Summer 2002

# RUMINATIONS

NEWSLETTER OF THE GLOBAL LIVESTOCK COLLABORATIVE RESEARCH SUPPORT PROGRAM

## *Collective access to private pastures:* Farmers and Interdependency in the Mountain Forests of Bolivia

*By Carlos Vacaflores, Bolivian Coordinator for PLAN, Director of "Comunidad de Estudios JAINA," Bolivia*

Livestock-raising is a central component of the livelihood strategies of the small-scale farm households that characterize the mountain forest agro-ecosystems of the Department of Tarija in southern Bolivia. Livestock production, along with the other activities that comprise the rural household economic strategy, represents an expression of their logic of diversification as a strategy to deal with the risk inherent in the variability of these mountain environments. The production of livestock of different sizes, life cycles, and food habits conforms to the criterion of efficiency and economics of the farm household, taking advantage of the ecological niches present within the household productive territory, and as a means to control productive spaces far from the homestead itself. The role of larger livestock as a means of savings is well known, and, in the case of cattle, represents a means to accrue family capital, more than a strategy to obtain animal protein. This latter role is better filled by smaller livestock—goats, sheep, and fowl—whose management falls under the domain of women and children principally, while cattle and horses are principally the responsibility of men. In this manner, the production of different types of livestock also contributes to the balance of power

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## First Issue of GHA Early Warning Bulletin Released

The first issue of a monthly series of Greater Horn of Africa (GHA) Bulletin was released in May. The GHA Early Warning Bulletin is collaborative initiative of the Drought Monitoring Center - Nairobi (DMNC-N), Famine Early Warning Network (FEWS-NET), Livestock Early Warning System project of the Global Livestock CRSP (LEWS/GLCRSP), Regional Center for Mapping of Resources for Development (RCMRD) and the United States Geological Survey (USGS). The Bulletin covers food security issues in ten GHA countries: Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania and Uganda.

The purpose of the Bulletin is to provide timely and accurate early warning information on food security conditions in the GHA region to decision makers

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# Child Nutrition Project Research Briefs Available

The Global Livestock CRSP has released a second set of research briefs. The five new research briefs focus on the results of the Child Nutrition project's controlled intervention study in Embu, Kenya.

This new publication series, first introduced by the Global Livestock CRSP in December of 2001, provides the development community with research results in an accessible format. The research briefs condense project studies into 1 - 2 page documents highlighting the important findings. A list of "Further Reading" provides sources of additional information and more detailed descriptions of the research. The briefs also provide the practical implications of the findings.

The Child Nutrition Project titles available are:

1. ***The Impact of Dietary Intervention on the Cognitive Development of Kenya Schoolchildren*** *by Shannon E. Whaley, Marian Sigman, Charlotte Neumann, Nimrod Bwibo, Donald Guthrie, Robert E. Weiss, Suzanne Murphy, and Susan Alber.*
2. ***Statistical Methods for the Kenya Feeding Intervention Trial*** *by Robert Weiss, Donald Guthrie, Li-Jung Liang, and Susan Alber.*
3. *The Flynn Effect in Rural Kenya by Tamara C. Daley, Shannon E. Whaley, Marian Sigman, and Charlotte Neumann.*
4. ***Supplementation with Beef or Milk Markedly Improves Vitamin B12 Status of Kenya Schoolers*** *by Erin D. Reid, Charlotte G. Neumann, Jonathan H. Siekmann, Nimrod O. Bwibo, Suzanne P. Murphy, and Lindsay H. Allen.*
5. ***Changes in Dietary Quality for School Children in Kenyan Villages*** *by Suzanne P. Murphy, Constance Gewa, Monika Grillenberger, Nimrod Bwibo, and Charlotte Neumann.*

The research briefs are available at the Global Livestock CRSP web site (http://glcrsp.ucdavis.edu) or by contacting the Management Entity of the Global Livestock CRSP, University of California - Davis, Davis, CA 95616. Email: glcrsp@ucdavis.edu. Fax: (530) 752-7523. The Pastoral Risk Management (PARIMA) project briefs released in December 2001 are also available.

# Travel Grants Awarded

The Global Livestock CRSP awarded four students travel grants to attend the Animal Source Foods and Nutrition in Developing Countries Conference in Washington D.C. in June 2002.

