking to enhance the sustainability of the local community. Acting as a group, they have taken the initiative to work together in making necessary improvements in environmental conservation, productive activities, and income generation.

problems at the level of the community and the watershed. Central to the success of incorporating host country priorities has been the concept workshops which allows integrating the local, national and regional needs and priorities into the research agenda. However, the EEP is concerned about the *ad hoc* nature of the research agenda and, to some extent, loose coordination between the country programs. Systematic interdisciplinary organization for participatory action research with a focused direction towards interdisciplinary work will greatly benefit the project.

The guiding principals and perspectives, conceptual frameworks and processes, strategies and methods being adopted, developed and applied as well as the comparative experiences of the three countries in implementing the same Problem Model and Approach should be well documented. The EEP feels strongly that a methodological process should come out of the research. The holistic approach and the community-based development process should be properly recorded. It is the opinion of the EEP that this should be a priority for the coming year. A scientific description of the process and development of the holistic approach would be of great value to the scientific and development communities.

Goals and Objectives

The objectives and activities of the project are well integrated in this Problem Model. There are three goals of the project: (1) determine how to incorporate livestock, agriculture, and natural resource uses into the environment in a manner that is ecologically sustainable and that will improve the livelihood of the local residents; (2) develop a set of processes useful for implementation of community development and natural resource management projects by local people in conjunction with external agents (i.e., how to achieve the first goal); and (3) provide training and institutional capacity building for current and future researchers and practitioners (i.e., develop a learning organization). This defines a complete overarching set of objectives for establishing the PLAN research agenda.

Goal One: Improve the livelihood of local residents.

The disciplinary science is of high standard and has been extensively, and appropriately reported. The move towards more interdisciplinary activities and participatory action research focusing on farm level integration of all crop, livestock, and soil management practices is applauded. Some of the current research supports the problem solving objectives (e.g. soil fertility and pasture improvement), while the research on livestock management should be redesigned in order to provide practical solutions to improved productivity, labor saving and increased household income. The production systems of the target zone are now better understood and production techniques for improving management practices have been identified in Ecuador and to some extent in Mexico and Bolivia.

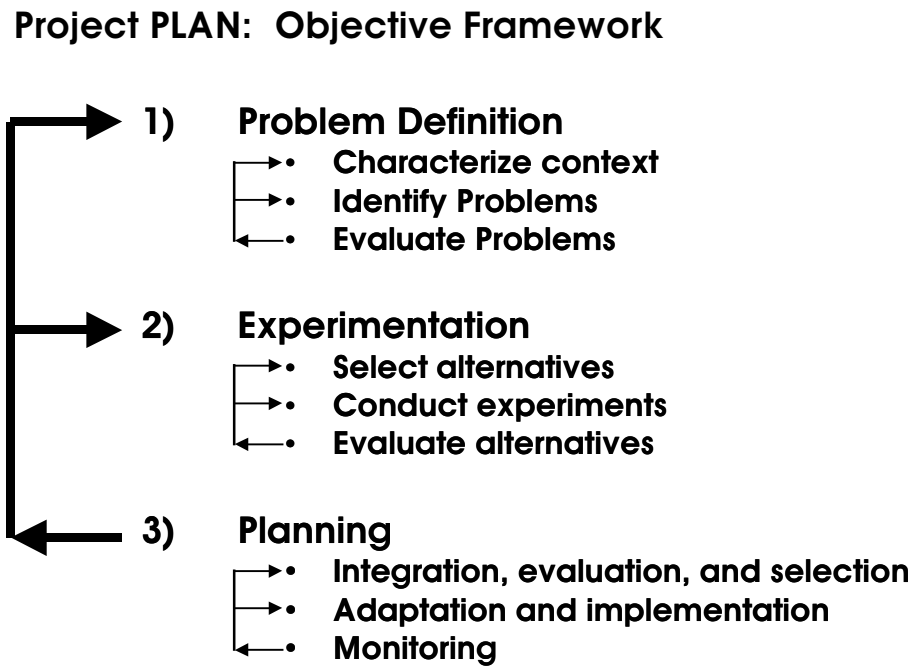
Although the technologies for improving and sustaining the natural resources and livestock

production are understood by participating farmers, there is a need to strengthen farm management and integrate use of research knowledge in order to maximize livestock output. Also, the reasons for poor uptake of the technical recommendations by the individual farmers need careful assessment. For example, the uncertainty of the current milk market might be the reason for poor harvesting of milk and the tendency for the farmers to diversify into other income generating activities. This supposition is speculation, as the research to answer this question has not been conducted. NGOs are applying the insights of social science research in the design of on-farm experiments with farmers, but are not benefiting from continued research on the implementation of those insights to assure development of sustainable production system dynamics. The EEP is of the view that sustainability must not be examined in a static or additive manner, but in terms of the dynamic interactions of the development trajectory focusing on what can change non-sustainable practices into sustainable systems.

Goal Two: Develop set of processes for community development and natural resource management projects.

While contextual social science issues have been researched (perceptions, conflicts, household structure and strategies, land tenure, and social capital) consistent with the first goal of the PM, social science research contributing to the second goal of the PM is minimal. Social science issues of

Box 2: Planning for Appropriate Alternatives and Adaptive Management



community and leadership development, collective management of resources, or mobilization of small groups for changing NR management practices needs further investigation. NGO partners have commented on how they have changed their approach from introducing new ideas to building on local initiatives. This strategy has been influenced by the fine participatory appraisals and contextual research conducted. Consequently, the introduction of new technologies has been built on local knowledge in this way engaging farmers to invest in learning new knowledge and in reallocating resources. However, information on the mechanisms by which this relationship between farmers and change agents has been established has not been documented.

The EEP was engaged in an interesting and useful discussion of the proposed "process" presented by the project team (See Box 2). It became obvious during the discussions that the proposed "process" could lead to a well integrated and problem solving research if the resources (e.g. collective thinking and participation of the members of the teams in each country) were focused and the plans implemented in a systematic manner. Activities have certainly been undertaken to promote community organization and development, but these efforts have not been documented in a way that could lead to the production of scientific knowledge to inform other development practitioners or to scale up project activities. The PLAN team needs to be self-reflective about their process and the mechanisms they use in order to implement their participatory research agenda. There is a need for analysis of leadership development and organizational dynamics. In sum, an explicit research agenda to achieve the second goal needs to be formulated. The EEP recommends that a sociologist who is an expert in participatory action research, organizational development and small group dynamics be added to the team. Priority in the coming year should be given to documenting the process.

Goal Three: Training and institutional capacity building.

EEP noted with satisfaction that training is one of the strongest aspects of the PLAN project. Another observation was the fact that the training was accomplished with considerable leverage of funds from other resources. Overall twenty-two students were trained/ or involved in training at the BS, Master and Ph.D. levels with a significant number of the trainees being from the three host countries. There is a mix of short and long-term training and most of the degree students are getting their training in their respective countries. Other training was achieved through workshops and conferences. However, the EEP questions whether the research agenda is driving the selection of trainees or if the trainees interests direct the research agenda. The EEP recommends that students be selected to participate in the project based on a focused research agenda with an overarching impact on the PM. A training plan that addresses the research agenda should be developed.

The effort to train the farmers has suffered from underfunding. The PLAN team is to be

commended for including representatives of the farmers in project meetings. However, the proposed host country farmer to farmer exchanges have not occurred on a regular basis or in substantial numbers to have an impact. These planned exchanges were cut due to the low funding level in the first years. Also, there was not a substantial emphasis within the project plans placed on training farmers. The EEP recommends that a plan for training be developed taking into consideration a very strong involvement of the farmers and that maximum effort should be directed towards a program which trains a broader sector of farmers and local professionals in community planning, interactive multidisciplinary research and in the analysis of the results (e.g. using farmers' field school approach or similar).

The PLAN team is highly diverse, representing a range of disciplines and institutions, and they have truly formed a "learning organization " capable, if properly focused, of developing a holistic research agenda. The exchange with the Ecuador team and the interaction seen between the three country representatives has given the EEP the impression that the PLAN researchers and NGO partners are learning from the experience of the past three years. Certainly there is an evolution in the thinking of the Project team favoring the move towards the undertaking of the complex community based research approach. The Ecuador Team and, to some extent the Mexican and Bolivian Teams, have modified their sub-programs. This was reflected in the extent of collaboration between the NGOs, the farmers and the professionals in Ecuador.

Project Management

The project partners have developed a good deal of mutual trust and self-confidence, which has encouraged open communications. If a single reason can be identified, this appears to be due to the open leadership of the PI. The PI should be commended for his effort to delegate the research tasks to the national coordinators and for his interpersonal capacity of team building and encouragement. The PI has facilitated a research environment that supports creativity, openness and productive working relationships. The team spirit and collaboration between the national team members (as demonstrated in Ecuador) and between the four countries has been a strong aspect of the project management.

The Ecuadorian partners appear to have very solid intellectual bonds and have developed clear lines of communication. Communication within the Mexican Team is reported to be equally as strong. Bolivia is more complex with two sites and two functionally different NGOs involved (one for research and one for development, each having responsibility for a single site). The quality of communication among U.S. collaborators could not be determined as none of the US based team were present for the review. However, all of the team members from the host countries we met were pleased with the opportunities, form, and frequency of communication.

The project management appears to be administratively centralized in the PI with reporting, financial management and overall

analysis of the research results. On the other hand, effective decision-making for most initiatives is decentralized and shared by the body of co-PIs from the four countries – local co-PIs appear to have greater influence over locally relevant decisions. This form of decentralized decision-making has been demonstrated as best for the encouragement of creativity and for assuring relevance and cost effectiveness of the identified researchable problems. Indeed, a coordinated research plan and a uniform approach for data collection verification, information sharing, etc. would positively influence project management and lead to considerable savings.

The yearly workshops, held to conceptually integrate the activities in each of the three host countries, are important mechanisms for consolidation of a common language to identify common problems and address issues across sites. Regional collaborators and team members have had a substantive role throughout the life of the project. They are interdisciplinary and action-oriented in their approach to the research as it has evolved through the various stages of implementation (from identifying and testing specific technological innovations through their integration in a production system reproducible at the community level).

Instruments to evaluate ongoing work (e.g. each year the workplan presents a set of evaluation criteria which are used by the project collaborators to evaluate project progress) are in place and should be useful. The utility of the indicators has not been demonstrated and warrants further consideration The evaluation should concentrate on the novel features of the research (e.g. the process of developing a community planning approach, participatory action research). Also the research should be oriented towards achieving a significant impact on the human welfare (and not only on the environmental sustainability aspects). These complex output targets need a thorough analysis of the expected deliverables (as mentioned above) which is a joint task of all teams but with leading responsibility being set on the shoulders of the PI and the UW team.

Impact

Although it is too early to identify any significant impact of the research program there are indicators of useful outputs (e.g. pasture improvement technology, training of a large number of students at the degree level). Indeed, the awareness, which has already been established about the importance of developing interdisciplinary research, is one important accomplishment. Also there is a progressive awareness about the need for resolving and minimizing the conflict between forest conservation and livestock/ crop production objectives. However, there is need to develop and specify the extent of the benefits (what, how and who), and the mechanism for dissemination of results (training, reporting, information sharing and communication of results). There are benefits to USA from supporting this research, which are reflected in the fact that almost half of the GLCRSP budget and about 40% of the training allocations are spent in UW.

BUDGET

The scope of the research is too broad for the budget and timeframe, although with leveraged funds a lot has been accomplished (hence, as stressed above, the need to set a clear research plan, develop an agenda and prioritize is critical to the success of the project). Project resources are not sufficient for such a wide range of activities without improved integration of research activities (and consequent economies of scale). Research needs to be more focused in order to match participatory action research with the budgetary resources available. The severely reduced budgets in the early years of the project have had beneficial effect on the development of a highly committed team of host country collaborators at the expense of a reduced level of contribution on the part of US collaborators. The small budgets could also have led to the ad hoc nature of the research agenda as individual leveraged projects were strung together to create a whole. The project has done very well in leveraging external funds, possibly because the project was under-funded for two years. For example the Project was able to expand its activities through leveraging national resources (in-kind contributions of the participating public and civil society institutions such as the local municipality, HPI and FUNAN etc.)

POLICY

The project goals have policy implications for land tenure and environmental protection. The project has been working at the micro-level up to this point and results have not advanced to the point of being able to influence national development. The policy level that this project is currently addressing is very much at the meso/micro-level. Issues involve the implementation of national laws (on land tenure, environmental protection) as they apply at the local level which is critical to address the agriculture/conservation interface that is the focus of this project. There is a strong emphasis on local policy development through support by the municipality for eco-tourism development and other community initiatives. These actions constitute implementation of sustainable development at the municipality level through collaboration between local organizations and local government facilitated by the NGO (e.g. FUNAN in Ecuador).

The various research activities have direct policy implications. For example the main thesis or PM is the recognition (and adherence) of the crop/ livestock farmers to the sustainable forest conservation and protection targets. Such implications were not explicitly recognized, and the engagement of the policy makers has so far been very limited (to the level of the municipality in case of Ecuador). Also, research has not focused on how policy makers (implementers) are being engaged and the consequences of that engagement although the results of the research are showing how national policies impact local decisions in ways that directly affect the farmer's welfare and the future of the conservation units in juxapostion to these communities. It is important to recognize that local policy implementation has direct consequences on individual and collective resource management decisions (e.g. on land tenure

policies). This point was reflected in the legitimizing practices of local authorities (e.g., agreeing to assist in development of the APROPAL eco-tourism project) and constitute an intermediate level of policy linking national legislation with local application.

EEP Recommendations

- ❑ The PLAN project should be extended into a second phase.
- ❑ Priority should be given to the development of a prioritized, focused and systematic research agenda based on a holistic approach.
- ❑ The EEP feels strongly that a methodological process should come out of the research. The holistic approach and the community-based development process should be properly documented and analyzed as a priority for the coming year.
- ❑ The move towards more interdisciplinary activities and participatory action research focusing on farm level integration of all crop, livestock, and soil management practices is applauded.
- ❑ The EEP recommends that an expert in participatory action research, organizational development and small group dynamics be added to the team.
- ❑ A training plan that addresses the research agenda should be developed. The EEP recommends that a training program with very strong involvement of the farmers also be taken into consideration.
- ❑ The PI should be commended for his effort to delegate the research tasks to the national coordinators and for his interpersonal capacity of team building and encouragement.
- ❑ The complex output targets need a thorough analysis of the expected deliverables. This should be a joint task of all teams but with leading responsibility being set on the shoulders of the PI and the US investigators.
- ❑ There is need to develop and specify the extent of the benefits (what, how and who), and the mechanism for dissemination of results (training, reporting, information sharing and communication of results).

THREE THINGS THE PLAN TEAM SHOULD DO:

1. Document and analyze the methodology as applied in the three countries as a whole team exercise. Construct a grid with the three broad levels and sub-levels of the Project PLAN Process (Objective Framework: Problem Definition, Individual Experimentation, and Community Application) on the y-axis and each of the communities across all sites along the x-axis. The objective is two-fold: first, to make explicit what has been accomplished (technical problems identified and solutions researched) and how (mechanisms of individual and community interaction) in each site; and second to compare your practices across sites to elicit the PLAN Model. This exercise could be done by small groups within country groups; and then comparisons could be made by mixed small groups, before a synthesis is prepared in a plenary session. The results of this exercise could be written up as a publication or briefing paper.

2. Set up tighter interdisciplinary experiments and activities recognizing that introducing new management systems and building local organizations requires cross-disciplinary collaboration and is a subject of research itself. The need for this has become very obvious from our discussion with two APROPAL member farmers. Although both farmers (one who owns a large farm and leaves its management to a landless contractor, and a small farmer who functions at the same time as an extension agent for FUNAN) know a lot about the benefits from several disciplinary research results (pasture improvement, range management, alternative farm enterprises, livestock improvement and management technologies) , the full benefit from this knowledge is far beyond reach because of lack of a comprehensive approach towards a better use of the livelihood assets which they own. For example one farmer knew that he could double milk yield and reduce the number of dairy cows but refrained from this because of a variety of reasons (lack of economic pressure, lack of hired labor, etc.). Putting such concepts into an integrated action research require leadership and a systematic approach for developing a problem solving research plan.

3. Intra project linkages: The EEP noted the existence of opportunities for useful linkages between the PLAN and two other projects embracing the goal of research which support the rural communities to develop their own action plan, as well as a capacity to monitor the Natural Resources. Such linkages could be realized between ICIMOD's Regional Range Project in the Himalayan – Hindu - Kush mountainous region; the ICARDA –IFAD supported Crop – livestock Integration project in the Mashreq (Middle East) & Maghreb (North Africa) region and the SANREM project in West Africa.

Central Asia Research Program

Livestock Development and Rangeland Conservation Tools for Central Asia

Report by Ahmed Sidahmed, IFAD and Bernard Engel, Purdue University

The External Evaluation Panel review of the Central Asia project entitled "Livestock Development and Rangeland Conservation Tools" was primarily a paper review with the addition of a full day of presentations at UC Davis on the project's progress (see appendix for agenda). The EEP team members for this review were Dr. Ahmed E. Sidahmed, Technical Advisor and Focal Point, Livestock and Rangeland Systems, International Fund for Agricultural Development (IFAD), who served as EEP team leader and Dr. Bernard Engel, Professor, Department of Agricultural and Biological Engineering, Purdue University. The EEP wishes to thank the lead Principal Investigator, Dr. Emilio Laca and Program Assistant, Ms. Mary Dalsin for arranging an excellent and informative program of presentations.

Summary

The EEP is satisfied with the performance of this research program and expresses special satisfaction with the effort extended by the Principal Investigator, Dr. Emilio Laca, and commends him for managing this complex undertaking, a project which involves several United States and Central Asian institutions. Of the four project modules, the two core modules are new areas, made very difficult to research in view of the transitioning and rapidly changing environment of Central Asia (CA). The Animal Production (AP) module includes very useful elements and is developing feed analysis in CA using state-of-the-art-technology. The co-PI for this model, Dr. Wolfgang Pittroff, should be commended for upgrading the TAMU Ruminants models for use with the current IT. However, the EEP is concerned that the Socio-economic (SE) module team did not gain fully from the generous funding provided by the GL-CRSP and the availability of a fully dedicated graduate student.

The EEP recognizes that carbon flux work, particularly the scaling up from sites to the region, is a significant technological and scientific contribution. This work on rangelands has never been done before and the techniques that have been developed are quite unique.

Research Program and Problem Model

The core modules (GIS and C fluxes) have received top emphasis and have made significant progress. However, the Problem Model (PM) targets related to providing local policy makers with information and tools to address the negative effects of the economic transition need further strengthening during the final year of this project phase.

