University of Missouri Columbia- Adapting to Change in the Andes: Practices and Strategies to Address Climate and

GOAL: To achieve food security and biodiversity in vulnerable rural communities of Andean Agro-ecosystems by building capacities and capabilities to adapt to change. This project develops knowledge and practices to build resilient livelihoods and ecosystems, in response to change in climate, markets and political conditions.

MEANS: Identify and or develop knowledge and practices that reduce vulnerability, value biodiversity, and build that natural capital. These will inform decisions about strategies that build resilient livelihoods, capable of adapting to change driven by markets and climate.

Objective 1: "Develop a shared understanding of the ecosystem, and the social and economic drivers of change in highland vulnerable communities." Develop measures and indicators of ecosystem and livelihood wellbeing.					
	Critical Tasks by Activities	Milestones this year	System	Responsible Parties US	Host Country
1. Assessment of livelihoods, assets, practices, and strategies, ex-ante and ex-post.	**Baseline Assessment of Community Household and Individual Livelihoods and Production Systems**		Farm Household and Community	C. Valdivia MU	E. Jimenez UC S. Vargas UNALM
	Analysis of surveys to identify current production and land use patterns in Umala and Ancoraimes	Summary report of baseline conditions for Umala and Ancoraimes. Share results with communities.	Farm-Household	C. Valdivia	E. Jimenez
	Analysis of linkages between assets and livelihoods	Study of diversification strategies and risk perceptions	Farm-Household	C. Valdivia L. Marks MU	E. Jimenez
	Evaluation of current NNRR management strategies for animal production and farmers capacity to environmental change adaptation.	Baseline May-June 2007 Summary Baseline Data Completed for 2 communities in Puno	Community	C. Flora ISU J. Flora ISU	C. Turin UNALM S. Vargas
	Baseline survey of Apolobamba	Develop sample frame Develop indicators and instrument	Community	J. Gilles MU	E. Jimenez
	Participatory Assessments of Sources of Vulnerability and KASAP			C. Valdivia MU J. Gilles MU C. Flora ISU	E. Jimenez UC S. Vargas UNALM
	Apolobamba Community Participatory Assessment (CPA) Analysis	Participatory appraisals to define sites; Identify demands, assets constraints.	Community (Production Systems)	J. Gilles	E. Jimenez UC
	Complete analysis of Puno PRAs Participatory assessment of sources of vulnerability in Puno communities.	Reports describing the demands, assets and constraints. CPAs from the Bolivian tested sites integrated to Puno research.	Community	C. Flora ISU	C. Turin UNALM

	Collect information on KASAP protocol during participatory research activities in Umala and Ancoraimes.	Complete KASAP instrument to assess participatory research on practices and strategies Implement KASAP.	Household	C. Valdivia C. Flora ISU	J. Aguilera PROINPA J. Cusicanqui UMSA E. Jimenez
2. Evaluating Past Climate Variability in the Andes	Statistical analysis of the 35 year time series data to identify trends that may be found in monthly temperature and precipitation data.	Definition of baseline statistics from which forecasts and observations are to be measured.	Ecosystem	A. Seth UConn	M. García UMSA
	Examine the historical trends of variations of climatic parameters.	Influence of Pacific and Atlantic Ocean conditions on the time trends and variability observed in the Altiplano.	Ecosystem	A. Seth	M. García
	Assemble available seasonal forecasts for the Altiplano rainy seasons 2006-2007.	Input into the evaluation of forecasts with local knowledge.	Ecosystem	A. Seth J. Gilles	M. García
3. Assessment of Organic Matter Conditions Under Current Management Regimes and Perceptions of Soil Quality	Participatory research on management regimes. Set up (Sept 06) and conduct participatory assessments of soil quality with farmers for first cropping year of project	Study of the effect of changes in management practices on soil organic matter and soil fertility	Community	P. Motavalli	J. Aguilera J. Cusicanqui
	Collection and laboratory analysis of different types of soils in collaboration with producers.	Study of the effect of changes in management practices on soil organic matter and soil fertility	Production systems	P. Motavalli	J. Aguilera J. Cusicanqui R. Miranda UMSA
	Comparison of organic amendments in different soil types.	Characterization of organic amendments used in communities for the study of the effects of changes in management practices on soil organic matter and soil fertility.	Community	P. Motavalli	J. Aguilera J. Cusicanqui