The grants enabled the students to present their work during a poster session at the conference. The awardees were:

*Katharine M. Jones* presented a poster entitled, "Participants in a Home Garden Program in Rural Nepal Have Better Nutrition Knowledge and Practices than Non-Participants." The study evaluated the impact of an agricultural development project that included home gardening, nutrition education, training and technical assistance and seed distribution. Ms. Jones is a student in the Program in International Nutrition, University of California, Davis. Co-authors on the poster are Parvati Shrestha of Chemonics/MARD Project, Nepal and Sheila Specio and Lindsay Allen of UC Davis.

*Simon Kuria* presented a poster entitled "Food

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## GL-CRSP Program Conference Travel Grants Available

Students currently involved in GL-CRSP projects are eligible to compete for travel grants to attend and present posters at the 2002 GL-CRSP Program Conference. The conference is scheduled for October 9 - 12th in Washington D.C. For more information, contact the GL-CRSP Management Entity, glcrsp@ucdavis.edu.

PROFILE

# David Swift -- New P.I. for POLEYC Project

Dave Swift of the Natural Resource Ecology Laboratory at Colorado State University has been asked to take over as the Principal Investigator of the POLEYC project (formerly known as IMAS) through the Global Livestock CRSP, following the untimely death of his friend and former POLEYC P.I. Jim Ellis. Not having been involved in the project prior to this time, Dave admits to be struggling up a very steep learning curve as he familiarizes himself with the many people involved in the project both in the States and in East Africa. Although he has worked in Kenya in the past, his familiarity with the specific research sites of the current project is limited. He is planning to take advantage of a trip to Africa for the EEP review to get to know the Kenyan and Tanzanian collaborators on the POLEYC project and to visit the study sites in both countries. This project is particularly interesting to Dave because of the importance of the issues being addressed (human welfare and ecosystem conservation) and because the project is designed to have an effect on management and policy in the pastoral areas of East Africa.

*Dave Swift and his wife, Liliana Castro*

Dave has a long history of research on pastoral systems in East Africa and has worked closely with many people on the POLEYC team, as well as with Layne Coppock, P.I. of the Pastoral Risk Management project. He was co-P.I. with Jim Ellis on the South Turkana Ecosystem Project throughout its history. He shared responsibility with Jim for overall management of that project and was deeply involved in the animal ecology and nutrition studies and in the simulation modeling done in association with that study. He has also worked extensively in other parts of the developing world, including China, Pakistan and Morocco, on projects dealing with pastoral systems and sustainable agricultural development. Much of this work was under the auspices of USAID so he is familiar with the workings and goals of our funding agency.

Dave grew up on the East Coast and did his undergraduate work in forestry at the State University of New York at Syracuse. Even then, he knew that he was more attracted to the dry climates of the Western part of the U.S. and that his days in the east were numbered. Following a three year stint in the army, he enrolled at Colorado State where he earned an M.S. in forest hydrology and was introduced to systems ecology by George Van Dyne and Sam Bledsoe. Upon completion of that degree in 1970 he began working under their direction as the manager of the data processing group of the Grassland Biome Program of the USIBP, which was the precursor to the NREL.

A few years later, Jim arrived at the NREL to coordinate research on consumers within the biome study. He saw a need for

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## David Swift -- New PI for POLEYC

improved simulation modeling capacity in that area and urged Dave to take on a more active role in that area. This required some significant retooling on Dave's part. His systems ecology training had prepared him for modeling in terms of techniques, but his understanding of animal ecology and nutrition was less than adequate. He quickly learned that the folks in the Animal Science Department at CSU were the ones in possession of most of the knowledge he needed, and his constant "pestering" of Dr. Don Johnson of that department for information eventually led to his enrolling in the Ph.D. program there. He completed his degree in 1983, his research centering on heat and water balance in animals in hot environments.

By that time, the South Turkana Ecosystem Project was in full swing, and became his primary research effort for the next 8 years. Since the conclusion of that project he has been involved in a variety of other research projects, has been active as a consultant internationally, and has taught several courses at CSU, including wildlife nutrition and the ecology of secondary production in grazing systems.

Dave is married to Liliana Castro, a transplanted Argentine, who teaches Spanish, and English as a second language; and who is chair of the Department of Arts and Humanities at Front Range Community College in Fort Collins. Two stepchildren came along with Lili, Nicolás - a sophomore at CSU studying political science, and Luciana - currently finishing up a year-long stay in Germany as a rotary exchange high school student. He has two children from a previous marriage as well, Melissa - the proud Mom of Colton and Claire, and Ethan - finishing with relief his first year of medical school at CU/ Denver.

