FINAL BRIDGING ACTIVITY REPORT

Sustainable Land Use and Biodiversity Conservation in the Andes: Scaling-Up SANREM-Andes Research

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I. Executive Summary

This report summarizes the accomplishments of the bridging project "Sustainable Land Use and Biodiversity Conservation in the Andes: Scaling-Up SANREM-Andes Research." The project's three objectives are: 1.) development of watershed visualization tools for LUC modeling and scenario planning, including climate change issues; 2.) creating guidelines and methods for biodiversity conservation, especially related to in situ/ex situ complementation and local needs of Andean crops; and 3.) delivery of SANREM-Andes data and meta-data for the SANREM knowledge base.

LUC/Scenario tools (future visioning, 3-D physical modeling, multi-source climate change method) have been disseminated through networking with collaborators in the Andes, publications in books and journals, farmer workshops in Ecuador, and presentations at several international and national conferences. The biodiversity conservation objective, with an emphasis on repatriation of native crops, was facilitated through an institutional agreement between UGA, CIP (International Potato Center), and Asociación Andes (Cuzco, Peru). The partners developed a joint repatriation website, initiated field research in Cusco with communities of the Potato Park, held a seed fair and farmer-gene bank exchange in Ecuador, published numerous publications, and gave presentations at international and national conferences. The SANREM-Andes database in a "toolbox" CD form ""People, Land and Resources of Cotacachi, Ecuador" was completed and distributed. The Cotacachi Atlas (El Canton Cotacachi: Espacio and Sociedad) was published and integrated into the Cotacachi Canton environmental information system for policy and planning.

II. Research Accomplishments by Objective

Objective 1: LUC/Scenario Tools

The purpose of this objective was to scale-up SANREM-Andes LUC modeling/future planning for Multiple Stakeholder Watershed planning with a special focus on the human dimensions of climate change. This scaling-up has occurred through the following activities and linkages:

Major Tasks Completed: The major tasks outlined in the original proposal were: 1.) advise collaborator network and sign MOUs (TMI, CIP, Ecuadorian indigenous

organizations); 2.) conduct LUC/scenario research on climate change in Cotacachi with participatory workshop in Cayambe; and 3.) write-up and disseminate DDS tools through conferences, publications, and video (3-D physical model; future scenarios; multi-source climate change research method). Although continued improvement of products continues, all major tasks have been completed.

Key Findings: Field research on human dimension of glacier retreat and climate change in the Andean region was conducted during the bridging research period. This research documents the rapid decline of Andean glaciers, especially those areas below 3500 mmsl and on the western cordillera. While the landscapes were initially flush with water during the early glacier melting process, the rivers, springs, and irrigation canals are now drying up. This drying up of water sources and lack of reform in water allocation has led to conflicts between stakeholders (indigenous communities, former haciendas, urban areas, and floriculturists). A multi-source methodology for study of human dimensions of climate change and social impacts was developed. Participatory workshops were held with local communities in Cotatacachi and Cayambe, Ecuador. Farmers and local leaders who attended the workshops defined similarities and differences between Cayambe and Cotacachi. Both regions are starting to suffer considerable water deficiencies due to the loss of the mountain glacier.

System Levels:

Global: Working with The Mountain Institute (TMI) and their global programs, we have been able to extrapolate and begin wider utilization of our SANREM-Andes data and methods, especially for the study of societal impacts of climate change in mountain regions. TMI utilized the future visioning methods in the Cordillera Blanca (Peru) and in the Sagramatha (Mt. Everest) region of Nepal on human impacts of climate change. Robert Rhoades is now a trustee of TMI, a role which will further expand the application of SANREM research. In addition, Dr. Rhoades–along with Jorge Recharte of TMI–is participating in a Global Mountain Initiative (GMA) on Science and Stakeholders to enhance social science input in Andean global change research. SANREM-Andes modeling, participatory methods, and future visioning will be a part of this effort. Dr. Rhoades has also participated in the Global Mountain Agenda (GMI) to enhance social science input in Andean global change research. He contributed to the preparation of the document “Global Change and Mountain Regions: Research Strategy,” a strategic planning document for guiding research in mountainous regions.