4. Diseases and Pests: Identification of major plant pests, diseases and incidence in recent years	Dynamic and fluctuation of the major pest population in individual potato and quinoa farmer fields.	Complete analysis of the major pests and diseases in year 2006-2007 in Umala and Ancoraimes municipalities.	Ecosystem	K. Garrett KSU	J. Aguilera J. Cusicanqui
	Community perspectives on history of pests and diseases in Central and North Altiplano.	Summary of historical information about pests and diseases in Umala and Ancoraimes from CPAs.	Ecosystem	K. Garrett KSU	J. Cusicanqui J. Aguilera
5. Biodiversity: Production Systems, Climate and Biodiversity Interactions	Evaluation of soil samples to relate biophysical characteristics to the suitability for new production activities.	Case study: changes in the cropping systems identified in six communities of Central and North Altiplano.	Field Communities	P. Motavalli MU	J. Aguilera J. Cusicanqui
	Analysis on cropping systems and pest/disease incidence.	Completion of analysis on cropping systems and pest/disease incidence from household survey data.	Household Farm	K. Garrett KSU C. Valdivia	J. Cusicanqui J. Aguilera E. Jimenez
	Study of biodiversity of native potato varieties, erosion, management and conservation in the Central Altiplano	Native potatoes characterized and evaluated in Umala. Protocol of management and conservation established			J. Aguilera
	Conservation of wild crop relatives of potato in Apolobamba Integrated Management Area. Knowledge to foster appreciation and value of these crops.	Develop a sampling plan for wild crop relatives and for testing utility of existing models of species distribution in the Andes.		K. Garrett KSU	
	Validate crop models with planting date and climate stressors scenarios for project sites.	Preliminary crop models use in forecasting yields.	Field	A. Seth R. Quiroz CIP	M. García
	Topoclimatic analysis to model temperature behavior (using the HOBO recorders) along slopes.	Topoclimatic maps indicating areas suitable for new agricultural activities and disturbances due to changing decisions attributable to climate change.	Ecosystem	A. Seth	M. García

Objective 2: "Understand how livelihood strategies are developed in response to farmer perceptions of the relative risks of these changes; and how these perceptions are linked to their assets (livelihoods)" by Evaluating Farmer Perceptions of Soil Conditions, Production Systems Changes, and Pests, Diseases, and Climate Risks.					
	Critical Tasks by Activities	Milestones this year	System	Responsible Parties	
				US	Host Country
1. Perceived risks and communication networks: climate, markets, agriculture, environment	Quantify the risks perceived by farmers and communities in relation to livelihood strategies.	Analysis of survey data ranking threats and risks, in relation to assets. Publication completed.	Household-Farm	C. Valdivia L. Marks	E. Jimenez
	Compare actual and perceived risks: climate risk, market risk, pest and disease risks; determine relationship between type of risk faced and decision making.	Focus groups to define threats, dreads, and measurement. Close ended survey measuring risk perceptions. Analysis of media risk communication.	Community and Farm Household	L. Marks J. Gilles	E. Jimenez
	Networks of information and communication for markets, climate, soils, pests and diseases, and technology.	Summary analysis of network strategies October 2006-May 2007 in Ancoraimes and Umala.	Household Community Region	J. Gilles	E. Jimenez C. Turin
2. Local perceptions of soil quality conditions and change	Identify local systems of soil classification for organic matter and for quality of organic inputs. Compare them to actual measurement of soil organic matter and organic input composition.	Study of community perceptions of soil quality to compare with measurement of soil properties in the Municipalities of Ancoraimes and Umala.	Community	P. Motavalli MU	J. Aguilera J. Cusicanqui
3. Community Perceptio	Determine perceptions of the conditions leading to elimination of woody plants from fallow	Study of Thola management and its degradation: Complete	Field (Production Systems)	P. Motavalli J. Gilles	J. Aguilera J. Cusicanqui

	systems, Altiplano Bolivia.	Participatory Assessments.			
	Assessment of community-livestock-rangeland/water interaction management and of environmental risk in Puno	KASAP implemented in two Puno communities.	Governance (Community)	C. Flora	C. Turin
4. Community Perceptions of Climate Change	Identify local knowledge forecasts for each region of the Altiplano. Evaluate observed climate variation and trends Sept 2006 – August 2007.	Survey farmers regarding local knowledge forecasts, before the beginning of each season, around the month of August.	Ecosystem	J. Gilles	M. García
5. Community Perceptions of Changes in Diseases and Pests	Perceptions of weed, pest (Andean weevil, and potato tuber moth) and disease (early blight) problems and comparing them with actual practices.	Complete CPAs and analysis in Umala and Ancoraimes. Analysis of surveys on disease and pest perceptions. Findings shared with communities.	Ecosystem	K. Garrett KSU C. Valdivia MU	J. Aguilera PROINPA J. Cusicanqui UMSA