The Colorado Mountains and the Canyons of Utah consume most of Dave's free time. Like many ecologists, he finds that time spent in the natural world is a joyful and inspiring experience and he is an avid hiker, backpacker and snowshoer. He has a long standing interest in birds and has taken advantage of his travels to indulge his bird-watching hobby. More recently, he and Lili have developed an interest in wildflower identification and they spend considerable time afield in Colorado puzzled and confused by the enormous variety of plants in the many life zones of the State.

*Dave Swift can be contacted at davesw@nrel.colostate.edu.*

## EEP Review Set for this Summer

The External Evaluation Panel review for 2002 will include site visits to East Africa and Latin America and a project meeting and presentations at UC Davis for the Central Asia project. Dr. Thomas Thurow, University of Wyoming, will serve as Chair of the EEP team. Panel members will include Dr. Bernard Engel, Purdue University; Dr. Ahmed Sidahmed, International Fund for Agricultural Development; and Dr. Keith Moore, Virginia Polytechnic Institute and State University.

Drs. Thurow and Engel will travel to Kenya and Ethiopia to review the LEWS, PARIMA, IMAS and POLEYC projects. Their site visit will include a tour of the Moyale cross-border livestock market, visits with local Malab-Chamuk women's groups, and tours of an NIRS lab and Group Ranches.

For the PLAN project review in Latin America, the team of Dr. Ahmed Sidahmed and Dr. Keith Moore will travel to Ecuador. They will visit local farms, farm fields, and meet with local government officials in the project study area near Baeza.

The LDRCT project review will primarily be a paper review but a day of presentations has been arranged at UC Davis. Dr. Ahmed Sidahmed will lead the review.

# $CO_2$ Flux Network Holds Third Scientific Seminar

Scientists, policy makers, government officials and graduate students from Kazakstan and Uzbekistan gathered in Samarkand, Uzbekistan in May 2002 to discuss recent research related to carbon sequestration by the rangelands of Central Asia.

Approximately 14 people were in attendance for the seminar held May 24 at the Samarkand Branch of the Academy of Sciences.

The seminar included several formal presentations by team members of the GL-CRSP Livestock Development and Rangeland Conservation Tools project (LDRCT). Recent advances in development of a model of $CO_2$ sequestration on pasture lands based on NDVI information that is being developed were presented by team member A. Nikolaenko, GIS expert at the Regional Environmental Center of Central Asia. Dr. B. Mardonov, Academy of Sciences and LDRCT team member, presented a report on the main directions of vegetation dynamics in semi-deserts under grazing. Research perspectives of $CO_2$ flux measurements were presented by Dr. M. Nasyrov of the Samarkand State University. And lastly, Prof. A Lapas presented research discussing the main causes of desertification of arid landscapes and the problem of soil salinization caused by winds.

This was the third gathering of the $CO_2$ flux network, which was formally organized in June of 2000. The network activities grew out of a grant awarded by the Association Liaison Office for University Cooperation in Development to Dr. Emilio Laca of the University of California, Davis.

The network was organized in part to enhance representation of Central Asian countries by Central Asians at international meetings and negotiations regarding carbon emissions and sequestration. In addition, the network works to attract greater national, regional and international attention to the role of well-managed rangelands on sustainable production and mitigation of the increasing $CO_2$ concentrations in the atmosphere.

*For more information, contact Emilio Laca, ealaca@ucdavis.edu.*

## Supplemental On-Site Training on GIS Technologies

A workshop on Geographic Information Systems (GIS) technologies was held in mid May in Samarkand, Uzbekistan for the Uzbek LDRCT GIS team. The workshop was the second such workshop and provided supplemental training to Uzbek scientists who had undergone GIS training in Samarkand last year. Participants in the training included nine Masters students and Post Graduates of the Samarkand Branch of the Academy of Sciences. A. Nikolaenko, a GIS expert from the Regional Environmental Center of Central Asia and LDRCT team member, led the training.

The workshop included advanced training on IDRISI software, modeling using GIS software, and methods in using satellite images in GIS work.

The trainees will continue to use these skills in the development of a complete GIS database of climate, agricultural, forage, topographic, political, and demographic data of the rangelands of Uzbekistan. The database is also being refined and augmented to emphasize meteorological and remote sensing data. Eventually, this information will be used to develop grassland models, which along with the GIS data, will enable improved estimates of $CO_2$ flux on a regional basis.