The socio-economic component of the project, while included, is not as complete as other components at this point. Certainly the research results should assist in understanding, and consequently solving, the negative implication of the economic transition at both the physical and socioeconomic levels. Indeed, the C flux data set. The C model, GIS data set, sheep model, and the socio-economic model will have scientific and developmental value once completed and linked.

The project team was able to benefit from the knowledge and experience gained during the modification of the original PM and workplan, changed to include a more focused and manageable approach. Although the original scope of the research was appropriate given the budget and time frame, the primary goal to develop a comprehensive model was very ambitious and was based on separation of the biophysical research from the socio-economic research. The modified structure was more streamlined, effectively linking all parameters and research activities. Funding was adequate and was boosted by leveraging other resources (USAID, ILRI, IFAD, ALO, USDA).

Overall, the EEP believes that the accomplishments of the project are significant and up to expectations, taking into consideration the difficulties encountered in changing the hierarchical research culture of the senior Central Asian collaborators, as well as the language constraints.

New team members were identified appropriately as the research agenda was modified. This was reflected in the involvement of capable scientists from USDA, USGS-EROS, University of California-Davis (UCD), and Utah State University (USU); however, there is room for improving team interaction. For example, there is a need to allocate budgets for closer interaction between leaders of the four modules, and between the SE and AP model developers. The latter is necessary to allow for simulating the targeted improvement at the production system levels, and not solely on disciplinary levels; thus such models could be of direct use in changing policies and investment targets.

The EEP believes top-quality research is being conducted in all activities. The papers published or accepted are indicators of the quality and contribution of the project research to science. The linkage between the project's C flux activities with the USDA C flux research is an indication of the quality and value of the progress made. A further example is the AP module that is engaged in state-of-the-art technology and Alkane markers to understand grazing feed patterns and quality. In addition, the software used in the sheep and cattle model has been upgraded to keep pace with the

breakthrough advances in information technology. The GIS environment provides a low cost, state-of-the-art capability that is readily useable by scientists and policy makers. The SE module achieved very useful results by documenting the changes during transition, which in turn led to a transformation of the livestock production systems and marketing channels, from the collective systems to the smallholder private (peasant) and subsistence systems.

PROGRESS

There have been significant accomplishments during the project's current phase in developing appropriate institutions at both the human and infrastructure levels; these need to be sustained. The EEP recognizes that a network of trained scientists in Central Asia linking the three countries and their institutions is a significant contribution of the project. However, further investments in these institutions by the Central Asian countries is needed to capitalize on the efforts of this project.

During the next phase, care needs to be taken to ensure that the outcome of the C flux component is linked to the livestock development policies in the region. Also, there is a need to consolidate quantification data regarding the impact of various grazing practices on the C flux in certain areas; specifically, those areas which are building on the findings of the recently funded study on the impacts of extensive grazing on carbon balances.

The initiative taken by the Global Livestock CRSP in developing the GEF project for the World Bank (WB) on steppe rehabilitation is an example of further support for the project's research, allowing the models to move from research tools to tools of development and policy support. The workshop for the dissemination of the GIS tool and data set, planned for Fall 2002, is an example of the approach needed. The same approach should be followed when disseminating the tools generated from the AP and SE models. In addition, it is noted that the team has done a satisfactory job in publishing and presenting the project's results in scientific periodicals and conferences. The planned research briefs for this and the following year should be a high priority.

The research completed promises significant benefits for the US. For example, the C flux data and modeling are being linked to the ongoing US project to measure and model C flux from rangelands. The carbon flux work, particularly the scaling up from sites to the region, is a significant technological and scientific contribution. The C flux work on rangelands and the techniques that have been developed are quite unique. Several of the modelling tools and GIS tools are being used within the US and elsewhere. The GL-CRSP is using cutting edge technology developed in Central Asia to lead the integration of data from the 10 US carbon flux sites to allow satellite monitoring and prediction of carbon flux in grasslands. The redevelopment and modernization of the Texas A&M University sheep and beef models will be of significant use to US livestock producers and scientists. Improving the livestock feed analysis techniques using the Alkane markers

will benefit many research, training, and teaching institutions. The project has contributed significantly to the graduate studies of several US students, at both the MS and the PhD levels.

Policy

The SE research and modelling are expected to contribute to the dialogue around policy change by providing the policy makers with knowledge and options. The results of the C flux research could provide policy makers with tools to develop national action plans (e.g. Kazakstan). The project has engaged policy makers in the research process, and results have been provided to the senior officials at the ministries and different relevant institutions. However, there is need for the researchers and policy makers to be more proactively involved with each other. To accomplish this, research results could be produced in a fashion more easily understood and easier for the policy makers to use (e.g. publication of research notes, or participation of the policy makers in the stakeholder workshops). The GL-CRSP carbon work has been instrumental in the establishment of the WB effort in dryland rehabilitation. This represents the fact the CRSP role was to do the basic science and the WB is building on that to do more practical intervention.

Training

There has been effective on-the-job and short-term training (e.g. through short term visits to US universities or participation in workshops) for the national collaborators. Significant leveraged funds were awarded through the ALO grant which allowed short-term training for six Central Asian scientists in the US. Positive impact was also achieved through the training of 11 students from the region at the undergraduate (BS level), and through the interaction between the US graduate students, regional students, and professionals; however the training program has fallen short of achieving the goal of engaging Central Asian students in long-term degree training in the US. Although we acknowledge the constraints faced as a result of language, institution standards, high cost, and command economy research cultures, we see potential for improving training and capacity building during the remaining period of this phase and during the next phase. Therefore, the project extension for another phase should put more emphasis on institutional reform as a condition for supporting further research in each Central Asian country, and by linking the USA degree training programs with the sustainability of the research programs in their respective Central Asian institutions, assuring that the field work will be done in each country as part of the overall national research plan.

Project Management

In the absence of direct contact between the EEP and the regional collaborators and some of the module coordinators, we do not claim understanding of the full management structure of the program. However, we note the strength of the research teams and the ability of the PI to pull together a diverse group of researchers who were able to work together to accomplish the individual

(module) tasks. The key remaining challenge is the linkage between the various tasks which could lead to the integration of the results from all activities that would maximize the value of this project.

MISCELLANEOUS

Leverage: We would like to commend the project leadership in doing a very good job of leveraging more than $ 1.5 million in kind and over US$ 0.75 million in cash.

Regional scale: Certainly the project is regional, involving three countries; however there is overemphasis on working in Kazakhstan.

Inter-project collaboration: The PI has been actively involved in the activities of two other GL-CRSP projects. The contribution of LDRCT to the PLAN project is noted through the participation of the PI in the field training workshop in Mexico. LEWS developed the GIS software that is being used extensively in this project. Also, LDRCT worked in the farms and with the collaborators of the livestock component in the closed Livestock Sector and Economic Reform project.

The Teams working in the four modules are from more than one USA institution (USDA, USGS-EROS, USU, and UCD). The UCD teams are themselves from more than one department (Agronomy and Range Science, Animal Science, and Agricultural Economics). The EEP notes that this is one of the few cross-agency projects in the CRSP linking USAID, USDA, and USGS. This linkage has fostered a cross-agency project that is integrating US carbon data (never done between the US sites) and leveraging USDA/ARS resources to have a US/Central Asia combined data set, allowing satellite monitoring and prediction of carbon flux in grasslands.

Intra project linkages: The EEP notes the existence of linkages between LDRCT and other research projects in the regions (e.g. IFAD-ICARDA, ILRI, ODI, the Macaulay Institute, and the USDA CO2 Network).

EEP RECOMMENDATIONS

- The activities for the remaining period of this year and the workplan for next year should clearly identify steps to be taken to integrate the AP module and SE modules in a way whereby specific sets of reliable parameters from Kazakhstan related to forage production, range and livestock management, and livestock genotypes will be provided by the SE team to the AP team. The AP module will incorporate these parameters in running the module and provide outputs which will lead to developed simplified functions and provide tools for policy makers. The interaction between the two modules will have a specific objective of simulating the major production systems featured during this transitional period in the Central Asia countries.

- Additional recommendations are targeted towards bringing the policy makers closer to the research process. To provide the local policy makers with information and tools they know how to use and are comfortable using, perhaps an in-country scientist could partner with one of the US researchers and formulate a concrete plan for outreach to local policy makers. Suggested approaches include: invitations to come and visit research sites, and routine updates via research briefs or other published materials with specific examples as to how they can begin to implement what is being learned. This step should be emphasized in the next phase of the project since it is essential in order to counteract the negative implication of economic transition. Reaching out to a wider group of official is useful, as well. Senior officials should still be contacted; however, widening the circle of dissemination would be beneficial.

- In order to more fully link the USA degree training programs with the research programs in the respective Central Asian institution, the project should think about how to surmount the barriers that currently keep Central Asian students from engaging in long-term degree training in the US. If the barrier is language, how might learning English be accomplished for these students? Is it feasible to fund small-scale local language classes for students and Central Asian researchers? Are there any staff on the project to whom a stipend could be offered to arrange and/or provide language instruction? If the barrier is cost, who might offer additional money to facilitate language classes? An analysis of these obstacles would help both this project and future projects that might face the same problems. Including this analysis in a brief or research update sent to local policy makers as well as US NGOs would increase awareness as to the difficulties faced in working in a command economy research culture.

East Africa Research Program

Introduction

Thomas Thurow and Bernard Engel served as External Evaluation Panel (EEP) members for the on-site review of three Global Livestock Collaborative Research Support Program (GL-CRSP) projects in East Africa. Dr. Thurow, Professor and Head of the Department of Renewable Resources at the University of Wyoming served as Team Leader and as Chair of the EEP. Dr. Bernard Engel is with the Department of Agricultural and Biological Engineering. The projects reviewed were the "Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa" (LEWS) project led by Dr. Jerry Stuth, Texas A&M University; "Improving Pastoral Risk Management on East African Rangelands" (PARIMA) project led by Dr. Layne Coppock, Utah State University; and "Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa" (POLEYC) project led by Dr. David Swift, Colorado State University. The itinerary of these project visits, which took place from 18-29 June 2002, is included as the appendix of this report. The EEP thanks the PIs and collaborators of each of the projects for their collegiality and hospitality during our visit. The EEP also wishes to thank them and the GL-CRSP Management Entity personnel for their great efforts in planning, information provision, and logistic arrangements. The format of this report is organized to respond to the questions which formed the basis for the EEP Scope of Work – the EEP offers these perspectives in the spirit of constructive input. This is followed by summary recommendations for each project.

Left: Local leaders in Moyale, Kenya demonstrate "clean-milk" technology during the External Evaluation Panel tour.

Above: Accomodation near Marsabit, N. Kenya. Below: EEP members, PARIMA team meembers and collaborators at airstrip in Moyale, Kenya, prior to departure for Marsabit and Nairobi. Left: Peter Little and Layne Coppock at PARIMA outreach site in Southern Ethiopia.

Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa (LEWS)

Report by Dr. Thomas Thurow, Professor, University of Wyoming (Team Leader and EEP Chair) and Dr. Bernard Engel, Professor, Department of Agricultural and Biological Engineering Purdue University

Adequacy of the Problem Model and the Quality of the Scientific Research

a) How does the Problem Model (PM) address a development issue of importance to the country(s) in which the project functions. Is the PM clear, fully developed, and scientifically sound?

The project model focuses on developing an early warning system for pastoral management systems. By developing a system in the East African countries that tracks forage availability and predicts future forage production, the project develops an important capability that has many ramifications for local and regional planning. For example, assessment of regional forage availability can be an important source of information for aiding livestock marketing decisions, guiding livestock and people movement patterns, anticipation of areas of conflict associated with the movement patterns, anticipation of disease outbreaks, and positioning of relief efforts.

b) Is the scope of the research appropriate given the budget and time frame? Does the budget accurately reflect the needs of the project?

Yes, the project PIs have done an excellent job of leveraging existing funds by working with organizations such as the livestock ministries, Famine Early Warning System (FEWS), Arid Land Information Network (ALIN) and a host of NGO's that help distribute the information. Significant funds have also been leveraged from other sources that are complimentary and beneficial to the LEWS effort.

The project is making good use of their existing budget. Based on their track-record of accomplishment, there is good reason to believe the project would provide a good return-on-investment if additional funds were available — particularly in the context of developing capability that would link into PARIMA and POLEYC activities (see recommendations).

c) How do the objectives and activities fit the problem model?

The PI's have done a very good job focusing their activities to accomplishing the objectives embedded in their problem model, both in terms of research and outreach.

d) Are there aspects of the PM that are missing or are inappropriate? What are they?

There are no aspects of the PM that are inappropriate. It is an ambitious but do-able project, particularly given the significant buy-in by interested parties throughout the region. See the recommendation section for some suggestions of other complimentary lines of inquiry that would be helpful if time and funding allow.

e) What is the quality of research being conducted? Does the research make a significant contribution to the relevant field(s) of science and does it advance understanding of appropriate development processes?

The PI's and their collaborators have excellent credentials, experience, and commitment needed to conduct quality research which is then well distributed through their extensive contacts to the organizations that can benefit from their research output. Yes, the research makes significant scientific and development contributions in the field of creating, refining, and operationalizing a forage-based early warning system. The PIs have an excellent publication record based on research conducted within the LEWS project.

f) Does the research support a problem solving objective and link logically with the PM? Does it develop a technology that has development/science value?

Yes, the research targets an important information gap associated with anticipating and responding to forage-based dimensions associated with the inherent climatic variability within the region. There is both development and scientific value to this endeavor. For example, the technology and associated science that have been developed are being applied in several diverse rangeland environments in the US and elsewhere. There are many creative spin-offs of these products; for example, the approach being used in East Africa is under consideration for becoming the basis for input to a US forage insurance program mandated in the 2002 Farm Bill.

g) How does the team's expertise match the research agenda? Is the level of contribution appropriate to the area of investigation? How does the team interact?

An excellent team has been assembled to address the PM. Particularly impressive is the caliber, and dedication, of the PIs from the East African countries who have coordinated their activities, are aware of what each other are doing, and seem to work extremely well together. The PIs and collaborating members interact regularly via various communication channels. Overall, the group functions as a team. The PIs from the East African countries are characterized by each of them having the desirable combination of rank, scientific skill, and commitment to improving natural resource management. It is a fairly sensitive task to build such a team (because this inevitably means that some put forward by Ministry politicos, who do not have this combination of traits, must be politely steered away). The approach of the GL-CRSP in having a proposal development grant prior to the selection of the funded projects seems to have helped in

providing the leverage needed to separate the wheat from the chaff — i.e., Dr. Stuth could make the case that well-placed, skilled, committed scientists needed to be made available by the collaborating Ministries (from Uganda, Tanzania, Eritrea, Ethiopia and Kenya) or else the project would likely not be funded.

h) Is the research agenda appropriately matched to the project's resources? Why or why not?

The CRSP is getting a very good return on investment given the substantial leveraging that has been done, especially in terms of outreach and the development of technology that might be applied in other locations, including the US.

i) How effectively has new knowledge been applied in the modification of the original PM workplans?

The PI's have done a very good job of adapting to unanticipated challenges while still maintaining focus on the objectives of the PM.

PROGRESS

a) Considering the funding history of the project, evaluate the accomplishments of the project and provide rationale for your evaluations?

An excellent team of talented, dedicated scientists has been assembled from each of the East African countries that are part of the project (i.e., Kenya, Tanzania, Uganda, Ethiopia). A sound, well-dispersed monitoring network has been established. A validation procedure has been instituted to demonstrate product reliability and aid model refinement. Excellent progress has been made on establishing an effective dissemination network for the information both through the project and by working with other established information organizations in the region (e.g. the Famine Early Warning System (FEWS) and the Arid Lands Information Network (ALIN).

b) Should the project be continued or modified? Provide rationale for your evaluation.

The project should definitely be continued. The project is now in a trust-building phase which needs time to mature. The project should be continued so that the germination of this technology has a chance to take root and become firmly established while the project continues to refine the products and develop complimentary capabilities (see recommendations). There has been good progress at setting the stage to institutionalize the forage early warning capabilities. An estimate of about four years of additional involvement by the GL-CRSP is warranted. This estimate is based on time needed to establish trust in the network output and time needed to develop complimentary aspects of the forage-early warning system to its potential (see recommendations). Additional time is needed to institutionalize the process for creating the estimated forage availability maps so that it is self-sustaining throughout East Africa. The PIs are very sensitive to the need to institutionalize the monitoring and reporting network and are doing a good job at establishing a firm foundation for self-sustaining maintenance of their monitoring

network and integration of network output into a host of planning groups (ranging from pastoral communities to the office of the President of the respective countries). One of the most disappointing elements of development projects in general is that projects that demonstrate genuine promise and early success are cut off from support before the self-sustaining connections into regional infrastructure is firmly established. This is a successful project and therefore merits the investment/time that a next phase can provide to firmly establish their technologies under the care of the national governments.

c) In what ways have the impacts and outputs been significant? Evaluate the mechanisms for dissemination of research results.

Examples include monthly maps of forage availability on the Famine Early Warning System (FEWS) web-site and their monthly newsletter which is disseminated to about 600 government agencies and NGOs throughout the region. For example, the FEWS newsletter is a regular agenda item for update/discussion in the Kenyan President's cabinet meeting. The information is also well disseminated through the radio satellite system enabling remote NGOs to receive and disseminate the information. A collaborative relationship with the Arid Land Information Network (ALIN) has been established for dissemination via radio satellite. Maps of regional forage status are posted at some of the livestock market centers throughout East Africa and generate much interest by the traders. It is very important to stress the distinction between interest and trust. The transition from interest to trust is a very important period that needs time; potential users appreciate the potential value (hence the interest) but must be given the opportunity to validate, through their own experience, that the information is indeed something that they can rely on (hence the trust). Only then will there be an environment that will allow the program to succeed (as measured by institutionalization of the project by the regional governments).

d) What, if any, are the benefits to the US?

There are potentially multiple benefits of this work to the US. The information collected throughout East Africa has been used to improve the robustness of the NIRS and NUTBAL PRO models which are used in the US as well as globally. These models are in the process of being listed as a Best Management Practice in the US for the USDA-EQIP program. The technique of using point-based biophysical modeling and geostatistics resulted in formation of several studies that gave rise to the Texas Livestock Early Warning System with two pilot studies as well as the Nobel Foundation providing funding for a Livestock Early Warning System that covers a 47-county region in the south-central US. The automation techniques coupled with the point-based biophysical modeling is being considered for recommendation to the USDA-Risk Management Agency by a US company (AGRILOGIC Inc.) in their feasibility study to use it as the basis of the new forage insurance program mandated by the US Congress in the 2002 Farm Bill. The web techniques of automation of the satellite-based

weather was used to create the US forage/ weather and US livestock/weather web sites used in support of early warning and livestock management systems in the U.S. This integration of East African research into US benefits is an excellent accomplishment by the PIs.