Objective 3: "Link local and new knowledge to produce practices and information that provide alternatives for adapting to change." Develop Practices (specific interventions in soils, disease and pest management, biodiversity, crop varieties, natural resource management) and Dissemination Strategies (networks to access new information)					
	Critical Tasks by Activities	Milestones this year	System	Responsible Parties	
				US	Host Country
1.Soils	Evaluate benefits of protecting biodiversity in fallow areas and of alternative tillage and manure strategies.	Establishment of field sites and community participation in the evaluation of experiments. GIS identification.	Farm	P. Motavalli MU J. Flora ISU	J. Aguilera J. Cusicanqui
2. On-farm Diversification: Adapted Varieties	On-farm field experiments with early maturing quinoa varieties using local knowledge to monitor production and to evaluate potential for integration to existing cropping systems. Participatory assessments with area growers.	Design the on-farm testing (August-September). At least three varieties of quinoa selected by farmers. Seed of quinoa obtained and distributed among farmers. GIS participating farmer fields.	Field	K. Garrett KSU J. Gilles MU	J. Aguilera PROINPA
3. Information: GIS applications for predicting farming	Develop predictions of shifts in late blight pressure on potatoes using predicted climate change. Expand predictions to other important insect and disease pressures.	Long-term recommendations for the flexibility and potential changes in the cropping system management.	Field	K. Garrett KSU	P. Forbes CIP
4. Pest and Disease Management Strategies	Evaluate effectiveness of current management strategies to control pests and disease.	Identify current strategy for control and of dynamics of pest/diseases. Sept 2007 design interventions cropping year, and complete interviews.	Field	K. Garrett KSU	J. Aguilera PROINPA J. Cusicanqui UMSA
5. Information on Climate Conditions and Forecasts: integrating	Evaluate Intergovernmental Panel on Climate Change (IPCC) Assessment Report Four (AR4) climate models for highland region. Evaluate downscaling methods. Test multifractal and wavelet	Skill of the global climate models in simulating observed time trend and variability in Altiplano and sites. Research report on	Ecosystem	A. Seth UConn	M. García UMSA R. Quiroz CIP

	transform methods for downscaling climate data in the highland region of the Andes.	downscaling methodologies for the Altiplano sites.			
	Compare traditional - local knowledge - forecasts with forecast models using data gathered each August and September.	Compare forecasts and correlated with data collected on weather conditions at each site.	Ecosystem-Local scale	J. Gilles MU	M. García UMSA
6. Information Dissemination Networks	Study information flows within and among groups of producers in communities and between communities Case studies of information networks for planting and for marketing decisions.	Complete analysis of information sources from baseline studies Oct 2006-Sept 2007. Bolivian graduate research field work completed in May. Sept 2007 case studies written.	Governance	J. Gilles MU	E. Jimenez UC

Objective 4: Develop market access through strategies and institutions that contribute to resilience. We define resilience as the ability of people and their environments to recover from shocks and stresses.

	Critical Tasks by Activities	Milestones this year	System	Responsible Parties	
				US	Host Country
1. Market Access in the	Evaluation of market behaviour and individual transaction costs Assessment of household data from the Central and North Altiplano Regions	Review of MAPA studies for the Altiplano (March 2007)	Farm (Regional Central and North Altiplano)	C. Valdivia MU	E. Jimenez UC
2. Niche market assessments for native crops	Assessment of agricultural systems to identify market opportunities, potential for traditional Andean tubers and native crops. Identify and assess the chain between production and consumption of native varieties to enhance income and biodiversity.	Methodologies developed in year 2. Identify MU MSc student to conduct thesis research. Field research in July August 2007. An MA student identified to conduct thesis research on at the household level. MA thesis data collection begins.	Farm	C. Valdivia MU	E. Jimenez UC J. Aguilera PROINPA J. Cusicanqui UMSA
3. Ac ce	Evaluation of feasibility of financial institutions.		Policy		