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## Nutrition Conference Travel Grants Awarded

Insecurity and Malnutrition Among the Rendile Community of Marsabit, Kenya: Part Review of the Status and Interventions to Alleviate the Problem." Rendille is one of the pastoral communities of Kenya living in the lowlands of Marsabit administrative district. The community traditionally kept camels and small stock, and relied on the livestock products (milk, meat and blood) for subsistence. However, recent developments indicate that both lifestyles and food habits on the community are fast changing. This poster reviews some of the factors prompting the changes, implications of the changes on the community food security and nutrition as well as some of the interventions to mitigate the negative effects of the changes. Mr. Kuria is a student at the University of Nairobi, Kenya and works at KARI.

*Immaculate Nduma* presented a poster entitled, "Poultry as a Potential Animal Source Food for Settled Households Among Pastoral Communities in Northern Kenya." The poster reports on on-going studies under EU-KARI ARSP in the Rendille area of Korr and the Marsabit mountain area where women and children from livestock poor and/or female-headed households are principal participants in the study. The participants have diversified their livelihood strategies by keeping poultry. Ms. Nduma is a student at Egerton University in Njoro, Kenya. Co-authors on the poster paper are H. Maina Warui of KARI and Chris Onyango and AA. Aboud of Egerton University.

*Erin Reid* presented a poster entitled, "Supplementation with Beef or Milk Markedly Improves Vitamin B12 Status of Kenyan Schoolers." The poster looks at the GL-CRSP Child Nutrition Project's controlled intervention study and results of the Vitamin B12 research. Ms. Reid is a student in the Program in International Nutrition at UC Davis. Co-authors on the poster were J.H. Siekmann and Lindsay Allen also of UC Davis; N. Bwibo, University of Nairobi and C. Neumann of UCLA.

The GL-CRSP Management Entity will offer travel grants once again for the Program Conference in October 2002. For more information, contact us at glcrsp@ucdavis.edu.

### Jim Ellis Graduate Mentorship Program:

## First Grant Recipients Named

The first recipients of the Jim Ellis Graduate Mentorship Program Grant were announced in June 2002. The grant program provides support to improve the overall quality of the student's dissertation or thesis. The program is named in honor and in memory of Dr. Jim Ellis, a renowned scientist and GL-CRSP Principal Investigator. Five awards were made this year:

*Stacy Lynn,* Colorado State University. Her project is titled, "Finding balance in a changing system: an integrated assessment of the pastoral-wildlife-agricultural interface in the Tarangire-Manyara Ecosystem, Tanzania."

*Constance Gewa,* University of California, Los Angeles. Her project is titled, "Validation of a Semi-Quantitative Food Frequency Questionnaire Amongst School Children in Embu District, Kenya."

*Laban MacOpiyo,* Texas A&M University. His project is titled, "Spatial Modeling of the Livestock Marketing Dynamics in the Greater Horn of Africa."

*Rose Epaku Omaria,* Makerere University, Kampala, Uganda. Her project is titled, "Development of NIRS Fecal Calibration Equations for Pregnancy Testing in Cattle and Goats."

*Joana Roque de Pinho,* International Livestock Research Institute Nairobi and Colorado State University. Her project is entitled, "Wildlife Utilization in Kajiado District, Kenya: Land Tenure and Land Use Constraints."

Our congratulations to all the recipients.

# Do Pastoralists Value Modern Climate Forecast Information?

*By Christopher B. Barrett, Winnie K. Luseno, John G. McPeak, Peter D. Little, Getachew Gebru, and Travis J. Lybbert.*

Skillful seasonal climate forecasts have considerable potential to improve resource management and the welfare of rural populations, perhaps especially in marginal areas of developing countries, like the rangelands of the Horn of Africa (HA). The past decade's droughts and floods that buffeted pastoralists have sparked intense interest in improving and extending the climate forecasting component of early warning systems in HA. Donors hope that such investments might help break the "relief trap" cycle of emergency relief distribution that crowds out expenditures on development projects that might help pastoralists reduce their vulnerability to the next shock. Much effort has been directed toward building up climate forecasting and dissemination capacity in the region. Yet questions abound as to the value of climate forecast information, including among pastoralists and other micro-level end-users.

The research summarized here aims to fill that void. We report on work undertaken over the course of 2001 to understand pastoralists' access to, confidence in and use of indigenous and modern, model-based seasonal climate forecasts in the Pastoral Risk Management (PARIMA) project's study region in southern Ethiopia and northern Kenya.