There are also indirect benefits to U.S. development and diplomatic agency activities, in that these techniques offer potential for helping to identify areas experiencing, or about to experience, forage deficits in developing countries. This capability can be helpful in identifying where food-aid should be pre-positioned to alleviate a pending shortage of livestock products (e.g., milk) linked to a shortage of forage — famine among pastoral people is notoriously difficult to proactively plan for, the tools developed by this project can be a substantial help in dealing with these concerns. The forage maps may be helpful in identifying areas of potential conflict prompted by disputes over scarce resources (these conflicts can serve as an ignition point for reopening a host of animosities leading to broader conflict; e.g., there are several good examples of this sequence of events in the past decade in various locales around the Horn of Africa). The models developed by the project may also be useful as a stand-off/peer-in tool for current areas of conflict (e.g., Somalia) where current information is scarce.

POLICY

a) Do the project goals have policy implications? What are they and how have they impacted national development?

The products of the project feed into many levels of policy decisions regarding livestock production and movement patterns influenced by forage availability. As trust in the model output increases, and as corollary products are developed (see recommendations), the upside for significant policy impact will continue to increase. The scales of potential policy impact range from local to national and regional.

b) Has policy been incorporated in the project design? At what level are appropriate policy makers engaged? (Ministries, provincial, regional, local, etc.)

Yes, policy relevance is a primary consideration in project design and results dissemination at all levels of government as well as with the private sectors.

TRAINING

a) Rate the adequacy of the amount and quality of the training. Is there an appropriate mixture of long - and short-term training? Evaluate the impact of the training on participants.

There is an excellent mixture of short- and long-term training of Africans. This training is clearly building capacity of the collaborating institutions necessary to eventually sustainably operate the monitoring network and forage map generation

process and develop NIRS capability within the NARS of the collaborating countries. The project has also done an excellent job in leveraging other resources to increase the number of Africans that can receive graduate education. There are seven students who have received, or are completing Ph.D.s (five at TAMU, one at U. Nairobi and one at Makerere U. – funding is from DANIDA, NIFFIC, World Bank, EU and GL-CRSP). Three students are pursuing M.S. degrees (two at TAMU, one at Allemeye University — funding from the GL-CRSP, Texas Agriculture Experiment Station and the USDA-NRCS).

b) How does the human capacity building provide the basis for long-term capability to institutionalize the goals of the project?

The people being trained work within organizations that have a demonstrated vested interest in the products being generated by the project. A computer server and training on LEWS tools has improved development of the IGAD early warning newsletter. The Regional Center for Mapping Resource Development is building capacity as a LEWS zonal training center. An NIRS lab located at KARI is fully functional with Uganda's recently coming on line. Labs are in the process of being established in Tanzania and Ethiopia. ILRI was an initial recipient of NIRS lab in Addis Ababa in 1999. Worldspace container partners are RANET for country level reports and ALIN for regional level reports. LEWS has 2-3 Mbytes of content with these institutions.

PROJECT MANAGEMENT

a) Has the team developed mechanisms to ensure that local, national and regional needs and priorities will continue to be incorporated into the development of the research agenda? Do regional collaborators and team members have a substantive role throughout the life of the project?

Yes, these aspects are discussed above.

b) Describe the project management structure and function. Is it appropriate for the type of research being conducted?

Dr. Stuth and his support staff at TAMU provide overall management of the project. Robert Kaitho provides much of the day to day management and leadership for the project. He makes frequent trips to East Africa to work with team members. Team members within various countries are responsible for local data collection and analysis that provides data for generation of forage maps and their validation. This management approach has been very effective for the work conducted.

c) Evaluate the intra-project communication.

The project team seems to communicate regularly via a variety of communication avenues including email, fax, telephone, written correspondence, and project meetings. Both the quantity and quality of communication seem very good.

d) Does the project management function effectively? Why or why not?

The project management functions effectively based on the level of productivity demonstrated by this project. The individuals providing project management have instilled a sense of teamwork among the team that was very evident in their productivity as well as their attitude toward the project.

e) Evaluate the quality of communication with all members including host country collaborators. Is communication adequate, frequent enough, are there problems?

The project management seems efficient. There is good esprit de corps among the collaborators from the project countries. They interact effectively and are well informed as to what each group is doing. The various collaborators were asked and did not express concerns about project administration (i.e., the managing PI was handling communications and support as well as possible).

f) Do regional collaborators and team members have a substantive role throughout the life of the project?

Yes, the regional collaborators and team members are will integrated into the decision-making process.

g) How effective are operational decisions? What mechanisms have been incorporated for evaluation of ongoing work? Are they effective?

Operational decisions are effective. The project is commended for the excellent manner in which the diffuse monitoring network throughout remote regions of four East African countries has been established and maintained. Regular communications and a good validation protocol for tracking field and model performance is in place. The project accomplishments are really quite impressive, especially given the challenges associated with establishing and maintaining such a monitoring network.

MISCELLANEOUS

a) Has the project leveraged significant funding from other sources? Why or why not?

The project has leveraged significant funding from various sources and is benefiting from “in kind” collaborative efforts as well. Information provided by the LEWS project indicates that for every $1 they receive from the GL-CRSP they have leveraged $1.57 in complementary support from other organizations (including USAID-ASARECA, USAID-SPAN-ILRI, Rockefeller Foundation, DANIDA, FAO-TCP, TAMU- Kelleher Professorship contribution, World Bank, SANREM CRSP, USDA-NRCS, EU and NUFFIC). FAO and FEWS NET are considering proposals for development of peer-in capability to Somalia (i.e., estimate forage base using satellite data without actually getting the opportunity to set up monitoring stations within that difficult-to-access country) and USAID-REDSO-FEWS NET are considering a proposal to apply LEWS in conflict vulnerability assessment.

b) Is the project regional? Is the rationale for regionalization clear? What are the linkages to regional activities? How appropriate are they? Should changes be made? Why? Are its linkages appropriate to its regional activities.

Yes, the project is truly a regional effort. The linkages to organizations affiliated with livestock/ forage/drought aspects are thorough and appropriate. An indication of the extent to which a host of organizations are aware of and seek information about this project can be obtained from their web site, which has received over 1401 queries from at least 10 countries in last six months.

c) What is the level and quality of inter-project collaboration?

A small effort is on-going between the LEWS project and PARIMA project to create a marketing decision support capability for the northern Kenya and southern Ethiopia area. This effort had only been recently initiated (within the last year) so assessment of progress was difficult. Opportunities for further collaboration exist during the next phase of GL-CRSP efforts. If this is a priority, additional funds should be available for such efforts (see recommendation to ME section).

d) Describe any significant linkages to other research/ development projects (CRSP or non- CRSP)?

This has been already addressed above – see responses to questions II C, IV A&B, VI C.

e) Identify unexplored areas of collaboration between projects that are feasible and have potential.

Opportunities for additional validation of the LEWS forage production maps are possible by working with the POLEYC and PARIMA efforts. However, the current LEWS validation efforts may be sufficient and therefore further validation may not be warranted.

If the future direction of the LEWS project includes additional decision support capabilities related to livestock production and marketing, additional collaborative efforts with the PARIMA project should be explored. The PARIMA efforts may also provide an opportunity for more extensive evaluation of how pastoralists might use the forage maps and the level of trust pastoralists place in the maps.

Some of the plot data collected within the LEWS effort for validation might also be useful to the POLEYC effort for model parameterization and potentially for validation.

EEP RECOMMENDATIONS

- As the project continues to expand monitoring locations, emphasis should be focused in particular on sites where forage is the primary limiting factor to pastoral production systems in the regional landscape (i.e., on some sites water typically runs out before forage, on other sites forage typically runs out before water). The rationale for this suggestion is that it is most important that the confidence limits be as narrow as possible on forage-limited sites; confidence limits can afford to be somewhat wider on water-limited sites.

- Forage is correlated with a variety of other factors of interest to pastoral communities. For example, tick populations, and the incidence of diseases they transmit, may be strongly correlated with the same climatic factors that are manifest in forage production (forage production is a good bio-indicator that takes account of the amount of rain, timing of the rain, humidity, temperature, and wind; forage production is easier to monitor than tick numbers but the forage production and ticks may have a collinear relationship so that knowing forage production is the same as knowing the status of the tick population.). This type of information could be used to pre-position/target provision of veterinary services. Another example is that pastoral movement related to regional patterns of forage availability is often a precursor to conflict between pastoral groups. If the pastoral movement patterns in response to drought can be anticipated, the advanced warning could provide time to plan and negotiate how an influx of livestock could be accommodated (e.g., gear up for vaccination prior to entering a private ranch where disease has been controlled; agree where livestock may have access to a park as opposed to trying to cope with random incursions.). It would be very helpful if these types of relationships were quantified and then disseminated as bulletins which provide early warning of these concerns.

- The LEWS project is commended for the outstanding job they have done in disseminating information in a policy relevant format to organizations which reach different sectors with an interest in pastoralism (e.g., inclusion of forage status information in the Famine Early Warning System monthly bulletin which is used in particular, by government planning agencies and — at the other extreme — getting space on the radio-satellite network which reaches remote NGOs who, in turn, transmit it to a host of their client pastoralists.). Team members described how they are pursuing a host of other creative means for expanding dissemination of their products. Efforts to continue to creatively open new lines of dissemination are encouraged as opportunities arise. When distributing provincial/district - level maps, it is important to put a few key landmarks on the maps that are important to

pastoralists so that they can more easily get perspective (i.e., political boundaries should be complemented by also placing a few key mountains/rivers/well on the map.). Pastoralists are usually quite good at reading/interpreting maps/aerial photos once they locate a few landmarks that they can identify.

- It is extremely important that maps of current conditions/future projection be transmitted to all sources at the same time to ensure equal access to information that could possibly influence market price. As trust in the utility of the current/future representations grow, this will become very important (i.e., there is no room for a glitch in information distribution that puts valuable information in some hands before others). The PIs are sensitive to this concern regarding building even-handed trust among all stakeholders. The acceptance psychology of users of model output require time for validation and building of trust by stakeholders (particularly since many of the potential users have little or no experience with computers or modeling technology). Great interest by many sectors of the pastoral community/NGO/government has been expressed, but it will likely take several years before substantive decisions will be made which primarily rely on model output.

- A useful investigation would be to document the relationship between NDVI greenness images, forage availability, and livestock movement out of an area prompted by decline in forage quantity/quality. Modelers trust that these three values are roughly equivalent but there is some anecdotal evidence which indicates that forage availability (especially when quality of the forage is considered) is not well related to greenness images, consequently livestock move out of an area while the NDVI images still indicate the quantity and quality of the forage should be high. The LEWS study design is positioned to test the validity of this assumption. The results of this investigation would be of great value to all three of the GL-CRSP projects in the region, as well as a service to many around the world who use the readily available NDVI images for planning.

- A research element of the next phase that may be worth considering would be to document (using case studies of the five collaborating countries) a procedure of the successes and pitfalls associated with developing a self-sustaining institutionalization of a promising new technology (venues such as the J. of Administration Overseas or the Journal of Public Administration and Development are devoted to these types of issues; alternately, Dr. Stuth is the co-author of an article in Agricultural Systems describing team-building associated with a US-based research collaboration). We encourage the CRSP structure to consider breaking new ground by considering doing research on this important weak link between science, product development, and sustainable adoption by regional agencies that profess the value of the product.

Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa (POLEYC)

Report by Dr. Thomas Thurow, Professor, University of Wyoming (Team Leader and EEP Chair) and Dr. Bernard Engel, Professor, Department of Agricultural and Biological Engineering Purdue University

Adequacy of the Problem Model and the Quality of the Scientific Research

a) How does the Problem Model (PM) address a development issue of importance to the country(s) in which the project functions? Is the PM clear, fully developed, and scientifically sound?

The PM is structured to develop a capability to explore options for pastoralism and wildlife conservation by creating a complex simulation tool to determine how land use patterns and policies will influence wildlife density and diversity, livestock production and health, ecosystem state, human health, and economic status. There is a desire to promote decisions which optimize positive outcomes for people and wildlife. The PM seeks to identify critical problems at the pastoralist-livestock-wildlife interface, develop integrated assessments to address those problems, and define the probable outcomes of alternate policies, practices, and decisions and their effects on people, livestock and wildlife. The research focuses on developing the capability to use models to provide assessments at local (site specific) and regional levels.

b) Is the scope of the research appropriate given the budget and time frame? Does the budget accurately reflect the needs of the project?

The scope of the PM is so sweeping and complex that the only hope is to view project activity within the context of an iterative process which makes the base models more robust.

c) How do the objectives and activities fit the problem model?

The objectives and activities fit the problem model in that they target building the capability to use the models to provide assessments in locales where people-livestock-wildlife conflicts are present and getting more intense.

d) Are there aspects of the PM that are missing or are inappropriate? What are they?

The focus of the work is on the research component of strengthening the robustness of the SAVANNA and PHEWs models, and on collecting information needed to parameterize the models at

the study locations. The research is excellent. However, if the models are going to be accepted for actually guiding policy decisions, there needs to be much more emphasis on independent validation of the model output. Currently, the models work in the manner in which the researchers think they should work, but getting model output that makes sense to the researcher does not constitute validation of the model. The tedious, un-glamorous aspects of model development (e.g., conducting independent validation and documenting sensitivity analysis) is not well integrated into the PM. Grassroots work with the target policy-making groups — stressing rudimentary and maintained assumptions — needs to be strengthened to make sure that these groups understand the ramifications of model design assumptions and parameterization decisions, and so that output is presented in a manner that most effectively targets their concerns.

e) What is the quality of research being conducted? Does the research make a significant contribution to the relevant field(s) of science and does it advance understanding of appropriate development processes?

The quality of the research being conducted is very good. The research is extending SAVANNA and a group of related models. These advances improve the science and provide modeling tools that will be useful in further scientific endeavors as well as providing potential for assisting with development.

f) Does the research support a problem solving objective and link logically with the PM? Does it develop a technology that has development/science value?

Yes, the research supports parameterization and refinement of the models. In this context the efforts support a problem-solving objective and link logically with the PM. The development/ refinement of this complex technology does indeed have great science value. The development value depends upon how much the interested parties accept/trust the model output as a tool for guiding decisions regarding their future. There is a definite curiosity about the data collection and model output, but there is no evidence that the transition has been made from curiosity about model output to viewing it as a reliable, trusted tool that has acceptance in the policy arena.

g) How does the team's expertise match the research agenda? Is the level of contribution appropriate to the area of investigation? How does the team interact?

The expertise of the team is excellent and definitely matches the research agenda. The research team interacts well together – it is impressive to see how the ecologists, sociologists and economists are working together to develop/ refine these integrative tools. Making the transition from developing/refining a research tool that is actually used by local policy makers involves huge challenges because the most vitally concerned beneficiaries of the research should be the members of the local communities. Many of the leaders of the pastoral communities (and, even more so, the general populace) have never seen a computer, much less understand what is happening inside. It is not at all clear that the community leaders, nor other district/regional/ national officers, would actually rely upon the

model output to help guide their decisions. In contrast, the Kenya Wildlife Service and university collaborators do understand the process much better. Consequently, the KWS collaborators seem to be much more concerned about getting the underlying assumptions embedded in the model to reflect their objectives.

h) Is the research agenda appropriately matched to the project's resources? Why or why not?

The research agenda is ambitious; the PIs have done an excellent job of leveraging the GL-CRSP funds with other sources of research funding, in particular a significant grant from the National Science Foundation. If the research agenda is constrained to developing/parameterizing/refining the models, they are doing a good job. If part of the research agenda is to do the validation/ sensitivity documentation/building of trust by pastoralists and non-scientist government bureaucrats, then the answer is no.

i) How effectively has new knowledge been applied in the modification of the original PM workplans?

Model development is an iterative process; the PIs are world-class experts in model development and therefore are very adept at effectively integrating new knowledge into their PM.

PROGRESS

a) Considering the funding history of the project, evaluate the accomplishments of the project and provide rationale for your evaluations?

Based on the funding history of the project and the recent tragic loss of the project PI, the accomplishments of the project to date are for the most part reasonable. The scientific accomplishments largely meet expectations. Additional efforts to create "products" that are useful to policy makers and stakeholders are needed. Additional details are provided in the recommendations section.

b) Should the project be continued or modified? Provide rationale for your evaluation.

The recommendations section provides suggestions for the conditions that should be addressed in order for the project to continue. Much depends on whether the project can demonstrate that non-scientist policy makers trust and use the model output in tangible ways. This could be one of the best projects in CRSP history or one that does good science but is not used by policy makers (there are many examples of very good scientific insight that does not have an impact beyond the research arena for any of a host of reasons.). Since CRSP success is traditionally judged in the context of both science and sustainable application of the science, the project must do a more thorough job at documenting tangible application of their modeling tools. The development value depends upon how much the interested parties accept/trust the model output as a tool for guiding decisions regarding their future. There is no evidence that the transition has been made from curiosity about model output to viewing it as a reliable, trusted tool that has acceptance in the policy arena. It is not at all clear that non-scientists such as the

community leaders, nor other district/regional/ national officers, would actually rely upon the model output to help guide their decisions. The project needs to devote substantive effort to documenting information use, as opposed to the current emphasis on information provision. There are many examples in the development literature which illustrate that better information is not the limiting factor to decision processes – it is not at all clear that the type of information provided by the project will change behavior of the communities or the government planning ministries. Future project funding should be in jeopardy unless the project can document the information they are providing will really make a difference to community decision-making.

c) In what ways have the impacts and outputs been significant? Evaluate the mechanisms for dissemination or research results.

The outputs from the project have the potential to be very significant. However, much of the potential has not yet been realized. The Kenyan Wildlife Service (KWS) is using some of the results of the project and is very interested in expanding capacity building with the project (see recommendations). Results of the project have recently been summarized for use in the Ngorongoro Conservation Area (NCA) but it is apparent that some of the stakeholders (e.g., the Maasai collaborators) are confused by some of the output and underlying assumptions.

Project results have largely been disseminated in the form of journal papers and SAVANNA workshops for stakeholders. Further efforts are needed to create results that incorporate the concerns of all stakeholders in manners that they understand and to provide results in policy relevant forms (see recommendations).

d) What, if any, are the benefits to the US?