	An MA student identified to conduct this research for their thesis. Assessment of survey information on access to credit in communities.				
4. Marketing	Develop a protocol for market coalition building in Ancoraimes and Umala.	Identify student to carry out research. First training on coalition building in Umala and Ancoraimes.	Governance	J. Flora ISU	J. Aguilera PROINPA J. Cusicanqui UMSA

Objective 5: Capacities and Capabilities Our underlying approach is to share capacities across disciplines (bio-physical, social sciences), across countries, rural communities, research and development communities, and stakeholders (NGOs, UNDP, USAID, WFP).					
	Critical Tasks by Activities	Milestones this year	System	Responsible Parties	
				US	Host Country
1. Team and Stakeholder Integration	Annual Stakeholder Participatory Planning Meeting (with participation of the Advisory Group), and Scientific Meeting (starting year 2 with findings). Team planning, development of techniques, and integrated analysis of the biophysical and socio-economic relationships. Share preliminary findings of network and communications with collaborators and stakeholders	Research Committee Meeting Jan 2007 International planning meeting held in La Paz June 2007	Governance	C. Valdivia MU UConn KSU ISU	E. Jimenez UC UC UMSA and PROINPA Team and participants from USAID, MACA, STC, ADRA, Climate Change Program, UNDP, CI, Municipalities, Producer Associations
2. Participatory interdisciplinary Research	Integrated teams of biophysical, socio, economic researchers and farmers to carry out on-farm experimentation and to discuss, assess and develop production and marketing strategies that address their soil quality, crop production and health, biodiversity and climate.	January 2007 Demands framed with farmers. On-farm field experiments implemented (under both local and new knowledge). Data collected with farmers.	Farm	C. Valdivia and US Team	Bolivia and Peru Research Teams

	Farmer research groups, and training about potato and quinoa management.	On farm field experiments evaluated with farmers and field technicians.			
3. Farmer and Stakeholder	Farmer group to farmer group sharing and coalition building for marketing strategies.	Coalition building technique training in Bolivia and Peru Sept 2006 and January 2007	Governance	J. Flora C. Flora ISU	E. Jimenez UC S. Vargas UNALM
4. Training multi, inter disciplinary research capacities	**Graduate Training** One Graduate Student Rural Sociology recruited begins study linking local and scientific knowledge.	Graduate Degree candidate rural sociology starts program Jan 2007 MA Bolivian network analysis in May 2007	Governance	J. Gilles	
	One PhD Student at UConn. Formal and informal training in downscaling, statistical analysis and evaluation of climate models.	Candidate trained in hypothesis testing and analysis of climate data (station, gridded and model), and forecasts at UConn	Ecosystem	A. Seth UConn	M. García UMSA
	One PhD student in Soils at MU identified to start in Sept. 2006.	Student recruited to start research and coursework at MU this year. Research on soil fertility management in Bolivia.	Farm	P. Motavalli	J. Aguilera
	Recruiting will continue in year 2 MSc student on market integration PhD student on risk perceptions and communication	Research on linking producers to high income markets. Research on risk perceptions and communication.	Governance Farm	C. Valdivia	
	Training MA students in multi-disciplinary research approaches through thesis research in the communities.	Students from UMSA, UNALM, and UC graduate thesis research			
	A part-time student at KSU involved in the research.			K. Garrett	
	Undergraduate *licenciatura* student to work on analysis of pests and diseases at UNALM.		Ecosystem	K. Garrett	

	Training *licenciatura* students in multi-disciplinary research participation in rural communities.	Students from UMSA, UNALM, UC will conduct thesis research			
	Module of participatory extension UNALM graduate program. Formal training and research training for Bolivian Peruvian and US graduates in modules. Short term Post-Doc for Bolivian and Peruvian Faculty (identify funding) *Biodiversity, Conservation and Ecosystem Services in managed Landscapes*, proposal submitted to US National Center for Ecological analysis and Synthesis Call for Distributed Graduate Seminars KSU and Collaborating Host Country Institutions Graduate research on networks, one Bolivian graduate student.			C. Flora J. Flora All US to identify opportunities K. Garrett KSU	S. Vargas C. Turin