**The Basics of Information Theory.** Forecast information can be valuable to an individual who must make resource allocation decisions in the face of uncertain future conditions that affect the relative productivity of different available alternatives, but only when it satisfies certain criteria. First, there must be some skill in the forecast; it must not be uncorrelated with observed outcomes. Second, the forecast must provide new information that differs from the recipient's prior beliefs. Third, the recipient must have confidence in the forecast and update her prior beliefs in response to the forecast. Fourth, the recipient must be willing and able to act on her updated beliefs. Researchers and policy makers too often assume that only the first of these – forecast skill – is necessary for information to have non-negligible value. This can lead to overestimates of the value of forecast information when models exhibit some predictive skill, as with climate forecasting in east Africa.

**Data.** The PARIMA project undertook this work on a subcontract from the "Regional Climate Prediction and Applications for the Greater Horn of Africa" project of Columbia University's International Research Institute for Climate Prediction, in collaboration with the University of Nairobi's Department of Range Management. A two-stage survey bracketing either side of the long rains of March-May 2001 was fielded among the 323 pastoralist households in PARIMA's ongoing field studies. An open-ended questionnaire was also administered to establish prevailing indigenous climate forecasting methods.

We contrast indigenous forecasts based on traditional methods such as reading of clouds, stars, the moon, intestines, livestock and wildlife behavior, or other phenomena, with external forecasts based on modern climate science, particularly coupled global ocean-atmospheric models.

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## About the Authors

Dr. Christopher Barrett is an Associate Professor in the Department of Applied Economics and Management at Cornell University, Ithaca, NY; Winnie Luseno, John McPeak and Travis Lybbert are also at Cornell University. Getachew Gebru is at the International Livestock Research Institute, Addis Ababa, Ethiopia, and Nairobi, Kenya and at Utah State University, Logan, Utah; and, Peter Little is at University of Kentucky, Lexington, KY.

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## Do Pastoralists Value Modern Climate Forecast Information?

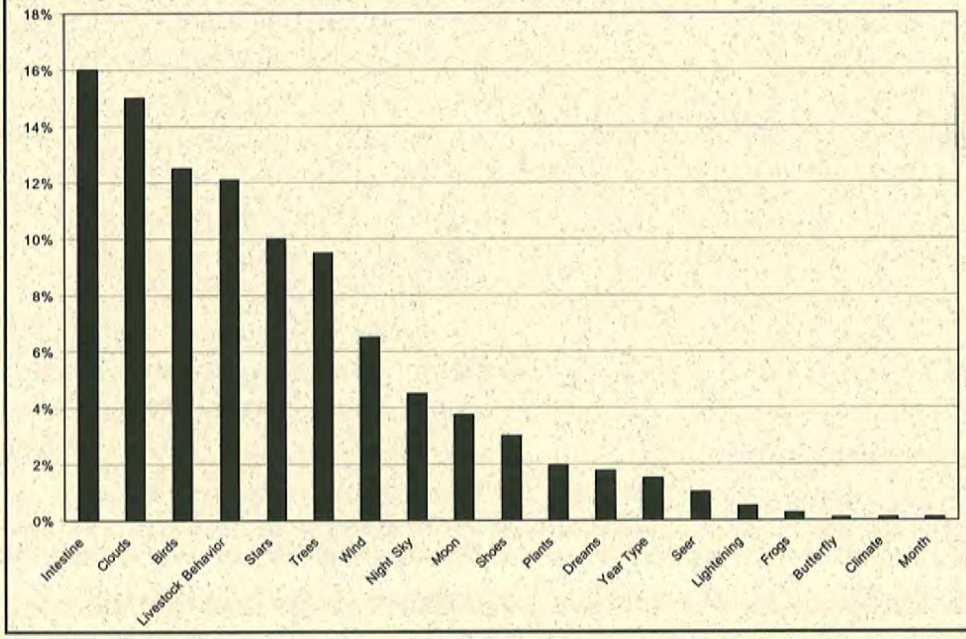
The external forecasts we study were released by the Drought Monitoring Center Nairobi (DMC) through national meteorological agencies prior to our survey and the onset of the 2001 long rains. We explored pastoralists' awareness and use of and confidence in different climate forecasts, the channel(s) through which they receive this information, their own expectations for the 2001 long rains, and any change in their behaviors in response to their own climate expectations.

**The Value of Climate Forecast Information to HA Pastoralists.** We find that pastoralists offer their own probabilistic forecasts, underscoring the fact that they acknowledge and accept forecasts of less-than-perfect skill. They make extensive use of a wide range of indigenous climate forecasting methods (Figure 1) and have considerable confidence in several such methods. The considerably greater appeal to pastoralists of indigenous climate forecast methods generally lies in the higher spatial resolution and wider range of variables they forecast – notably, the onset date of rains and rain-related impact variables such as disease – relative to modern, model-based forecasts.