The models being developed are being applied in the US and elsewhere to address wildlife and ecology issues, therefore development of model robustness in theory improves model application throughout its domain of use. Development of sustainable wildlife policy in Africa and elsewhere is of interest to the US from preservation and tourism standpoints.

POLICY

a) Do the project goals have policy implications? What are they and how have they impacted national development?

The project goals have potentially extremely important policy implications related to development of issues regarding wildlife and wildlife interaction with pastoralists and farmers. This is especially germane since the traditional (communal) and more recent (group ranch) methods of controlling land use are being transformed by the current Kenyan policy of land subdivision into individual land holdings. Further efforts are needed, as described in more detail in the recommendations section, to ensure that the policy implications of the project are realized.

b) Has policy been incorporated in the project design? At what level are appropriate policy makers engaged? (Ministries, provincial, regional, local, etc.)

The project could have very significant policy implications. The modeling systems are crafted by the scientists on the project to address policy-relevant issues. Policy makers at various levels are involved in project discussions. Efforts to fully engage with policy makers need to continue to be emphasized (see recommendations section).

TRAINING

a) Rate the adequacy of the amount and quality of the training. Is there an appropriate mixture of long - and short-term training? Evaluate the impact of the training on participants.

Some short-term training has been provided for African scientists on data collection for parameterization of SAVANNA and related models. These scientists are currently collecting data in the field for use with SAVANNA and other models. Short-term training related to interpretation and use of SAVANNA results has been provided at several African locations. Several graduate students have conducted research related to the POLEYC project and several others are currently conducting related projects.

b) How does the human capacity building provide the basis for long-term capability to institutionalize the goals of the project?

Additional training of African scientists to fully utilize the modeling systems is needed to institutionalize the use of the models. One ILRI scientist is receiving training on SAVANNA at Colorado State University during July and August 2002. KWS and university personnel have asked to receive training on SAVANNA. African collaborators have some experience in collecting data to develop model inputs for SAVANNA.

PROJECT MANAGEMENT

a) Has the team developed mechanisms to ensure that local, national and regional needs and priorities will continue to be incorporated into the development of the research agenda? Do regional collaborators and team members have a substantive role throughout the life of the project?

The closest form of insightful collaboration seems to be with the KWS who would like to test and apply the model at many of their national parks, particularly those parks where there are conflicts between pastoralists and wildlife. Other stakeholders, particularly land-use policy makers at the national level, need to be cultivated.

b) Describe the project management structure and function. Is it appropriate for the type of research being conducted?

The project has gone through a fairly rapid transition of project leaders from Dr. Coughenour to Dr. Ellis to Dr. Swift. At the time of the EEP review, Dr. Swift was in the process of familiarizing himself with the project sites and past/current project efforts (Dr. Swift was not part of the

project until the last several months.). The unresolved question is relative weight placed on the science that goes into model development (the dominant project focus in the early years of the project) vs. emphasis on validation, integration, and institutionalization of the models and their policy-relevant capabilities developed through the project (topics that need more attention in the present and future).

c) Evaluate the intra-project communication.

Intra-project communication should continue to be a priority for the project management team. Communication has seemingly improved within the POLEYC phase of the project relative to the past project phase.

d) Does the project management function effectively? Why or why not?

The project management is in a transition period due to the loss of the lead-PI. The management team includes a staff member, Dr. BurnSilver, that completed graduate work on early phases of the IMAS project so she is very familiar with the region as well as the project; the team leader, Dr. Swift, was instrumental in the early phases of the SAVANNA model creation and development in northern Kenya and therefore brings the project some valuable insights.

e) Evaluate the quality of communication with all members including host country collaborators. Is communication adequate, frequent enough, are there problems?

Efforts are being made to improve communication among team members and collaborators through newsletters and other communications from the management team. The project would benefit from continued efforts to improve communications to ensure that all collaborators/ stakeholders are full participants in modeling scenarios that are conducted.

f) Have regional collaborators and team members have a substantive role throughout the life of the project?

Regional collaborators and team members seem to be more involved in the project since it became the POLEYC project (formerly it was the IMAS project). African team members are and will be heavily involved in data collection for sites that will be modeled with SAVANNA.

g) How effective are operational decisions? What mechanisms have been incorporated for evaluation of ongoing work? Are they effective?

The project needs to focus on evaluating/ documenting the impact of their science-based products on policy decision-making and how the achievements of the project are being institutionalized in a sustainable fashion by the local and national government entities.

MISCELLANEOUS

a) Has the project leveraged significant funding from other sources? Why or why not?

The project has leveraged other funds, especially from the National Science Foundation, primarily for the further development of models being used within the POLEYC project. Improvement in the models will be beneficial to the POLEYC effort.

b) Is the project regional? Is the rationale for regionalization clear? What are the linkages to regional activities? How appropriate are they? Should changes be made? Why? Are its linkages appropriate to its regional activities.

The project is working within Kenya and Tanzania. The focus of the models is on providing insight to areas of conflict between pastoralists and wildlife, within the context of the somewhat site-specific concerns in the vicinity of conservation areas. There are probably some broad, transportable lessons that could be learned from these site-specific case studies, but the focus to date has been characterizing the issues at a site-specific level. The project addresses issues that are regionally of interest and as the robustness of the models are increased the transportability of the models are likely to improve.

c) What is the level and quality of inter-project collaboration?

Some opportunities for inter-project collaboration exist. There may be opportunities to work with LEWS to validate forage availability using data collected within the POLEYC effort. Some of the small plot data collected by the LEWS project might be used for validation of POLEYC model components. Some of the risk mitigation considerations being investigated by PARIMA would be useful for incorporation into discussions with the group ranches that are undergoing subdivision (which, in some ways, increases risk for the residents trying to continue to make a living under significantly altered circumstances).

d) Describe any significant linkages to other research/ development projects (CRSP or non- CRSP)?

The POLEYC effort is part of a larger effort at Colorado State University related to ecological modeling. The POLEYC effort builds nicely on these efforts.

e) Identify unexplored areas of collaboration between projects that are feasible and have potential.

Some opportunities for possible collaboration are described above in section VI c above.

EEP Recommendations

- There are genuine concerns by the EEP, and indeed from some of the Maasai project collaborators who attended the meeting, that aspects of the modeling effort were not transparent and perhaps in need of serious refinement. These concerns fall into two broad categories: parameterization and design. Both these concerns could be alleviated by rigorous validation of the assumptions used in design and parameterization, but there was not sufficient information presented to assure either the EEP or the Maasai collaborators that this validation had been done in a manner that could dispel concerns about the resulting model output. An important issue with all models used in policy formulation is that there will likely be an interest group that will be unhappy with the implication of the output. It is, therefore, extremely important that key model design and parameterization decisions be explicitly documented in a transparent, defendable manner. No such documentation was presented to respond to the queries by the EEP. The utility of the model output for use as a policy tool will be seriously undercut if the PIs are unable to document the ramifications of design and parameterization decisions and present them simultaneously with the model output. It was apparent that several key model design decisions and parameterization assumptions have not undergone a rigorous, true validation in the region.

  The type of concerns regarding the details of the model expressed by the EEP are illustrated in the following example: NDVI greenness data seems to be used as a proxy for biomass production and is assumed to be a related to livestock movement patterns; however, other research from the Serengeti region indicates that livestock and wildlife movement patterns are more strongly influenced by forage quality for the class of animal (not necessarily related to greenness or quantity). This issue is further complicated by the apparent assumption that the condition of the rangeland in the NCA is stable, when in fact it has been steadily declining for the past four decades. The decline in range condition is most strongly manifest by a change in species composition from palatable bunchgrasses to extremely unpalatable bunchgrasses (e.g., a shift from Themeda triandra to Pennisetum schimperi, resulting in about a six-fold reduction in carrying capacity, even though greenness pattern associated with the sward and the amount of biomass production may stay about the same). The SAVANNA model output shown to the EEP appeared to assume that range condition was stable for the last several decades and would remain so in the future, when, in fact, range condition has been decreasing resulting in significant changes in species composition and associated forage quality. These types of concerns raise the specter that the policy relevance of the output could be seriously flawed. The basis for some of these assumptions was stated to have been

based on relationships validated on the predominately annual grasslands of Turkana, which in many ways is a fundamentally different system than the perennial grasslands of the NCA.

- The POLEYC group repeatedly asserted that one of their key clientele were the pastoralists. This is not supported by the way parameterization decisions are currently made because it was obvious that the pastoralists did not understand the ramifications of the assumptions embedded in the modeling effort. For example, the pastoralist community was documented to have an average daily caloric intake of only about 80% of the daily recommended values suggested by the World Health Organization (WHO). In response to our queries, we learned that this 80% number was held as a constant when projecting future options. The EEP is certain that no community would want their future modeled in a manner that assumes perpetuation of the current unacceptable situations (we asked several of the Maasai collaborators whether they understood the ramifications of this assumption: they clearly did not and expressed great concern when they understood the implications of the modeling decisions). This illustrates that the community is not a full/knowledgeable participant in terms of truly understanding the ramifications of parameterization decisions.

  When analyzing the human/livestock/wildlife tradeoffs in a region, at least one of the model runs should be done in the reasonable context of what it would take to get the community to a level of comfort/security they should reasonably be able to aspire to (e.g., people living inside the NCA should be able to secure a livelihood that is, at least, similar to those living adjacent to the NCA; people should be able so secure a livelihood at least at the level of WHO recommended nutrition standards). These are important baseline values that will dramatically change model output as opposed to the current practice which seems to be characterizing current, unacceptable conditions and projecting those into the future.

  Another fundamental disconnect with pastoral community perceptions is the practice of focusing evaluation on the monetary tradeoffs of crop-livestock/wildlife interaction. The monetary elements of this dynamic are a very minor part of the cost-benefit tradeoffs that takes place in the mind of the people living in the area. The most significant costs of wildlife interactions with pastoral communities are intangibles, (e.g. the assessment of the fear factor associated with the potential that wildlife kill people and livestock in their community {indeed, elephants alone kill several people each year in many of these districts}, the extra vulnerability/risk of wildlife-borne disease, the devastation that wildlife {e.g. elephants} can quickly inflict by destroying maize fields). Also, there is an inherent risk associated with becoming more dependent on eco-tourism revenue (i.e., one incident of an expatriate tourist

being robbed/killed in a conservation area can dramatically decrease tourism revenue to the region for months/years.). These concerns cannot be ignored since these risk-based intangibles are the dominant factors in a pastoralist's mind when assessing the desirability of changing their production system to be more dependent on wildlife-based tourism revenue. Given that a rigorous quantification of these issues would require far more resources than the GL-CRSP could provide, some methodology for a qualitative adjustment to the monetary calculations needs to be made (i.e., a focus group could be used to approximate what monetary compensation (a positive tradeoff) would be needed to offset negative concerns associated with wildlife.

To do any analysis of wildlife vis-a-vis the pastoral livelihood/welfare without at least attempting to incorporate the unquantifiable qualitative concerns generates a valuation of wildlife which is nonsense to the pastoral community. Therefore, one of the model runs should explicitly be centered on maximizing welfare of the people who live in the area. There was a stated reluctance/concern on the part of the ecologists/modelers to develop such a model run because of the concern that wildlife would lose out and that eco-tourism would look like a poor option compared to benefits of cereal or intensified livestock production. Rather than making a priori decisions regarding acceptability of output, the focus of the modeling effort should be on illustration of the magnitude of production tradeoffs, regardless of what those tradeoffs imply. Using these simulation results as a baseline, comparisons could be made in terms of cost to the community associated with other land use options. For example, this comparison would be necessary to establishing a defendable rationale for wildlife easement payments. Indeed, KWS is engaging in easements payments to the owners of the subdivided group ranch south of Nairobi National Park. The POLEYC model could be a helpful tool in developing a defendable rationale for the level of such payments.

- Parameterization should avoid divisive framing of value selection – this may require framing the question differently. For example, modeling the impact of doubling human population over time is problematic since it is clear that there is fundamental, contentious disagreement regarding both population growth rate and immigration policy. These issues could be sidestepped by instead framing the question in terms of how much extra cultivation would be necessary to raise the caloric supply to 100% of the WHO recommendation for different population levels. This frames the question in a policy relevant manner necessary for assessing tradeoffs of population increase without getting bogged down in a dispute over population growth rate and immigration policy.

- Parameterization of the SAVANNA model requires a significant amount of expertise and remains largely an "art." Continued efforts to move the parameterization from an "art" to a "science" are needed. Creating accepted protocols for parameterizing the models that are part of POLEYC will be important in the acceptance of the modeled results and in the ability to institutionalize the models within East Africa and elsewhere. As part of this effort, a more complete documentation of sensitivity analysis of SAVANNA and the related POLEYC models should be pursued. The results of a sensitivity analysis would be helpful to some stakeholders and decision makers.

- The POLEYC project has not produced publications that have described model output in a policy relevant manner; i.e., the focus to date has been on model refinement and on scientific publications as opposed to policy-relevant publications. The next six months of the project will likely determine how successful this group is in terms of distinguishing between these perspectives. Kenyan and Tanzanian USAID mission personnel should be useful checks as to whether this group is able to make the bridge between science and policy.

- The Kenyan Wildlife Service (KWS) and University administrators have asked to have some of their personnel trained in parameterization and operation of the SAVANNA model. There has been little discernible progress in pursuing a way that operation of the model could be institutionalized within Kenya/Tanzania. It is troubling that no Africans in the project area that hold positions within national agencies have been trained to independently parameterize and use the model. Training University, KWS and other agency personnel should be initiated as a high priority of the project.

- Previous EEP reports expressed concerns that the policy maker audience seems not to have been significantly engaged in this work to date, therefore there was some question as to the suitability of the models and the forms of its output to policy makers. These issues remain and are of particular concern since some of the aspects of some of the models are so complex that transparency of model design and parameterization decisions are not able to be readily understood/validated – which is especially pertinent in terms of trust in the output, which is an important attribute of models used in policy formulation and planning. Active, up-front participation of impacted policy makers in project planning, implementation, and decision making about the format for information delivery should be pursued.

- The project management needs to be more sensitive to making sure that the different interest groups concerned with model output receive published analyses at as close to the same time

as possible. It would also be useful for policy-relevant documents to solicit review input from the interested groups prior to dissemination – especially since there may be legitimate differences of opinion regarding critical parameterization decisions making it desirable for some interest groups to request a fuller explanation of caveats that may not be intuitively obvious to a casual observer.

- Restating the point made in II-2, there are many examples in the development literature which illustrate that better information is not the limiting factor to decision processes – it is not at all clear that the type of information provided by the project will change behavior of the communities or the government planning ministries. Future project funding should be in jeopardy unless the project can document the information they are providing will really make a tangible difference to community decision-making.

FOR A RESPONSE BY THE POLEYC PRINCIPAL INVESTIGATOR, PLEASE TURN TO PAGE 51.

Improving Pastoral Risk Management on East African Rangelands (PARIMA)

Report by Dr. Thomas Thurow, Professor, University of Wyoming (Team Leader and EEP Chair) and Dr. Bernard Engel, Professor, Department of Agricultural and Biological Engineering Purdue University

Adequacy of the Problem Model and the Quality of the Scientific Research

a) How does the Problem Model (PM) address a development issue of importance to the country(s) in which the project functions. Is the PM clear, fully developed, and scientifically sound?

The PM revolves around understanding the perceptions of risk in agro-pastoral settings, how risk perception influences behavior, and what pragmatic strategies could be developed to reduce vulnerability to risk. The PM is clear and fully developed. Addressing these issues with scientific rigor is certainly a challenge – the PIs are experts in their field and are doing their best to venture into areas of inquiry that have been avoided by scientists because of the difficulty of conducting defendable research. The fact that they have succeeded in getting a steady stream of their results published in peer-reviewed scientific journals indicates that they are meeting with some success.

b) Is the scope of the research appropriate given the budget and time frame? Does the budget accurately reflect the needs of the project?

The various manifestations of risk perception and response is clearly a large, complex topic. The PIs have done a good job of tackling this subject in a series of doable steps appropriate for the budget and time frame.

c) How do the objectives and activities fit the problem model?

The objectives and activities are appropriate and well constructed to address components of the problem model.

d) Are there aspects of the PM that are missing or are inappropriate? What are they?

The big question is whether the PIs can pull all of their lines of inquiry together to address the complex integrated issues embedded in the PM. There is some evidence that the project is making progress in this regard, but it has not come close to reaching its potential.

e) What is the quality of research being conducted? Does the research make a significant contribution to the relevant field(s) of science and does it advance understanding of appropriate development processes?

The quality of the research is very good – the nature of the topic requires creative study design and interpretation. The results are more in line with integrating ecology and economics into social science format for inquiry, as opposed to the much more lock-step data collection and analysis which typifies much of the ecological and economic literature.

f) Does the research support a problem solving objective and link logically with the PM? Does it develop a technology that has development/science value?

A component of the research is definitely oriented toward problem solving. The PIs are cautioned, and have been cautioned in previous EEP reviews, that the outcomes of this problem solving effort be based on testable hypotheses related to development needs that are being addressed. This is an important component of defensability and transportablity of the conclusions, some of which should be able to transcend analysis of ad hoc responses to the immediacy of encountered risks at site-specific locals.

g) How does the team's expertise match the research agenda? Is the level of contribution appropriate to the area of investigation? How does the team interact?

The team is an excellent composition of ecologists, economists and sociologists with long-term experience in the region. The team interacts very well; regardless of their disciplinary diversity, they all share a deeply shared vision that their expertise is a necessary component of a greater whole, therefore they have a strong commitment to understanding the perspectives that each discipline brings to the PM.

h) Is the research agenda appropriately matched to the projects resources? Why or why not?

The PIs have done a good job of scaling their research to match the project resources available. This has been helped by substantial buy-in from the USAID-Ethiopia mission to their outreach efforts.

i) How effectively has new knowledge been applied in the modification of the original PM workplans?

The PIs have been very sensitive/responsive to incorporating new knowledge into the original PM workplans. If anything, there is a danger of being too responsive to new information in that it can side-track a disciplined line of inquiry needed to address testable research hypotheses that build on the step-by-step progress associated with building a defendable case for investment in particular components of risk response.

PROGRESS

a) Considering the funding history of the project, evaluate the accomplishments of the project and provide rationale for your evaluations?

The project accomplishments to date are reasonable. A good number of publications have been generated in peer-reviewed venues. A significant amount of data has been collected that

has not been fully analyzed and will provide a strong foundation for continued scientific and development contributions. The project has generated not only significant local interest but has actually catalyzed grassroots action in response to project findings – in some cases secondary adoption of risk management strategies (e.g., income diversification; education to enhance access to saving/credit markets) has already taken place even though the interventions are still in the process of being tested where they were introduced.

b) Should the project be continued or modified? Provide rationale for your evaluation.