We found that less than 20 percent of pastoralists presently receive external forecasts, and almost exclusively via radio, not via print media or government or NGO extension services. Indeed, the share of pastoralists receiving external forecasts is almost precisely the proportion that owns a radio. Nevertheless, almost all those who receive modern forecasts had at least some confidence in them prior to the rains and believed them to have proved reasonably accurate when queried again after the rains. Forecast skill and recipient confidence in modern forecasts do not seem to be limiting factors.

The external DMC forecasts differed significantly from the comparable climate expectations articulated by those pastoralists who did not receive external forecasts, suggesting that the external forecasts indeed provided new information. It likewise appears that once one controls properly for recipient characteristics, receipt of and confidence in an external climate forecast induces some updating of one's prior beliefs. Interestingly, updating appears stronger in response to relatively optimistic forecasts of greater-than-previously-expected rainfall than to relatively pessimistic forecasts. In sum, these results imply that external climate forecasts satisfy the first three criteria – forecast skill, confidence in forecasts, and responsive updating of beliefs – necessary for information to

*Figure 1: Use of Different Traditional Methods in Kenya*

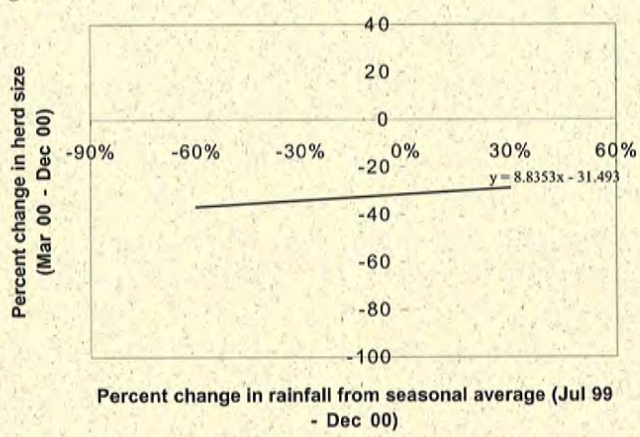


have value, albeit only among a small minority of the region's pastoralists.

The obstacle to external climate forecast information having significant, positive value arises from pastoralists' limited capacity or willingness (or both) to act on their own climate beliefs.

Less than ten percent of those who received external forecasts adjusted behaviors in response to their rainfall volume expectations for the coming season. The minority of respondents who did alter management practices did so mainly on the strength of traditional information about the onset date, a variable that state-of-the-art climate models currently cannot forecast with any skill, and with respect to crop cultivation rather than herd management practices such as migration or marketing.

*Figure 2:*




These results may seem puzzling since pastoralists' livelihoods depend so heavily on climatic patterns. The absence of a strong behavioral response to external climate forecast information likely results from three key factors. First, nomadic pastoralism builds in spatio-temporal flexibility largely absent in crop cultivation. Pastoralists can generally react effectively ex post. This suggests there may be greater value to pastoralists from accurate, timely reporting of recent weather phenomena than from long-lead forecasts. Second, the linkage between rainfall and livelihood risk is less strong among pastoralists than one might be led to believe by conventional wisdom, as PARIMA's prior participatory risk mapping exercises have demonstrated. Although there is a positive relationship between rainfall and herd size change, the relationship is relatively weak in data at both community-level (Figure 2) and household-level. Factors other than rainfall matter at least as much to herd performance. Third, even if they wanted to, pastoralists often lack the means to adjust behaviors to suit emerging conditions. Loss of spatial refugia in the rangelands to town growth, violence, gazetting of parks, and encroachment of dryland cultivation all limit grazing management options and few desirable non-pastoral opportunities exist, especially for those who lack secondary education or funds sufficient to start a business.

**Summary.** Although climate fluctuations clearly have a significant effect on pastoralist livelihoods in the ASAL, the value to pastoralists of modern climate forecast information based on sophisticated computer models seems quite low at present. Those who seek to mitigate climate-related risk among vulnerable populations must be careful not to equate forecast skill with forecast value, nor to focus excessively on improving forecast skill or dissemination or increasing recipient confidence in external climate forecasts. These do not seem to be binding constraints, even if external forecasts are accessed by only a small minority of pastoralists in the region. Rather, greater attention needs to be given to the infrastructural and institutional advances necessary to facilitate the use of climate forecast information within the livelihood strategies prevailing in these fragile systems.