Yes, the project needs time to pull together the complex array of risk management considerations that transcend traditional disciplinary boundaries of scientific inquiry. The grassroots interest of the local public, government organizations and NGOs regarding the ambitious array of risk management strategies being investigated is impressive.

c) In what ways have the impacts and outputs been significant? Evaluate the mechanisms for dissemination of research results.

The project is having significant impacts in the communities involved. Communities have implemented informal education, small savings banks, small businesses and other activities. The primary beneficiaries of the findings to date are local stakeholders, NGOs and other local groups involved in development.

Additional documentation of the successful approaches to accomplish these efforts is needed. Documentation and generalization of the findings in formats that can be used for development in other locations should be pursued.

d) What, if any, are the benefits to the US?

The project is identifying strategies to deal with risk in pastoral communities. Some of the strategies deal with cross border issues. These strategies are useful to the US in dealing with development issues in regions with pastoral communities and border issues. Successful approaches for working with NGOs have been demonstrated within the project. These approaches will be useful for NGOs working in developing areas.

POLICY

a) Do the project goals have policy implications? What are they and how have they impacted national development?

There are many pragmatic policy implications to the research. This is an example of research that is understood by the public who is willing to participate even though they are not sure of whether it will make a difference or not – they are willing to try. The researchers have pieced together an impressive mosaic of sometimes complimentary, sometimes quite different risk management strategies which they are in the process of documenting. Greater effort needs to be spent on connecting the different lines of inquiry with

broader, transportable lessons-learned regarding risk management strategies.

b) Has policy been incorporated in the project design? At what level are appropriate policy makers engaged? (Ministries, provincial, regional, local, etc.).

Policy implications are at the heart of project design. Much of the focus is on strategies that can be adopted on a local level, so policy makers at the village and district level have been well-engaged. The research also has some national and cross-boarder ramifications; the study site is well-situated and truly straddles the border of Ethiopia and Kenya.

TRAINING

a) Rate the adequacy of the amount and quality of the training. Is there an appropriate mixture of long - and short-term training? Evaluate the impact of the training on participants.

The project has provided an effective mixture of both short- and long-term training. The project has been especially effective at working with Egerton University to facilitate graduate training of a large number of students, in addition to some also getting advanced degrees in the U.S. Many of the Egerton professors were products of previous USAID investment; it is gratifying to see how these professors are working well with this project to produce the next generation of natural resource scientists.

b) How does the human capacity building provide the basis for long-term capability to institutionalize the goals of the project?

The evidence of short-term training influencing community adoption of risk management strategies are very apparent within the communities of the study site. This short-term training is well integrated with local NGOs and government activity in the region.

PROJECT MANAGEMENT

a) The team has developed mechanisms to ensure that local, national and regional needs and priorities will continue to be incorporated into the development of the research agenda. Regional collaborators and team members have a substantive role throughout the life of the project.

The regional collaborators working with local communities identify research and development issues and approaches that are appropriate to the regional and local situation. Communities have selected the approaches that were of highest priority and these approaches (e.g. informal education, small savings banks, etc) are being implemented. The approach used should help to insure that regional issues continue to be addressed.

b) Describe the project management structure and function. Is it appropriate for the type of research being conducted?

The project management structure is distributed due to the number and locations of the

investigators. The work being conducted seems well organized and coordinated indicating the project is being managed effectively.

c) Evaluate the intra-project communication.

Project communication among team members and partners seems to work quite well, particularly given the distributed nature of the team. The team members exhibit a genuine commitment to integrating their disciplinary strengths with the others.

d) Does the project management function effectively? Why or why not?

The project management functions effectively. A team atmosphere has been instilled among all of the project members. The teamwork demonstrated is one of the strengths of the project.

e) Evaluate the quality of communication with all members including host country collaborators. Is communication adequate, frequent enough, are there problems?

Communication among all collaborators including host country collaborators is excellent. The team members were knowledgeable of the various aspects of the project indicating communications are working well.

f) Have regional collaborators and team members had a substantive role throughout the life of the project?

Regional collaborators and team members play a significant role in the project. The involvement and teamwork of regional collaborators are a strength of the project.

g) How effective are operational decisions? What mechanisms have been incorporated for evaluation of ongoing work? Are they effective?

Regional collaborators and team members are empowered to make project decisions. The excellent communication within the project ensures that decisions are made in consultation with other team members. The communication among the team is helpful in the continuous evaluation of the project by the team.

MISCELLANEOUS

a) Has the project leveraged significant funding from other sources? Why or why not?

The project has leveraged some additional funding, particularly funds for development and outreach efforts. These funds have allowed the project to conduct significant outreach and development activities in southern Ethiopia.

Additional opportunities to leverage resources within Kenya may be possible with the change in priorities of the USAID mission in Kenya.

b) Is the project regional? Is the rationale for regionalization clear? What are the linkages to regional activities? How appropriate are they? Should changes be made? Why? Are its linkages appropriate to its regional activities?

The project functions in northern Kenya and southern Ethiopia. There are similarities within the region as well as differences and border issues that make this an appropriate study area. The project is linked to efforts of the USAID Ethiopian mission. The linkages are appropriate and represent a strength of the project.

c) What is the level and quality of inter-project collaboration?

A small effort is on-going between the LEWS project and PARIMA project to create and assess a marketing decision support capability for the northern Kenya and southern Ethiopia area. This effort had only been recently started (within the last year) so the collaboration is still in a formative stage, and it is not yet possible to assess it, beyond the fact that local participants in the project very much see the value of the effort. Opportunities for further collaboration exist during the next phase of GL-CRSP efforts and should be tangibly encouraged through funding support.

d) Describe any significant linkages to other research/ development projects (CRSP or non- CRSP)?

As indicated above, there is a linkage between the LEWS and PARIMA projects through a special initiative started in the last year or so. The USAID-Ethiopian mission is funding a significant portion of the PARIMA outreach efforts.

e) Identify unexplored areas of collaboration between projects that are feasible and have potential.

Opportunities exist to work with the LEWS project effort to evaluate the LEWS products and to further the decision support tool recently initiated in collaboration with LEWS. Some of the efforts of central/south American project and the PARIMA project are seemingly complementary. Opportunities for collaborative efforts between these projects might be explored. Collaborative efforts between these projects might allow the results of both efforts to be more readily globalized.

EEP Recommendations

- Of the three projects reviewed, this is the most difficult one to write comments for mainly because the PIs are truly focused on the nexus of where ecology, economics and sociology come together. The EEP agrees that working on issues that are at the forefront of this interdisciplinary frontier are some of the most limiting hurdles to sustainable development. The EEP agrees that the composition of the team and commitment to the interdisciplinary nature of their research questions is exceptional – i.e., if anyone can make progress on this frontier, this team can. The grassroots understanding by the local people of what the research project is trying to investigate is impressive. The products that the project has produced so far are thought-provoking and achieving sometimes hard-won acceptance in peer-reviewed literature. The big question is how repeatable/transportable are the results? It

bears emphasizing that these challenges are faced by any cross-disciplinary team that tries to push the frontiers where disciplines overlap. The project needs/deserves more time to make the case that emergent properties of risk management can be packaged in ways that are relevant beyond the study site. Maybe the best way to make this point is to use an analogy: Sammy Sosa hits a lot of home runs and also strikes out a lot – balancing the pros and cons I would choose him for my team. The future of this project is a lot like seeing Sammy Sosa come up to the plate. If the project can creatively make the case that emergent properties of risk management learned on the study site can be relevant to risk management beyond the study site they will have hit a home run – they will need several more years before the outcome of the project is clear.

- A variety of risk management strategies are being characterized. Data should be collected and presented in ways necessary to illustrate the degree to which risk is reduced relative to investment in a particular approach.

- The Central/South American GL-CRSP project is examining aspects of risk management that appear to be similar to what PARIMA is doing. Opportunities to collaborate should be explored. Collaboration/methodology coordination between efforts in these two regions may facilitate identification of emergent traits that can help "globalize" some of the site-specific lessons learned.

- On several occasions PIs expressed their plans to begin collecting information on a subject that was clearly outside their area of expertise. PIs are encouraged to focus on subjects about which they have special knowledge, and to collaborate with other experts rather than trying to collect information outside of their disciplinary expertise (e.g., an economist should collaborate with a plant ecologist rather than trying to collect information on plant ecology directly). The project has done a good job of fostering complimentary interaction among disciplines to date and, of course, should continue to put forth the managerial effort to make sure this coordination of effort persists within the team.

EEP RECOMMENDATIONS FOR THE MANAGEMENT ENTITY

- Expenses associated with EEP reviews would probably best be handled by the ME withholding sufficient funds to cover the entire review costs. In this review the projects covered in-country costs of the EEP creating an awkward but understandable perception that the PIs could have used the money for other project activities if they were not spending it on reviews (the projects did not appear to fully understand that the EEP is required by USAID as part of the CRSP by-laws and is therefore not a discretionary activity). If the ME desires to have the projects pay for in-country costs in the future (an understandable perspective of the ME to keep review travel proposed by the projects reasonable), the projects should probably be required to have a separate line in their budget for review costs, so they can see up-front when they receive funds, that part of the condition for receiving the funds is that a small portion be reserved by the projects for review costs.

- The ME is commended for shifting emphasis from long annual reports (which very few people read) to instead having the annual accomplishments summarized in several page briefs expressed in a format suitable for broad distribution. Some of the briefs have been largely focused on science with little or no attention to the "So what?" and "Who cares?" element of the story. It appears that the ME needs to continue to emphasize to the PI's that they need to make the connection between scientific results and applicability/impact. A section that explicitly focuses on the pragmatic benefits of the research should be required as a component of each of the briefs. The PIs should be encouraged to be sensitive to the fact that success within the context of a CRSP requires that rigorous scientific products be produced and that the take-away message from those scientific activities must be packaged in a manner that is transportable and policy relevant.

- Collaboration between the GL-CRSP projects has not come close to reaching its potential. This can be partially attributed to each of the projects having ambitious agendas embedded in their own projects, hence they are naturally concentrating on assuring attainment of their own project deliverables before reaching out to develop additional synergies with the other projects. The method of initial project selection and funding-level by the GL-CRSP ensured that the PIs would be fully occupied by their own project commitments – probably catalyst funds would be needed to facilitate substantive project interaction which are understandably viewed by the PIs as extra activities to what they are committed to delivering on an already tight time-line and budget. There is probably a ME line item for getting all the GL-CRSP projects together for information exchange and strategic planning, perhaps this portion of the budget under control of the ME should be expanded to include a source of funds to facilitate inter-project collaboration to pursue ideas that result from this interchange of information (i.e., the PIs see the value of collaboration, but in most cases they do not feel that have sufficient slack in their existing budgets to act on collaborative ventures that are outside of scope of their initial budget.). The example of the $150,000 RFP for collaboration between LEWS and PARIMA is an excellent illustration of how catalytic funds can be used to facilitate cross-project collaboration. This opportunity was created as soon as there was some budgetary flexibility to enable the ME to pursue this type of cross-project collaboration. It would be desirable if a line-item could be created in the ME's budget during the next phase of the GL-CRSP that was targeted at giving the ME more flexibility to fund these types of efforts.

ADDENDUM TO EEP REVIEW
POLEYC Project, Dave Swift, Lead Principal Investigator

We recently received the report of the External Evaluation Panel (EEP) relative to our GL-CRSP project (Policy Options for Livestock-based Livelihoods and Ecosystem Conservation - POLEYC). While our project staff feel that the review was very helpful and that we learned a great deal of value to us during the review process there are some points raised by the EEP that we would like to comment on. We sent an expanded version of this response to the members of the EEP, but have not had a response from them.

Early in the recommendation section the EEP expresses concerns about the transparency of model design and parameterization decisions and seem to urge that such decisions be reached in consultation with our collaborators, particularly with pastoral representatives. Clearly, the decisions need to be transparent and we need to be able to defend them to all parties involved. We do not feel, however, that it is reasonable to try to make these decisions in a participatory manner. As they point out, correctly, in a situation such as this, there will always be an interest group that will be unhappy with the implication of model output. Likewise there will, in many cases, be an interest group that will be unhappy with what ever parameter is selected for a specific phenomenon. We can't expect to get complete agreement on many of the decisions in this realm. Certain interest groups will always promote certain (and often incorrect) values for certain parameters for political or other reasons. We can only try to arrive at values which best fit the data available to us, and/or which correspond to the research we do in the area. We are able to defend these decisions. This does not mean that we will in all cases be able to satisfy all collaborators of the correctness of individual decisions. We expect that there will always be some collaborators unhappy with specific parameters and with specific model predictions. Our credibility, we believe, arises from the fact that the pattern of results that we produce reflect an even-handed approach, sometimes favorable to the position of one interest group and sometimes to the position of another.

In paragraph 6 of the recommendation the report criticizes our "practice of focusing evaluation on the monetary tradeoffs of crop-livestock/wildlife interactions". We really do not feel that we are doing this. When this issue came up during the review, several of us responded to it, including our graduate student, Johana Roque de Pinho, who is working on the issue of Maasai perceptions of and valuations of wildlife in the Kajiado area. She made it clear, we feel, that her approach is a distinctly non-economic approach to valuation, aimed at determining Maasai "attitudes" toward wildlife, the strength of these attitudes and the reasons they are held. She has selected this approach because she feels that "monetary value as the central index of valuation has no meaning beyond the confines of certain human societies" (her research proposal), and that the societies with which we are working fall outside of that set. Some of our collaborators, Kenya Wildlife Service among them, would like to see us develop some simple cost:benefit relationships relative to pastoralists and wildlife, since such relationships would make it easier for them to make and justify decisions about wildlife. While we understand their interest in such metrics, we don't think trying to develop them would be fruitful because most pastoralists do not

view wildlife in economic terms. Thus, we do not think our approach in this area represents a "fundamental disconnect with pastoral community perceptions", as the EEP suggests.

On the issue of building trust in model output, and whether the technology has scientific and development value (sections 1.f, 1.h and 2.b); we feel we have been fairly successful in getting many of our collaborators beyond the "curiosity" phase with regards to our models. The chief conservator of the NCA specifically asked us to address some scenarios of interest to him and we did so. The Kenya Wildlife Service is very interested in being able to use the modeling system as part of its strategic planning and management activities for all of its National Parks and Reserves. The system is becoming an accepted part of the repertoire of tools available to these agencies. It has proven more difficult to develop this level of interest among the pastoral people themselves. This is not surprising considering that many of these people are not in a position to understand the technology we use. We have made headway with pastoralists through a series of meetings and workshops, but we are not yet at the point of general acceptance we would like to reach. It has been stated that, "any technology, sufficiently advanced, is indistinguishable from magic". Indeed, we have had some success engaging pastoralists at this level of understanding, but we would like to move beyond this stage. We continue to work with the Maasai to develop a high level of interest and trust.

Concern was expressed about our use of NDVI values in our modeling. Evidently we did not describe this properly to the EEP. NDVI greenness is not used as a proxy for biomass production in our modeling efforts. Biomass is simulated in SAVANNA through processes affecting plant growth and populations. We used NDVI images simply as a validation tool, to ensure that relative plant biomass and phenology were being modeled reasonably well (Boone et al. 2002). Animal movements in the model were related to simulated variables, including standing crop biomass, forage quality and distance to water, but not to NDVI. Assumptions from annual grasslands in Turkana were not applied to NCA.

Associated with the above concern was a discussion of declining range condition and thus, presumably, carrying capacity in East African rangelands. We are unaware of evidence demonstrating either a four-decade decline in range condition, or a six-fold reduction in carrying capacity *within* Ngorongoro Conservation Area. We recognize declining trends in range condition have been found in other parts of Africa, but evidence does not show this to be the case in NCA. Large herbivore biomass in Ngorongoro Crater has not changed significantly in decades (Runyoro et al. 1995; Moehlman et al. 1997). Livestock numbers within NCA have been relatively constant since the early 1960s (Kijazi et al. 1997), and from 1994 to 1999 showed a 1.2% decline, attributed to diseases associated with El Niño rains in 1998 (NCAA 1999). Wildlife populations have not shown severe changes, except those associated with poaching in the 1970s and 80s. In fact, during the four decades cited by the EEP, the wildebeest population using part of NCA during the wet season has increased five-fold (but have been relatively stable since the late 1970s).

We do not suggest that the NCA is static. For example, there have been profound changes in vegetation composition in Ngorongoro Crater (Boone and Coughenour 2001), and continued encroachment of unpalatable *Eleusine jaegeri*. But no one has quantified the effect *Eleusine* has on carrying capacity. In Ngorongoro Crater, for example, the changes in vegetation have not changed capacity, as already cited, although herbivore populations are changing (Runyoro et al. 1997). Given that broad-scale changes in species composition have not been mapped or quantified, and may be

outside the realm of issues that local managers may address, we parameterized range condition to represent current conditions, and any deviation from those conditions were reported as modeling results of use to policy makers (POLEYC 2002).

Several times, the issue of simulating the NCA as a pure grain producing system or as an intense, market oriented livestock production system was raised by the EEP. We have not done this for several reasons. One, this type of analysis is outside the scope of the work we proposed to do. Second, our models are not really well designed to simulate such situations. Our models are designed to represent range-based livestock and wildlife systems. Scenarios such as the ones suggested would be better assessed by crop modelers or those interested in intensive, subsidized livestock operations. Third, the Integrated Assessment system is intended to be driven by the concerns of the stakeholders, who generate the scenarios we examine. None of our collaborators, tribal, governmental or non-governmental has ever asked or even suggested that such scenarios should be examined or hold any interest for them.

Citations

Boone, R.B. and M.B. Coughenour (editors). 2001. A system for integrated management and assessment of East African pastoral lands: Balancing food security, wildlife conservation, and ecosystem integrity. Final Report to the Global Livestock Collaborative Research Support Program, University of California, Davis, California, USA.

Boone, R.B., M.B. Coughenour, K.A. Galvin, and J.E. Ellis. 2002. Addressing management questions for Ngorongoro Conservation Area using the Savanna Modeling System. African Journal of Ecology 40:138-150.

Kijazi, A., S. Mkumbo, and D.M. Thompson. 1997. Human and livestock population trends. Pages 169-180 *In* Multiple land-use: The experience of the Ngorongoro Conservation Area, Tanzania. (Thomson, D.M., editor). IUCN, Gland, Switzerland and Cambridge, UK.

Moehlman, P.D., V.A. Runyoro, and H. Hofer. 1997. Wildlife population trends in the Ngorongoro Crater. Pages 59-69 *In* Multiple land-use: The experience of the Ngorongoro Conservation Area, Tanzania. (Thomson, D.M., editor). IUCN, Gland, Switzerland and Cambridge, UK.

Ngorongoro Conservation Area Authority (NCAA). 1999. 1998 aerial boma count, 1999 people and livestock census, and human population trend between 1954 and 1999 in the NCA. Research and Planning Unit Report, Ngorongoro Conservation Area Authority, Ngorongoro Crater, Tanzania.

Policy Options for Livestock-based Livelihoods and Ecosystem Conservation (POLEYC). 2002. Integrated assessment results to support policy decisions in Ngorongoro Conservation Area, Tanzania. Report to the Global Livestock Collaborative Research Support Program, University of California, Davis, California, USA.

Runyoro, V.A., H. Hoffer, E.B. Chausi, and P.D. Moehlman. 1995. Long-term trends in the herbivore populations of the Ngorongoro Crater, Tanzania. Pages 146-168 *In* Serengeti II: Dynamics, management, and conservation of an ecosystem (Sinclair, A.R.E. and P. Arcese, editors). University of Chicago Press, Chicago, Illinois, USA.

Appendix

A: Scope of Work

B: Itineraries and Agendas

C. List of Materials Provided for EEP Review

D: Project Teams

E: Funding History of Projects

F: Glossary

Scope of Work

I) Adequacy of the Problem Model and the Quality of the Scientific Research

a) How does the Problem Model (PM) address a development issue of importance to the country(s) in which the project functions. Is the PM clear, fully developed, and scientifically sound?
b) Is the scope of the research appropriate given the budget and timeframe? Does the budget accurately reflect the needs of the project?
c) How do the objectives and activities fit the problem model?
d) Are there aspects of the PM that are missing or are inappropriate? What are they?
e) What is the quality of research being conducted? Does the research make a significant contribution to the relevant field(s) of science and does it advance understanding of appropriate development processes?
f) Does the research support a problem solving objective and link logically with the PM? Does it develop a technology that has development/science value?
g) How does the team's expertise match the research agenda? Is the level of contribution appropriate to the area of investigation? How does the team interact?
h) Is the research agenda appropriately matched to the projects resources? Why or why not?
i) How effectively has new knowledge been applied in the modification of the original PM and workplans?

I) Progress

a) Considering the funding history of the project, evaluate the accomplishments of the project and provide rationale for your evaluations?
b) Should the project be continued or modified? Provide rationale for your evaluation.
c) In what ways have the impacts and outputs been significant? Evaluate the mechanisms for dissemination of research results.
d) What, if any, are the benefits to the US?

I) Policy

a) Do the project goals have policy implications? What are they and how have they impacted national development?
b) Has policy been incorporated in the project design? At what level are appropriate policy makers engaged? (ministries, provincial, regional, local, etc.)

I) Training

a) Rate the adequacy of the amount and quality of the training. Is there an appropriate mixture of long- and short-term training? Evaluate the impact of the training on participants?
b) How does the human capacity building provide the basis for long-term capability to institutionalize the goals of the project?

I) Project management

a) The team has developed mechanisms to ensure that local, national and regional needs and priorities will continue to be incorporated into the development of the research agenda. Regional collaborators and team members have a substantive role throughout the life of the project.
b) Describe the project management structure and function. Is it appropriate for the type of research being conducted?
c) Evaluate the intra-project communication.
d) Does the project management function effectively? Why or why not?
e) Evaluate the quality of communication with all members including host country collaborators. Is communication adequate, frequent enough, are there problems?
f) Have regional collaborators and team members have a substantive role through out the life of the project?
g) How effective are operational decisions? What mechanisms have been incorporated for evaluation of ongoing work? Are they effective?

I) Miscellaneous

a) Has the project leveraged significant funding from other sources? Why or why not?
b) Is the project regional? Is the rationale for regionalization clear? What are the linkages to regional activities? How appropriate are they? Should changes be made? Why? Are its linkages appropriate to its regional activities?
c) What is the level and quality of inter-project collaboration?
d) Describe any significant linkages to other research/development projects (CRSP or non-CRSP)?
e) Identify unexplored areas of collaboration between projects that are feasible and have potential.

Itineraries and Agendas

Itinerary -- East Africa EEP Review
18 - 28 June 2002

Tuesday, June 18

Lodging: ILRI Hostel
Old Naivasha Road
P.O. Box 30709
Nairobi, Kenya
Phone: 254-2-630743
Fax: 254-2-631499

3 pm – 6 pm: Room 720 at ILRI.
Introductions of EEP and PARIMA team members, followed by concise presentations that will include: Overview of the GL-CRSP in East Africa (Layne Coppock), overview of the PARIMA project (Abdillahi Aboud), highlights from research findings 1997-2000 (Layne Coppock), and overview of the rationale for current research 2001-present, including quarterly repeated survey, modules, and selected student projects (Chris Barrett and Peter Little).

6 pm – 7:30 pm: ILRI dining room for dinner

7:30 pm – 9 pm: Room 720 at ILRI
Current research results 2001-present, with a focus on the quarterly repeated survey and modules (Peter Little, John McPeak, Getachew Gebru, and Cheryl Doss).

Wednesday, June 19
Lodging: Bekele Molla Hotel
Moyale, Ethiopia
Phone: 251-1-514601 (main Bekele Molla number)
Fax: 251-1-518223 (main Bekele Molla fax)

Schedule: 7:00 to 8:00 am: ILRI dining room for breakfast.

8:00 am to 11:00 pm: Room 720 at ILRI.
Current research results, continued (Peter Little, John McPeak, Getachew Gebru, Cheryl Doss, et al.). Overview of research projects of students trained in the US (Peter Little, Winnie Luseno, et al.), overview of PARIMA-LEWS joint activity (Layne Coppock and Jerry Stuth), overview of degree-training

for students at Egerton University (Abdillahi Aboud and Frank Lusenaka), overview of outreach, workshops, and non-degree training (Solomon Desta and Layne Coppock).

11:00 am to 12:00 pm: ILRI dining room for early lunch
After lunch travelers including Thurow, Engel, Little, Coppock, McPeak, and Desta travel to Wilson Field to board a charter plane (MAF) to Moyale, Kenya. Check-in is 1:00 PM. Arrive at the Moyale lower airstrip at 3:30 PM. Travelers will be met by Mr. Mollu Dika of the Kenya Arid Lands Resource Management Project (ALRMP) for transport to the border, customs clearance, and arrival at Bekele Molla Hotel in Moyale, Ethiopia.

Informal social, dinner, and after-dinner meeting with local Ethiopian and Kenyan officials and project collaborators at the Yosadayo Hotel, Moyale, Ethiopia.

Thursday, June 20
Lodging: Bekele Molla Hotel
Moyale, Ethiopia

Schedule: 7 to 8 am: Breakfast at Yosadayo Hotel

8 to 9:30 am:
Tour of the Moyale cross-border livestock market led by local Kenyan and Ethiopian officials and livestock traders.

9:30 to 10:30 am:
Visit with local Malab-Chamuk women's groups led by Ethiopian extension agents.

10:30 to 12:30 pm:
Travel north by road on the Borana Plateau to Yabelo via Mega. Brief stop at the Melbana Deep Wells.

12:30 to 1:30 pm: Lunch at the Southern Rangelands Development Unit (SORDU) cafeteria.

1:30 to 3:30 pm:
Visit the PARIMA research site called Did Hara. Overview of key risk-management research findings. Observe pilot outreach activities including non-formal education centers and savings and credit groups implemented by a local NGO based on results from Participatory Rural Appraisal. Opportunities to interview groups of Boran men and women pastoralists.

3:30 to 5:30 pm: Travel to Moyale, Ethiopia.

6:30 pm: Dinner at Yosadayo Hotel and informal discussions (opportunity to discuss research, development impact, and information linkages to decision-making processes).

Friday, June 21
Lodging: ILRI Hostel
Nairobi, Kenya

Schedule: 7 to 10 am: Breakfast and travel to the Moyale lower airstrip with the Kenyan ALRMP. The flight is scheduled to depart by 10:00 AM. Fly south to Marsabit Mountain. Conduct flyover around the mountain to observe ecology and population distribution.

Land at the PARIMA research site called Loglogo around noon. Have a goat for lunch. Overview of key risk-management research findings.

Opportunities to interview groups of Rendille men and women pastoralists.
If time and interest allow, stop at the PARIMA research site called Kargi if the airstrip is deemed suitable from fly-over inspection. Overview of key risk-management research findings. Review pilot outreach activity including mitigation of water quality problems at the Kargi wells.

Return to Wilson Field and ILRI by early evening.

Saturday, June 22
Lodging: Sportsman Arms Hotel
P.O. Box 3, Nanyuki, Kenya
Phone: (0176) 32347/8
Fax: (0176) 22895
Email: sportsmansarms@wanachi.com
Web: http://www.sportsmansarms.com

Schedule: LEWS briefing in the morning, depart for Laikipia district (Dr. Robert Kaitho and Mr. Jay Angerer to accompany EEP, lunch boxes on way). Drive to OSILGI pastoral community program NW of Nanyuki and meet with Zola Gibson and community outreach officers.

Sunday, June 23
Lodging: ILRI Hostel
Nairobi, Kenya

Schedule: Visit with Nick Georgiadis, Director of the Mpala Research Center and review site characterization and verification process with LEWS team. Depart that afternoon for Nairobi, arrive app. 7 pm

Monday, June 24
Lodging: ILRI Hostel
Nairobi, Kenya

Schedule: There will be a full briefing by all LEWS team members from 4 host countries and an ASARECA presentation. Each of the 4 country coordinators will outline the LEWS plan for their respective country. Zonal coordinators will brief on their experiences in the eight monitoring zones. Lunch break. The EEP will travel to meet with the department responsible for early warning advisories

at the Ministry of Agriculture in Kenya. The next meeting will be with one of LEWS' communications partners from the Arid Lands Information Network. They will meet w/Regional Coordinator of FEWS NET (Nick Maunder) and USGS regional representative, Gideon Galu.

Tuesday, June 25
Lodging: Landmark Hotel
Waiyaki Way, Westlands
Phone: 254-2448713/7

Schedule: Breakfast, depart to Naivasha. Tour NIRS lab at KARI's livestock research center.

11:30 am: Debriefing, followed by lunch.

2 pm - 5:30 pm:
Meet w/Colorado State team at ILRI; POLEYC project overview with Kenyan/Tanzanian Principal Investigators and Project Collaborators.

Wednesday, June 26
Lodging: Kibo Sloped Lodge
Loitokitok, Kajiado District

Schedule: Breakfast, demonstration of Integrated Assessment results for Ngorongoro Conservation Area, and IA assessment approach for Amboseli project area (at ILRI). Lunch. Travel to Loitokitok, Kaijado District. We will stop en route to meet with local collaborators, and tour Kimana Swamp agropastoral area, Imbirikani Group Ranch, Kalesirua).

Thursday, June 27
Lodging: ILRI Hostel
Nairobi, Kenya

Schedule: Breakfast at Kibo Slopes lodge. Briefing on activities in POLEYC Kajiado project site, with Group Ranch and Amboseli-Tsavo Group Ranch Conservation Association representatives. Travel to Amboseli National Park Headquarters and meet with Kenyan Wildlife Service (KWS) collaborators – Senior Park Warden/Community Warden. Lunch on the road. Travel back to Nairobi – arrive app. 6 pm.

7 p.m. Meet with Meg Brown of USAID-Kenya mission

Friday, June 28
Lodging: ILRI hostel
Nairobi, Kenya

Schedule: Breakfast; meet with collaborators at KWS Nairobi Headquarters regarding POLEYC activities in Meru National Park project area. Meet with CORE/PACT/African Conservation Centre/ African Wildlife Foundation Collaborators at CORE/PACT Headquarters. Lunch. Meet with POLEYC team members at ILRI Lab 8. 4 pm: final debriefing with EEP team and POLEYC team members.

ITINERARY -- LATIN AMERICA EEP REVIEW
6 - 10 JULY 2002

Project PLAN
Site Visit -- Rio Cosanga Watershed, Ecuador
7 - 8 July 2002

7 July 2002

6:30 a.m. Departure from Hotel Sur in Quito, Ecuador

7:30 a.m. Breakfast at Termas Papallacta. Check-in and leave luggage.

10:00 a.m. - 1:00 p.m.
Tour of Raquel Chunquimarca's Farm: Review of the systems of pasture improvement, livestock management, land management, and corn experiments.

Tour of Sailer Erazo's Farm: Greenhouse, corn experiments, chicken houses.

1:30 p.m. Lunch in Baeza

3:00 p.m. Visit to "La Isla", tourism project of APROPAL (Association of Producers of Las Palmas)

6:30 p.m. Return to Papallacta

8 July 2002

7:30 a.m. Breakfast in Termas

8:30 a.m. Travel to Las Palmas

9:30 to 1:00 p.m.
Tour of local research and production activities, with Mariana Valle

Tour of Alandi Torres' Farm: Pasture improvement system (preliminary stages), land management, corn experiments.

1:00 p.m. Lunch and meeting APROPAL members.

3:30 p.m. Conversations with the Director of the "Patronimo Municipal", head branch of local government and with Director of the Sustainable Development Unit of the Municipality.)

5:00 p.m. Return to Quito

AGENDA -- CENTRAL ASIA EEP REVIEW
11 JULY 2002

Livestock Development and Rangeland Conservation Tools
External Evaluation Presentations
July 11, 2002
139 Hunt Hall University of California -- Davis

8:00am	Project Overview Emilio A. Laca, Lead Principal Investigator
8:45am	Linking Livestock Production to Nutrition in Kazakstan, M Dalsin
9:30am	Forage Production Module, N Saliendra
10:15am	Coffee Break
10:30am	CO_2 scaling up and extrapolation process, B Wylie
11:15am	Animal Nutrition component and Animal model, EA Laca
12:00	Lunch (catered)
1:15pm	Basic Resource Module – ACT Demonstration, F Zermoglio
2:00pm	Socio-Economic Component, M Kobayashi
2:45pm	Coffee Break
3:00pm	Summary & Discussion
7:30pm	Dinner at Soga's Restaurant, 217 E Street

List of Materials Provided to the EEP

For all projects:

Annual Reports 1997 - 2001
Workplans and Budgets 1997 - 2001
Grant Proposals 1997 - 2000
Grant Proposals 1998 - 2003
Ruminations Newsletter Winter 1998 - Summer 2002
EEP Reports 1996 - 1999

By individual projects:

Improving Pastoral Risk Management on East African Rangelands (PARIMA)

1. Little, P., Smith, K., Cellarius, B, Coppock, L., and Barrett, C. 2001. Avoiding disaster: diversification and risk management among east African herders. Development and Change 32: 401-433.
2. Smith, K., Barrett, C., and Box, P. 2001. Not necessarily in the same boat: heterogenous risk assessment among east African pastoralists. Journal of Development Studies 37: 1-30.
3. McPeak, J., and Barrett, C. 2001. Differential risk exposure and stochastic poverty traps among east African pastoralists. American Journal of Agricultural Economics 83: 674-679.
4. Smith, K., Barrett, C., and Box, P. 2000. Participatory risk mapping for targeting research and assistance: With an example from east African pastoralists. World Development 28: 1945-1959.
5. Little, P., Mahmoud, H., and Coppock, L. When deserts flood: risk management and climatic processes among east African pastoralists. Climate Research 19:149-159.
6. Desta, S., and Coppock, L. 2002 PARIMA UPDATE. Newsletter of the Pastoral Risk management Project (English version). Volume 1, number 1. 6 pp.
7. Copies of all nine of the PARIMA research briefs for 2002

Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa (LEWS)

1. Stuth, Jerry W. External Evaluation Panel Briefing Document (Zonal Overview).
2. Ndung'u, J.N. and A.J.N. Ndathi. Overview of the GL-CRSP Livestock Early Warning System for East Africa.
3. Overview of the Structure and Function of the Livestock Early Warning Project (LEWS/GL-CRSP) in Northwest Kenya (Turkana District)
4. Kingamkono, Margaret N. Lews Zonal Information – Northern Tanzania

5. Overview of the Structure and Function of LEWS in the Laikipia Zone
6. The Structure and Functions of the Livestock Early Warning System (Lews/GL-CRSP) Activities in Central Tanzania
7. An overview of the Livestock Early Warning system (LEWS/GL-CRSP) Program in Uganda
8. Overview of the Structure and Function of LEWS in the Southern Ethiopia Zone (Borana)
9. Stuth, Jerry W., Abdi Jama, Robert Kaitho, Rapheal Marambii, and Jay Angerer. Overview of the GL-CRSP Livestock Early Warning System for East Africa.
10. Jama, Abdi, Zola Gibson, Jerry Stuth, Robert Kaitho, Jay Angerer, and Raphael Marambii. Setting Up a Livestock Early Warning System Monitoring Zone: Site Selection, Characterization, and Sampling for the PHYGROW Model.
11. Kaitho, Robert, Jay Angerer, Jerry Stuth, and Abdi Jama. Mapping Forage Response in the LEWS/GLCSP Project.
12. Marambii, Rapheal, Jerry Stuth, Robert Kaitho, Abdi Jama, and Zola Gibson. Communication Infrastructure of the GL/CRSP Livestock Early Warning System in East Africa.
13. Kingamkono, Margaret, William Mnene, Ezekiel Goromela, Steven Byenkya, Bayissa Hatew, Jane Sawe, Joseph Ndung'u, Peter Wandera, and Angello Mwilawa. Site Verifications of PHYGROW Model Simulation and Geospatial Extrapolation of Forage Estimates Simulations for Monitoring Points in the GL-CRSP Livestock Early Warning System for East Africa.
14. Stuth, Jerry, Doug Tolleson, Robert Kaitho, Abdi Jama. Building Infrastructure for Introduction of Nutritional Profiling Systems of Free-Ranging Livestock in East Africa.
15. Stuth, Jerry, Abdi Jama, and Doug Tolleson. Direct and Indirect Means of Predicting Forage Quality Through Near-Infrared Reflectance Spectroscopy.

Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa (POLEYC, formerly IMAS)

1. IMAS Project Final Report
2. IMAS PHEWS Final Report
3. NCA POLEYC Final Report
4. NCA Disease Assessment Report
5. POLEYC Jan-Feb 2002 Trip Report
6. POLEYC Aug 2001 Trip Report
7. KiSwahili and English versions of preliminary Integrated Assessment
8. Scenarios for the Kajiado project site
9. Link to the IMAS/POLEYC web site.