*For additional information, contact Chris Barrett (cbb2@cornell.edu) for background reports entitled "Assessing the value of climate forecast information for pastoralists: Evidence from southern Ethiopia and northern Kenya" and "Intestines vs. Computers: On Climate Forecasting and African Pastoralists' Updating of Rainfalls Beliefs".*

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## Farmers and Interdependency in the Mountain Forests of Bolivia

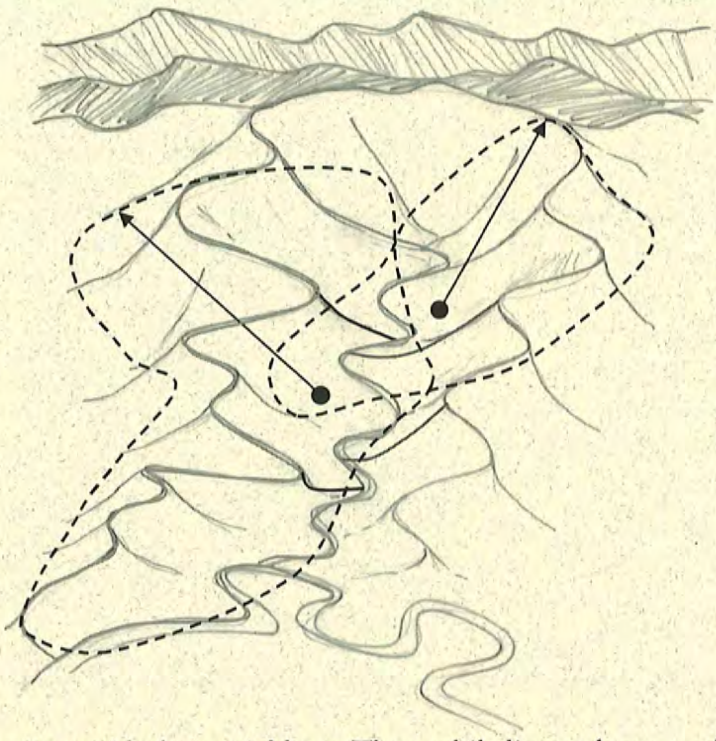
within the family and helps to define the gender roles within the local cultural traditions.

In the end, it is the requirements of the livestock themselves that produces the high level of interaction among farm households, an interaction that influences the nature and form of the social networks and rural communities that exist within the interconnected space of these micro-watersheds. The spatial organization of each household's territory is determined by the needs of the different types of livestock of varying size: small livestock (chickens, ducks, and turkeys) are kept close to and in sight of the homestead (~100 m radius); medium livestock (pigs, sheep, and goats) are managed within the property of the household usually through directly monitoring of herds (perhaps within a radius of 500m depending on the number of animals and the extent of the property); and large livestock (cattle and horses) require larger spaces than are contained within the domain of most households and typically form mixed herds with animals of other households and roam freely over adjacent properties.

Forage availability is highly seasonal. Cattle use the pastures most intensively during the summer when they are most productive. In late summer and during the winter, the pastures are far less productive. During this time, cattle shift their main foraging activities in the forests where the protection of the forest cover ameliorates the cold and maintains green foliage in the understorey. This forage, although less abundant and less nutritious than the pastures, provides survival forage on which to maintain the cattle when better forage options are unavailable. This seasonal change in the production of resources, requires that cattle rotate annually between forested upper slopes of the watershed and open field lower in the valleys adjacent to fields under cultivation. Thus, the production of cattle requires access to a large area that includes both types of forage production areas to facilitate this seasonal shift in feeding areas.

This form of livestock-raising determines the first level of interaction among neighboring households through opening part of their properties to the grazing of co-mingled herds of their own and their neighbors. These management systems established by these small-scale productive units define the nature of the use of the forage resources of these montane forested ecosystems as a type of "commons," particularly as expressed in the distribution of free ranging, co-mingled herds of cattle and horses. The main resource, in this case livestock forage in open pastures and forests, is available on a competitive basis to all the livestock in this system—that is, use of forage by some animals reduces its availability to other animals. Controlled access to the forest resources of selected sets of animal is difficult and impractical—not only is animal exclusion by either fencing or labor costly; forest forage is generally of low quality and both forest and pasture forage are highly variable in time and space. This does not, however, mean that this forage resource is transformed into an "open access" resource, where the inability to control access to the resource leads ultimately to its degradation. On the contrary, these local farmers have work out local "institutional" arrangements over the collective use of private property as a means of meeting each other's needs.