Livestock Development and Rangeland Conservation Tools (LDRCT)

1. Second Steering Committee Meeting of the IFAD-Supported Project "Integrated Feed and Livestock Production the Steppes of Central Asia" CAC Newsletter July – September 2000 p 9.
2. Climate Change: Prognosis and Solutions K. Akshalov, K. Erzhanov, E. Laca, T. Gilmanov, D. Johnson In Problems of Stabilizing and Developing Agriculture of Kazakstan, Siberia and

Mongolai. Almaty, KZ 2000 pp175-76 (Russian Language).
3. Carbon Sequestration – What's it all about. Center for Rural Affairs Newsletter. April 2000 p 3 – 4.
4. LDRCT Project Determines Effects of Land Cover Type on Carbon Flux in N. Kazakstan. N. Saliendra et al. Ruminations Fall 2001 p 1 and 10.
5. CO2 Flux Network for Central Asia Holds 2nd scientific seminar. Ruminations Spring 2001 p 6, 8.
6. Supplemental On-Site Training on CO2 flux measurements for LDRCT Team in Central Asia. Ruminations Spring 2001 p 8-9.
7. LDRCT Represented at International CO2 Meetings. Ruminations Winter 2001 p 2.
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9. Model Developed Under SRCRSP to be revised and updated for LDRCT Project in Central Asia. W. Pittroff. Ruminations Ruminations Winter 2001 p 4.
10. GLCRSP Links Universities and Institutions Addressing Livestock related problems in Central Asia. Ruminations Fall 2000 p 2.
11. Value of Mulberry Foliage Subject of LDRCT Study. Ruminations Fall 2000 p 7, 9.
12. Central Asian Scientists in US for Training. Ruminations Winter 2000 p 2.
13. Characteristics of Small holder Livestock Production Systems. E. Laca, A. Breuer. Ruminations Fall 1999 p 2, 12.
14. ALO Grant Awarded For Training and Partnership Program in Central Asia. Ruminations Fall 1999 p 2, 15.
15. Gross Primary Production of the Shidler Site 1997 (OK), and Woodward site 1997 (OK) and Shortandy site 2001 (KZ) in relation to remotely Sensed Vegetation Indices – A report to the Raytheon Co. T. Gilmanov 2002.
16. Dynamics of CO_2 Flux and Productivity on Three Major Rangeland Types of Central Asia: 1999 Growing Season. D. Johnson, T. Gilmanov, N. Saliendra, E. Laca, K. Akshalov, M. Dourikov, B. Madronov, and M. Nasyrov 2000.
17. Calculation of potential sequestration on vegetated grasslands of Kazakstan. A. Nikolaenko, L. Shabonova.
18. Smallholders' Manual. N. Malmakov (eds) Almaty, Bastau Press 2001 195 pp (Russian language).
19. Livestock Owing Households of Kazakstan. Part 1. Food Resources. Seasonal and Regional Analysis. Ecology of Food and Nutrition 41: 329-371: 2002.
20. Livestock Owing Households of Kazakstan. Part 2. Food Patterns and Health. Seasonal and Regional Analysis. Ecology of Food and Nutrition 41: 373-399: 2002.
21. Doran, M. 2001 Mulberry Foliage as an alternative feed for ruminant livestock. MS Thesis UCD.
22. Seigies J. 2001 Regional Differences in Livestock Feed Availability in Uzbekistan. MS Thesis, UCD.
23. Wolf, L. 2001 Landscape patterns of soil organic matter, snow, and severity of wind erosion in North Kazakstan. MS Thesis, UCD.
24. Dalsin, M. 2000 Linking Livestock Production to Human Nutrition in the Dry Steppe, Semi-Desert and Foothill Regions of Kazakstan, UCD.
25. Breuer, A. 2000 Patterns of Rangeland Use in the Dry Steppe, Semi-Desert and Foothill Regions of Kazakstan, UCD.

COMMUNITY PLANNING FOR SUSTAINABLE LIVESTOCK-BASED FORESTED ECOSYSTEMS IN LATIN AMERICA (SPANISH TITLE: PLANIFICACION LOCAL AGROPECUARIA Y DE LA NATURALEZA -- PROJECT PLAN)

1. Adame, Jesús Juan Rosales, Laura Elena Flores Beltrán, Eloy Fernando Carranza Montaño, Luis Manuel Martínez Rivera, and Martha Rosemeyer. An Agrosilvopastoral System with the Legume Tree, Leucaena Ieucocephala: a strategy to improve the quality and quantity of cattle forage in the community of Zenzontla, Tuxcacuesoco, Mexico.
2. Mercado-Silva, Norman. Assessment of Biotic integrity in the Ayuquila River, Jalisco, Mexico: Implications for Watershed Management Decisions.
3. Martinez, Luis M, Arturo Carranza, Angel Aguirre, Jose J. Sandoval, Jose L. Olgun, and Eva Judith Hueso Ayuquila. Watershed Conservation and Management.
4. Vacaflores, Carlos. Collective Access to Private Pastures: Farmers and Interdependency in the Mountain Forests of Bolivia.
5. Moermond, Tim. Divergent vs. Convergent Problems: New Approaches to Sustainable Agricultural Development.
6. Vacaflores, Carlos. Extensive Livestock Raising and Conflict Management in a Montane Forest Area.
7. Carlos, Juan Pablo Esparza, Luis Ignacio Iñiguez Dávalos, Timothy Moermond, Lucina Hernández, Francisco Santana Michel, and Ramón Cuevas. Feeding Habits of Cattle in the Tropical Dry Forest, Sierra de Manantlan, Biosphere Reserve, Mexico.
8. Food Insecurity in Latin-American Rural Villages: A Qualitative Assessment.
9. Carlos, Juan Pablo Esparza, Luis Ignacio Iñiguez Dávalos, Timothy Moermond and Lucina Hernández. Habitat Use by Cattle on Tropical Dry Forest Foraging Areas in Zonzontla, Sierra de Manantlan, Biosphere Reserve, Mexico
10. Eakright, Alexis. The Role of Household Assets in Determining Patterns of Income Diversification: Livestock Ownership and Investment in the Zenzontla Ejido, Mexico.
11. Milofsky, Tessa, Estalin Molina, Seylar Erazo, Martha Rosemeyer, and Kenneth Albrecht. The Impact of Lotus on Kikuyu-based Pasture Systems in Las Palmas, Ecuador.
12. Calispa, Fabián, Estalin Molina, Timothy Moermond, and Ken Albrecht. Importance of Native Vegetation for the Sustainable Management of Livestock Production in the Cosanga River Watershed, Ecuador.
13. D., Ricardo Paita and Dr. Orlando Corzo M. Incidence of Porcine Tapeworms in Pigs from the Watershed of Tomatirenda: One Serious Deficit of Low-cost Extensive Livestock Production.
14. Farmers as Experimenters: Preliminary case studies of farming families in Canton La Cueva, Bolivia.
15. Hernandez, Kattya B., Isabel Murillo M., and Gustavo Mosquera N. Land Tenure in the Rio Quijos Valley, Ecuador.
16. Galasso, Louise. Livestock Losses to Spectacled Bears in Ecuador.
17. Lastarria-Cornhiel, Susana with Alexis Eakright, Peter R. W. Gerritsen, Kattya Hernandez, Pilar Lizarraga, Arturo Moreno, Isabel Murillo, and Carlos Vacaflores. Natural Resource Access and Conflicts in Project PLAN.
18. Project PLAN: Framework and Focus
19. Milofsky, Tessa, Fabian Calispa, Estalin Molina, Seylar Erazo, Martha Rosemeyer, and Kenneth Albrecht. Study of a Maze-Legume Companion Crop System in Ecuador.

20. Sustainable Management of Natural and Agrosilvopastoral Systems in the Ejido of Zenzontla in the Sierra de Manantlan Biosphere Reserve, Jalisco, Mexico
21. Hernandez, Arturo Moreno, Guadalupe Hernadez Vargas, Cyntia Ayala G., and Ramón Cuevas Guzmán. Traditional Medicinal Plant Knowledge in Zenzontla, Mexico.
22. Autodiagnostico y Plan de Trabajo de la Organizacion Territorial de Base de Fuerte Santiago
23. Kattya Hernández Basante. Percepciones, Estrategias Productivas Y Capital Social en la Cuenca del rio Cosanga – Informe Final
24. Farm Productive Activity (PowerPoint photo presentation)

Project Teams

Latin America: Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America Project (PLAN)

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Collaborating Personnel:

Bolivia

Adautt, Samuel, Natural resource management, soils and botany, AGROSIG, Evaluation of pasture productivity and impacts on natural vegetation

Baldivieso, Erlan, GIS expert, AGROSIG, GIS, mapping support

Beltran, Rafael, Computer expert, AGROSIG, GIS, mapping and computer support

Calla, Rhinda, Sociology, JAINA, Sociological studies; community development

Carranza, Freddy, Agronomy, JAINA, Agronomy; community development

Castro, Miguel, Director, Lawyer, CER-DET, Instit. support in application of development projects

Cuba, Ruben, Agronomy, Botany, CER-DET, Use and commercialization of medicinal plants, community organization

Del Carpio, Ricardo, Agronomist, business, JAINA, Agronomy, community development

Espinoza, Linder, Director, Researcher, Forestry, Natural resource management, GIS Specialist, AGROSIG, Evaluation of natural resources

Flores, Magaly, Agronomy, Forestry, JAINA, Community development; forestry and biodiversity studies

Flores, Nelson, Resource management, soils and botany, AGROSIG, Evaluation of pasture productivity and impacts on natural vegetation

Gallarda, Norberto, Lawyer, CER-DET, Land Tenure

Gonzales, Jorge, Student, Law, JAINA, Legal analysis on resource access & community development

Jurado, Monica, Student, Agronomy, Biology, AGROSIG, Relation avifauna & agriculture

Lizárraga, Pilar, Researcher, Sociology, JAINA, Socioeconomic analyses and methodological support; autodiagnostics, perspectives studies, and participatory work and community organization

Lozano, Angelo, Agronomist, CER-DET, Natural resource management, livestock projects

Mealla, Grover, Agronomist, CER-DET, Planning & coordination, community org. & commercialization

Molina, Jesus, Agronomist, JAINA, Agronomy, community development

Montaño, Blanca, Sociology, CER-DET, Organization of community groups and women's artisanal groups, coordination of family food security activities

Mujica, Roberto, Agronomy, ecology, AGROSIG, Quality evaluation of water resources
Paita, Ricardo, Agronomy, Ecologist, CER-DET, Agro-ecology, agronomy, livestock projects
Roth, Erick, Director, Psychology, Environmental Education, CIEC, Advice on environmental and community education—application and strategies
Ruíz, Jorge, GIS and Agronomy, AGROSIG, Evaluation of natural resources
Vacaflores, Carlos Director, Researcher, Agronomy, JAINA, Coordination of project; socioeconomic analyses; autodiagnostics, perspectives studies, and participatory work and community organization
Villena, Aldo, Student, Forestry, JAINA, Community forest management

Ecuador
Calispa, Fabian, Researcher, Agronomy, Terranueva, Evaluation of livestock production, pastures, and agroecology
Castellanos, Armando, Ecologist, Jatun Sacha/CDC, Biodiversity
Cisneros, Jaqueline, Researcher, GIS, CDC, Mapping and GIS support; biodiversity inventory support
Hernández, Kattya, Researcher, Anthropology, Fundación Heifer, Local actors study, participatory work & community organization; coordination of project activities
Larrea, Fernando, Director, Anthropology, Fundacion Heifer, Coordination of project and advice on integrated community development approaches
Molina, Stalin, Extensionist (Representative, Community of Las Palmas), FUNAN, Support in impact of natural resource use on vegetation; community development
Mosquera, Gustavo, Researcher, Biology, FUNAN, Biodiversity studies and environmental education
Muñoz, Juan Pablo, Anthropologist, Terranueva, Anthropological studies
Murillo, Isabel, Researcher, Sociology, FUNAN, Community studies
Peñafiel, Marcia, GIS Engineer, Jatun Sacha/CDC, Coordination of biodiveristy & GIS
Pinos, Gonzalo, Researcher, GIS, mapping, CDC, Support in application of mapping and GIS
Ronquillo, Juan Carlos, Ecologist, Jatun Sacha/CDC, Biodiversity
Ruiz, Armando, Ecologist, FUNAN, Support in animal biodiversity studies
Serrano, Manuel, Researcher, Forestry, FUNAN, Support in impact of natural resource use on vegetation; community development
Utreras, Victor, Researcher, Biology, FUNAN, Support in animal biodiversity studies

Mexico
Aguirre, Angel, Ecologist, IMECBIO, Water quality
Alejos de la Fuente, Isidro, Student, Agronomy, Colegio de Post-graduados, Experimentation with sheep feed
Cárdenas, Oscar, Professor, Natural Resource Management, (UW-Student, Land Resources), IMECBIO/UW-Madison, Analysis of land use and land change due to government policies
Carranza, Arturo, Researcher, Soils, IMECBIO, Soils evaluation
Castellanos, Carla-Blanca, Student, Zoology, IMECBIO, Avian biodiversity study
Contreras, Sarahy, Researcher, Zoology, IMECBIO, Avian biodiversity study
Cuevas, Ramon, Professor, Botany, IMECBIO, Botanical and ethno-botanical studies
Esparza, Juan Pablo, Student, Zoology, IMECBIO, Cattle habitat and forage selection study
Gerritson, Peter, Professor, Sociology, IMECBIO, Socioeconomic evaluation; participatory work
Guevara, Ruben Dario, Research, Soils, IMECBIO, Soils evaluation
Guzman, German, Botanist, IMECBIO, Botany-flora

Hernández, Guadalupe, Research, Agronomy, IMECBIO, Agronomy, agro-forestry experimentation
Iñiguez, Luis Ignacio, Professor, Zoology, IMECBIO, Support for animal biodiversity studies and wildlife/agriculture interaction studies (rodents and vampire bats)
Martínez, Luis Manuel, Professor, Limnology and Watersheds, IMECBIO, Coordination of project; soil and watershed evaluation and mapping; hydrology and water quality studies
Moreno, Arturo, Professor, Economics, IMECBIO, Economic studies; participatory work including medicinal plants project with women's groups
Pineda, Maria del Rosario, Professor, Botany and Ecology, IMECBIO, Botanical studies of vegetation change
Ramírez, Manuel, GIS Engineer, IMECBIO, GIS
Rosales, Jesus Juan, Forestry, IMECBIO, Agroforestry
Sánchez, Lázaro, Professor, Botany and Ecology, IMECBIO, Botanical studies of vegetation change; maize cultivation and agroforestry experiments; characterization of livestock production systems; systems modeling
Sandoval, Jose de Jesus, Soil Science, IMECBIO, Conservation & classification of soils

United States
Albrecht, Kenneth, Agronomy, UW-Madison, Pasture improvement; farmer experimentation
Bleiweiss, Robert, Professor, Zoology, UW-Madison, Avian biodiversity and conservation studies; avian pollination studies
Eakright, Alexis, Student, Conservation Biology and Sustainable Development (CBSD) and Agricultural and Applied Economics, UW-Madison, socioeconomic and gender studies
Erdman, Joshua, Student, Zoology, UW-Madison, Avian biodiversity studies; avian pollination and seed dispersal in Ecuador
Galasso, Louise, Student, CBSD, UW-Madison, Study of wildlife value, status, and impact
Guries, Raymond, Forestry, UW-Madison, Support in application of agroforestry and woodlot management
Hernandez, Yoyi, Student, CBSD, UW-Madison, Bird community studies
Laca, Emilio, Professor, Range Science, Univ. California, Davis, Advice on range science and livestock production
Lastarria-Cornhiel, Susana, Researcher, Sociologist, UW-Madison, Community autodiagnostics; land tenure and gender studies; monitoring; project coordination assistance
Melgar-Quiñonez, Hugo, Researcher, M.D., Nutrition and Public Health, UC-Davis, CIAD, Community nutrition, public health, food security, and nutritional assessment
Mercado-Silva, Norman, Student, Zoology, UW-Madison, Fish community studies and bio-indicators
Milofsky, Tessa, Student, Agronomy, UW-Madison, On farm pasture enrichment experiments
Moermond, Timothy, Professor, Zoology and Environmental Studies, Project development, UW-Madison, Principal coordinator of the project; integration of conservation and development; community organization; biodiversity studies
Nordheim, Rick, Professor, Statistics and Forestry, UW-Madison, Statistical support for project research studies; project design; monitoring design and analysis
Rosemeyer, Martha, Agronomy, UW-Madison/Evergreen State College, Farmer experimentation; participatory studies, pasture improvement and agroforestry
Rutledge, Jack, Professor, Animal Science, UW-Madison, Development of cattle embryo transfer techniques to improve cattle production under tropical forest conditions in Ecuador

Sansom, April, Student, CBSD, UW-Madison, Project coordination assistance; community development
Wattiaux, Michel, Researcher, Animal Science, UW-Madison, Animal nutrition and animal production systems; agricultural education
Young, Andrea, Student, Zoology, UW-Madison, Biodiversity studies, impact of birds on maize
Young, Michelle, Student, UC, Davis, Farm community families, economics land use change
Yuill, Thomas, Director, IES; Professor, Veterinary Science, UW-Madison, Advice on animal health
Zepeda, Lydia, Professor, Economics, UW-Madison, Economic studies of livestock production and farm family strategies
Zubieta, Ana Claudia, Researcher, Nutrition, UC, Davis, CIAD, Community nutrition, micronutrients, food security, and nutritional assessment

United Kingdom
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CENTRAL ASIA: LIVESTOCK DEVELOPMENT AND RANGELAND CONSERVATION TOOLS PROJECT (LDRCT)

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Seigies, Joern, Graduate Student, UC Davis

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Shabanova, Ludmila, Institute of Ecology and Sustainable Development
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Alimaiev, Iliya, Institute of Forage and Rangelands
Asanov, Kasim A., Professor, Institute of Feed and Pasture
Satybaldin, Azimkhan A., Professor, Ministry of Science-Academy of Science RK (MS ASRK)
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Sarbasov, Gaziz, Institute of Sheep Breeding
Malmakov, Nurlan, Institute of Sheep Breeding
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East Africa: Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa (LEWS)

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Tanzania
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Margret Kingamkono, Animal Scientist, Selian Agricultural Research Institute

Uganda

Felix Bareeba, Professor, Makerere University, Uganda
Stephen Byenkya, Forage Scientist, National Agricultural Research Organization.
Grace Ebiyau, Technician, National Agricultural Research Organization
Cyprian Ebong, Livestock Production, National Agricultural Research Organization
Sarah Ossiya, Range Scientist, National Agricultural Research Organization
Rose Omaria, Vet. Officer, National Agricultural Research Organization
Emily Twinamasiko, Vet. Officer, Agricultural Research and Development Center, Mbarara.

East Africa: Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa (POLEYC)

Lead Princiapl Investigator: David Swift, Natural Resource Ecology Laboratory, Colorado State University, Ft. Collins, CO 80523. Telphone: (970) 491 5599; Fax: (970) 491 1965; Email: davesw@nrel.colostate.edu

Collaborating Personnel:

United States
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M. Coughenour (Principal Investigator, Senior Research Scientist NREL- CSU)
D.Swift (Lead Principal Investigator, Senior Research Scientist NREL- CSU)
K. Galvin (Senior Research Scientist, NREL- CSU)

R. Boone (Post-Doc, NREL-CSU)
S. BurnSilver (Project Manager, Research Associate, NREL-CSU)

Kenya
R. Reid (Program Director- People Livestock and the Environment, ILRI)
P. Thornton (Programme Co-ordinator, Systems Analysis and Impact Assessment)
J. Kinyamario (Kenya PI, GL-CRSP project, and Meru Project Leader Chairman/Professor in the Dept. of Botany, University of Nairobi)
John Mworia (PhD Student, University of Nairobi)
G. Olukoye (PhD Student, Kenyatta University)
W. Mutero (GIS Specialist, Kenya Wildlife Service)
P. Mulama (Spatial Analyst, KWS)
R. Bagine (KWS, Director of Research)
N. Georiadis (Ecologist/Researcher, M'pala Research Center)
Ole Kamuaro (Ministry of the Environment, Kenya)
W. Otichillo (Director, RCMRD)
J. Gathua (Researcher, Department of Remote Sensing, Resource Surveys)
C. Situma (Spatial Analyst, DRSRS)
J. Wandera (Land Use Planning Coordinator, SARDEP- Kajiado)
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H. Cheruiyot (Director, Kenyan Agricultural Research Institute)
J. Grootenhuis (Veterinarian, Veterinaires sans Frontieres)
J. Njoka (Professor Range Science Department, University of Nairobi)
S. Mbogoh (Agricultural Economist/Professor, University of Nairobi)
J. Ndathi Mwai (Environmental Conservation Dept.- M.E.N.R.)
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East Africa: Improving Pastoral Risk Management on East African Rangelands (PARIMA)

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ALLOCATIONS BY PROJECT

Projects	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	TOTAL
LDRCT	$135,817	$401,423	$322,100	$300,000	$368,000	$368,000	**$1,895,340**
POLEYC/IMAS	$117,678	$325,000	$350,000	$300,000	$137,500	$350,000	**$1,580,178**
LEWS	$130,930	$353,000	$275,000	$300,000	$350,000	$350,000	**$1,758,930**
PARIMA	$110,973	$325,000	$308,000	$328,418	$360,000	$350,000	**$1,782,391**
PLAN	$104,655	$120,000	$100,000	$156,250	$350,000	$350,000	**$1,180,905**
LEWS/PARIMA	$0	$0	$0	$0	$50,000	$50,000	**$100,000**
Subtotal:	**$600,053**	**$1,524,423**	**$1,355,100**	**$1,384,668**	**$1,615,500**	**$1,818,000**	**$8,297,744**

LDRCT: Integrated Tools for Livestock Development and Rangeland Conservation in Central Asia

POLEYC (formerly IMAS): Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development

LEWS: Early Warning System for Monitoring Livestock Nutrition and Health for Food Security of Humans in East Africa

PARIMA: Improving Pastoral Risk Management on East African Rangelands

PLAN: Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America (Spanish Title: Planificacion Local Agropecuaria y de la Naturaleza)

GLOSSARY

A-AARNET	ASARECA Animal Agriculture Research Network
AAU	Addis Ababa University
ACT	Almanac Characterization Tool
AFRNET	African Feed Resources Network
AGRIS	International Information System for the Agricultural Sciences and Technology, FAO
AGROSIG	Servicios Agro-Informaticos de Apolyo a la Planificacion para el Uso y Manejo de los Recursos Naturales
AID	Agency for International Development, Washington D.C., USA
AIGACAA	Asociacion Integral de Ganadevos en Camelidos de los Andes Altos
ALIN	Arid Lands Information Network
ALO	Association Liaison Office for University Cooperation in Development
ALRMP	Arid Lands Resource Management Project
ANPP	Annual Net Primary Productivity
AP	Animal Production
APEX	Multi-crop simulation model
APROPAL	Association of Producers of Las Palmas
ARC	Agriculture Research Council
ARD	Association for Rural Development
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASF	Animal Source Foods
ASP	Agrosilvopastoral
ASPADERUC	Asociacion para el Dasarolla Rural de Cajamarca
AT	Assessment Team
ATI	Appropriate Technology International

AVHRR	Advanced Very High Resolution Radiometer
AWF	American Wildlife Federation
BIFAD	Board for International Food and Agriculture Development
BLUE	Best Linear Unbiased Estimator
BPP	National Rubber Research Institute, Indonesia
BPT	Balai Penelitian Ternak, Bogor, Indonesia (Animal Husbandry Research Institute)
BR	Bowen Ratio
BS	Bachelor of Science degree
C	Carbon
CA	Central Asia
CAP	Common Agricultural Policy
CAR	Central Asian Republics
CARDI	Caribbean Agricultural Research and Development Institute
CARE	Cooperative for American Remittance to Europe, Inc.
CATIE	Centro Agronomico Tropical de Investigacion y Ensenaza
CBE	Commercial Bank of Ethiopia
CBPP	Contagious Bovine Pleuropneumonia
CBSD	Conservation Biology and Sustainable Development
CCD	Convention to Combat Desertification (United Nations)
CCPP	Contagious Caprine Pleuropneumonia
CDC	Centro de Datos para la Conservacion
CEDEP	Centro de Estudios para d'Oesarrollo y la Participacion
CER-DET	Centro de Estudios Regionales para el Desarrollo de Tarija
CGIAR	Consultative Group on International Agricultural Research
CHDC	Child Health and Development Center
CIAT	Centro Internacional de Agricultura Tropical
CIDICCO	Centro Internacional de Informacion Sobre Cultivos de Cobertura
CIEC	Centro Interdisciplinario de Estudios Comunitarios (Interdisciplinary Center for Community Studies)

CIESTAAM	Center for Economic, Social, and Technology Research on World Agriculture and Agribusiness
CIP	Centro Internacional de la Papa - International Potato Center
CLAS-UMSS	Centro de Levantamientos Aerospaciales y Aplicaciones de SIG
CMO	Crisis Mitigation Office
CNA	Confederacion Nacional Agropecuario
CNCPS	Cornell Net Carbohydrate and Protein System
CNG	Confederacion Nacional Ganadera
CNL	Crocker Nuclear Laboratory
CONDESAN	Consorcio para el Desarrollo Sostenible de la Ecoregion Andina
CORAF	Conference de la Recherche Agronomique des Responsable Africains et Francais
CP	Crude protein
CPV	Capripox virus
CRES	Center for Resource and Environmental Studies
CRIAS	Coordinating Research Institute for Animal Science, Indonesia
CRSP	Collaborative Research Support Program
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSSG	Center for Sheep Selection and Genetics
CSU	Colorado State University
CT	condensed tannins
CUCSUR	Centro Universitario de la Costa Sur, Universidad de Guadalajara
CURLA	Centro Universitario Regional del Litoral Atlantico
DANIDA	Danish International Development Agency
DOM	Digestible Organic Matter
DM	Dry Matter
DPG	Dual Purpose Goat
DPIRP	Drought Preparedness Intervention and Recovery Program
DSS	Decision Support System
EEC	European Economic Community

EEP	External Evaluation Panel
EHNRI	Ethiopian Health and Nutrition Research Institute
ELISA	Enzyme linked immunosorbent assays
EMBRAPA	Brazilian National Agency for Agricultural Research
ENNIV	Peruvian Living Standards and Measurement Survey
ENSO	El Nino and Southern Oscillation
EPG	Eggs per Gram
EPIC	Erosion Productivity Import Calculator
EU	Edgerton University
EW	Extension Worker
EWS	Early Warning System
FA	FARM Africa
FAO	Food and Agriculture Organization, United Nations
FCC	Fertility Capability Classification System
FD	Full-day
FDC-PROSAT	Fondo de Desarrollo Campesino -- Programa del Servicio y Assistencia Tecnica
FEWS	Famine Early Warning System
FIA	Fundacion Interamericana
FIRA	Fideicomisos Instituidos en Relacion con la Agricultura
FISO	Food Information System Unit
FLACSO	Facultad Latinoamericana de Ciencias Sociales
FMD	Foot and Mouth Disease
FOSS	First in Food Analysis
FUNAN	Fundacion Antisana
GAN Lab	Grazingland Animal Nutrition Laboratory
GEF	Global Environmental Facility (World Bank)
GIEWS	Global Information and Early Warning System (FAO)
GIS	Geographic Information System
GLCI	Grazing Lands Conservation Initiative

GO	Government Organization
GPS	Global Positioning Systems
GSE	Greater Serengeti Ecosystem
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
ha	Hectare
HPI	Heifer Project International
HSPC	Human Subject Protection Committee
IADB	Inter-American Development Bank
IAE	International Agricultural Economics
IAP-MU	International Agriculture Programs - Missouri University
IAR	Institute for Agricultral Research
IARC	International Agricultural Research Center
IBTA	Instituto Boliviano de Technologia Agropecuaria
ICA	Instituto Colombiano Agropecuaria, Colombia
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICIMOD	International Centre for Integrated Mountain Development
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	International Centre for Research on Agroforestry
ICRISAT	International Crops Research Institute for the Semiarid Tropics
ICRW	International Center for Research on Women
IDIAP	Agricultural Research Institute of Panama
IDRC	International Development Research Centre (Canada)
IEMUT	French Tropical Veterinary Institute
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IGADD	International Governmental Authority on Drought and Development
IICA	Interamerican Institute for Cooperation in Agriculture
IIML	Integrated Information Management Laboratory

IIN	Instituto Investigacion Nutricional
ILRAD	International Laboratory for Research on Animal Diseases
ILRI	International Livestock Research Institute
IMAS	Integrated Modeling and Assessment System
IMECBIO	Instituto Manantlan de Ecologia y Conservation de la Biodeversidad
INCALAC	Industria Cajamarquina de Lacteos
INCAP	Instituto de Nutricion para Centro America y Panama
INEGI	Instituto de Estadistica, Geografia e Informatica
INIA	Instituto Nacional de Investigacion Agrarias
INIFAP	Instituto Nacional de Investigaciones Forestales y Agropecuarios
IP2TP	Installation for Research and Assessment of Agricultural Technology
IPB	Bogor Agricultural University
ISLP	Integrated Small Livestock Project
ISNAR	International Service for National Agricultural Research
JAINA	Comunidad de Estudios
JDA	Joint Development Associates
JS	Fundacion Jatun Sacha
KARI	Kenya Agricultural Research Institute
KCB	Kenya Commercial Bank
KDPG	Kenya Dual Purpose Goat
KDRSRS	Kenya Department of Resource Surveys and Remote Sensing
KEVEVAPI	Kenya Veterinarian Vaccine Production Institute
kg	kilogram
KLDP	Kenya Livestock Development Program
KNP	Katavi National Park
KRTISB	Kazakh Research and Technological Institute of Sheep Breeding
Ksh	Kenya Shilling
KUSCCO	Kenya Union of Savings and Credit Cooperatives
KWS	Kenya Wildlife Service

KWVA	Kenya Women's Veterinary Association
KZ	Kazakstan
LAC	Latin American Countries
LAI	Leaf Area Index
LDC	Lesser Developed Country
LDRCT	Livestock Development and Rangeland Conservation Tools (GL-CRSP Project)
LEWS	Livestock Early Warning System
LGCA	Loliondo Game Area
LINDA	Livestock Information Network Development for the Americas
LPRI	Livestock Production Research Institute
LS	Livestock
LU	Livestock Units
M	Composite Population Sheep: 25% St. Croix, 25% Barbados Blackbelly, 50% Sumatran Sheep
MALDM	Ministry of Agriculture, Livestock Development and Marketing
MCF	Malignant Catarrhal Fever
MDP	Marsabit Development Project (GTZ)
ME	Management Entity
MIAC	MidAmerica International Agricultural Consortium
MOA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Rural Development
MOH	Ministry of Health
MOU	Memorandum of Understanding
MRC	Mpala Research Center
MUCIA	Midwest Universities Consortium for International Agriculture
NAARI	Namulaonge Agricultural and Animal Production Research Institute
NAFTA	North American Free Trade Agreement
NARO	National Agricultural Research Organization

NARS	National Agricultural Research System
NCA	Ngorongoro Conservation Area
NCAA	Ngorongoro Conservation Area Authority
NCSU	North Carolina State University
NDF	Neutral detergent fiber
NDVI	Normalized Difference Vegetation Indices
NES	Nucleus Estate Smallholder
NFTA	Nitrogen Fixing Tree Association
NGO	Non-Governmental Organization
NIH	National Institute for Health
NIRS	Near Infrared Reflectance Spectroscopy
NIS	Newly Independent States
NOAA	National Oceanographic and Atmospheric Administration
NOVIB	Counterpart International (Uzbek NGO)
NRC	National Research Council
NRCS	Natural Resources Conservation Service
NREL	Natural Resource Ecology Laboratory
NR	Natural Resources
NSDV	Nairobi Sheep Disease Virus
NSF	National Science Foundation
NUTBAL	Nutritional Balance Analyzer
OADB	Oromia Agricultural Development Bureau
OAU	Organization of African Unity
OCPB	Oromia Cooperative Promotion Bureau
ODA	Overseas Development Administration
ODI	Overseas Development Institute
OFDA	Office of Foreign Disaster Assistance
OMD	Organic Matter Digestibility
OMI	Organic Matter Intake

OPC	Ovine pulmonary carcinoma
OPMM	Outreach Research Project at Membang Muda
OPP	Outreach Pilot Project
OPS	Outreach Project for the Sosa
ORP	Outreach Research Project
OvLV	Ovine lentivirus
PA	Participatory Appraisal
PAC	Program Advisory Committee
PAR	Photosynthetic Active Radiation
PARIMA	Pastoral Risk Management Project (GL-CRSP)
PCV	Packed Cell Volume
PEM	Protein-Energy Malnutrition
PENHA	Pastoral and Environmental Network in the Horn of Africa
PHYGROW	Plant Growth/Hydrology/Yield Simulation Models
PI	Principal Investigator
PL480	Public Law No. 480
PLAN	Planificacion Local Agropecuaria y de la Naturaleza (Spanish title for GL-CRSP project: Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America)
PM	Problem Model
POLEYC	Policy Optons for Livestock-based Livelihoods and Ecosystem Conservation (formerly known as IMAS project)
PRA	Participatory Rural Appraisals
PROMETA	Proteccion del Medio Ambiente Tarija
PRR	Proyecto de Reconstrucion Rural
PSICA	Information System and Agricultural Census Project
PVO	Public Volunteer Organization
RAINAT	Research and Assessment Installation for Agricultural Technology
REDSO	East African Region USAID

RERUMEN	Latin American Network of the Small Ruminant CRSP
RF	Range Forage
RFA	Request for Assistance
RFP	Request for Proposals
RGR	Rukwa Game Reserve
RH	Relative Air Humidity
RIAP	Research Institute for Animal Production, Bogor, Indonesia
RISPAL	Latin American Network for Animal Production Systems Research, IDRC
RMSC	Root Mean Square Corrected
RS	Remote Sensing Technologies
RS	Resident Scientist
RSG	Ranching Systems Group
RVFV	Rift Valley Fever Virus
S	Sumatra Sheep
SA	Small Animals
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SAGAR	Secretaria de Agricultural, Ganaderia y Desarrollo Rural
SALTLICK	Semi-Arid Lands Training and Livestock Improvement Centres of Kenya
SANREM	Sustainable Agriculture and Natural Research Management CRSP
SARI	Selian Agricultural Research Institute
SBPT	Balai Penelitian Ternak, Sei Putih, Indonesia (Animal Husbandry Research Institute)
SCT	Spatial Characterization Tool
SE	Socio-Economic
SEAD	Servicios de Apoyo al Desarrollo
SECOFI	Secreatria de Comercio
SEIR	Susceptible, Exposed, Infected, and Removed
SEMARNAP	Servicio Nacional del Medio Ambiente, Recursos Naturales y Pesca
SES	Socio-economic Status

SICA	Proyecto Censo Agropecuario y Sistema de Informacion
SNIM	Servicio Nacional de Informacion de Mercados
SORDU	Southern Rangeland Development Unit
SPAN	Strengthening Partnerships with National Agricultural Systems
SR-CRSP	Small Ruminant Collaborative Research Support Program
SRNET	Pan-African Small Ruminant Research Network
SRUPNA	Small Ruminant Production Systems Network for Asia
TACIS	Technical Assistance to the Commonwealth of Independent States
TANAPA	Tanzania National Parks
TAMU	Texas A&M University
TCP	Technical Cooperative Program (FAO's assistance Program)
TE	Terraneuva
TK	Turkmenistan
TNC	The Nature Conservatory
TT	Technology Transfer
UACh	Autonomous University of Chapingo
UCD	University of California, Davis
UCR	University of Costa Rica
UCV	Universidad Central de Venezuela, Maracay
UMC	University of Missouri-Columbia
UN	University of Nairobi
UNALM	Universidad Nacional Agraria La Molina
UNAM	Universidad Nacional Autonoma de Mexico
UNDOS	United Nations Development Office for Somalia
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNMSM	Universidad Nacional Mayor de San Marcos
URIMR	Uzbek Research Institute of Market Reform
US	United States

USAID	United States Agency for International Development
USAMRID	United States Army Medical Research Inst. of Infectious Disease
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USU	Utah State University
UT	Utah
UW	University of Wisconsin
UWI	University of West Indies
VOCA	Volunteers in Overseas Cooperative Assistance
WAICENT	World Agricultural Information Center
WAN	Wide Area Network
WB	World Bank
WHO	World Health Organization
WKO	West Kazakhstan Oblast
WMO	World Meterological Organization
WSU	Washington State University
WI	Winrock International Institute for Agricultural Development
WILD	Women in Livestock Development
WINS	Women Infant Nutrition Support
Wsoil	Soil Moisture
WTO	World Trade Organization
WWF	World Wildlife Fund
ZONISIG	Proyecto Zonification Agro-ecologica y Establecimients de una Base de Datos y Red de Sistema de Informacion