The management of the cattle of a typical household under this situation faces two problems: 1) to acquire sufficient forage, their cattle require the use of areas beyond the limitations of their own property, particularly when forage availability on their own lands is low, and 2) when forage conditions on their own lands are good, their land will be invaded by cattle from neighboring properties. For these farm households to survive the natural high variability endemic to these mountain systems, their solution to reduce the risk of failure is to maintain agreements of reciprocal



*The spatial relationships between household properties (solid lines), household productive areas for cattle (dotted lines), and the micro-watershed (outlined in gray). The limits of productive areas are shown for the two household properties with a large black dot marking the location of homestead and an arrow indicating the limit of their cattle productive area.*

access with their neighbors. Thus, while livestock are a critical component of the livelihood strategies of these peasant households, the interaction of this form of livestock management with the characteristics of the forage resources available in these watersheds necessitates an interdependency among these farm households through their collective access to the production factors needed for livestock production.

Farmers who are members of the collective networks monitor the relation between the number of animals and the carrying capacity of the system as a check against overuse or misuse of the resources available. Successful operation of this arrangement is possible through this system of self- and reciprocal monitoring by its members who are naturally interconnected to each other in a network of interdependence as defined by the spatial distribution of these "common" resources within the micro-watershed.

Nevertheless, this "natural interdependency is not always symmetrical. The advantage of a given household to enter into this collectivity depends on the relative balance of access ceded relative to access gained. In some cases, certain households find themselves in a situation of competition over access to resources, and, in many cases, some households need to find forage spaces located outside the watershed so that their cattle can complete the summer—winter cycle. Thus, household productive domains often show spatial discontinuities in which subunits of their productive areas are not connected physically but, instead, are linked through mutually beneficial social agreements. These cases emphasize the reciprocal use of these "common" resources is a product of a complex network of collective access agreements among private property users rather than a common pool of resources under the communal control of a defined user group.

While dispersed, "communities" of small landholder livestock producers are common throughout the forested montane ecosystems of this region, the ecological and social nature of their system of "collective access" has not been widely appreciated. An understanding the nature and basis for this complex, interconnected system of livestock management is essential to guide the appropriate development of any assistance program intended to improve the sustainability of these mountain agro-ecosystems and the livelihoods of these interdependent, rural household networks.

# PARIMA Update in Kiswahili

*Jarida la Habari za PARIMA.*

The Pastoral Risk Management (PARIMA) news update is now available in Kiswahili. PARIMA Update informs PARIMA's network members and its target communities on project status, research findings, outreach progress and important development events relevant to the project. The Update is currently available in English as well as Kiswahili. It will soon be available in Oromifa as well. Kiswahili and Oromifa are the most widely spoken languages in the project area. The Update is edited by Dr. Solomon Desta and Dr. Layne Coppock. Ezzekiiel Goromela is translator for the Kiswahili edition.

For more information on PARIMA Update or the PARIMA project, contact Dr. Solomon Desta, PARIMA Outreach Coordinator, based at International Livestock Research Institute, P.O. Box 30709, Nairobi, Kenya. Email: s.desta@cgiar.org or in the US, Dr. Layne Coppock, Utah State University, Logan, UT 84322-5230. Fax: 435-797-3796, Email: LCoppock@cc.usu.edu.

## ASARECA Newsletter AgriForum on the Net

The quarterly newsletter of ASARECA, AgriForum, is now available at their web site, www.asareca.org. The website also has links to regional research networks, programmes and projects under ASARECA and the National Agricultural Research Institutes in eastern and central Africa. The regional networks and programmes are now in the process of developing their websites with links to each other and to related websites.

*(continued from page one)*

## GHA Early Warning Bulletin Released

for early and appropriate mitigation and responses. The information for the bulletin is obtained from various sources including strong inputs from food security actors in the region.

The first issue focused on the impact of the recent heavy rains. While the good rains are generally expected to be beneficial, floods in part of the GHA countries are raising food security concerns in southern Somalia and northeastern districts of Kenya. There is also an increased risk of flooding around the Lake Victoria Basin and the Lower Nile River Basin in Souther Sudan.

The second issue, which was released as this newsletter went to press, highlights the impacts of the mixed rainfall performance during March to May on food security in the region. In addition, the issue covers the climate outlooks for June-September, which may have important consequences for northern states; and the impact of food shortages in southern African countries on food security in GHA.

The editors of the Bulletin aim to adapt the contents of future issues to the needs of the target audience. Comments and suggestions are welcome.

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## Ruminations

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*This publication was made possible through support provided by the Office of Agriculture and Food Security, Global Bureau, U.S. Agency for International Development, under Grant No. PCE-G-00-98-00036-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID.*

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