The Cotacachi research has been globally disseminated through public outreach activities of the Radio Project in conjunction with National Public Radio. SANREM-Andes research was featured in a 15 minute special on “Living on Earth” on April 17, 2006 (see http://www.loe.org/shows/shows.htm?programID=06-P13-00014#feature5). Other spin-off programs and web-based stories by the producers of the NPR program have also been released. Earthwatch Radio is in the process of producing a radio program on the Cotacachi glacier to air nationally in the U.S.

***National*:** Within Ecuador, our team (R. Rhoades and Xavier Zapata) had considerable interaction with Ing. Bolivar Caceres Correa of the National Glacier Program. The work is largely biophysical and our information on human impacts of climate change, deglaciation, and water loss has broadened the thinking of the national program.

Local: Today, in the training headquarters of UNORCAC (Union of Organizations of Peasant and Indigenous Communities of Cotacachi) are housed the 3-D physical model of the region which is used intensively in training. Also, the products of the future scenario work hangs on the wall. All data has been distributed and is being used in the planning for the Canton. The Atlas and Toolbook CD are integral parts of the cantonal participatory planning process.

Development Impact: SANREM information has played a key role in Cotacachi becoming an "ecological canton." DDS tools, data, information, and publications are used in the Canton for planning. More extensive information on SANREM's role is found in Rhoades (2006), an edited volume reporting on SANREM research since 1997.

In the U.S., Oglethorpe County, Georgia utilized the Future Visioning Methodology and in its integrated planning effort. Data and text from a report prepared by a graduate class of R. Rhoades was utilized in the appendix to the report.

Timelines: The project timelines were met and no major obstacles were encountered.

Objective 2: Biodiversity Conservation

The purpose of this objective was to conduct research to enhance effective policy and scientific guidelines for in situ biodiversity and repatriation of native crops to indigenous communities.

Major Tasks Completed: The major activities proposed were: 1.) develop collaborative agreements with Peru and Ecuador collaborators; 2.) facilitate exchange visits between gene banks and local communities; 3.) publish *Recipes for Life* based on Cotacachi research; 4.) prepare and publish volume on in situ conservation and repatriation; and 5.) publish guidelines for community gene banks. Although the refinement of products continues, all of these objectives have been met.

Key Findings: Institutional linkage between UGA, International Potato Center (CIP), and Association Andes (Peruvian NGO) was established to conduct research on repatriation of Native Andean crops. A repatriation website was developed and evaluated by the partners. Gene bank and community exchanges were completed in Ecuador and facilitated in Peru under the leadership of CIP and Asociación Andes. The video "conservation with a small 'c'" was completed in both English and Spanish. The book *Recetas Para la Vida" Platos, Dichos, y Costumbres de Los Andes* has been published by Abya Yala Press in Quito (2006). Copies of the book *Recetas Para la Vida* were distributed in Cotacachi during our last Ecuador trip in June. The Protocol "Seed Preparation and Rapid Multiplication for Communal Gene Banking" by Dr. Zozimo

Huaman is complete and also in press with Abya Yala Press (Spanish). In Cuzco, Peru, research was conducted with a women's group on traditional culinary preparation linked to repatriation of traditional crops from genebanks. The results of the Cotacachi work on linking biodiversity concerns with culture were shared with Peruvian counterparts. The process of documenting traditional customary law in relation to benefit sharing of plant genetic resources has begun in Cusco. A book edited by Virginia Nazarea and Robert Rhoades and programmed to be published by an academic press is nearing completion with most of the chapters finalized. Virginia Nazarea's invited paper "Local Knowledge and Memory in the Conservation of Biodiversity" was published in October 2006, in the *Annual Review of Anthropology*, considered to be one of the most prestigious publications in anthropology.

System Levels

***Global*:** In light of the Convention on Biodiversity and increasing concern with intellectual property issues, our research has shed new light on issues surrounding in situ conservation and repatriation of native crops. The research has reached a global audience through publications and presentation in international fora (see presentations and publications)**.**

National: Increased flow of germplasm between the Ecuadorian national genebank and indigenous communities has been stimulated through our genebank-local community exchanges.

***Local*:** In the Cotacachi region, local informants report an increase in the number of varieties locally planted, as well as recuperation of lost local varieties as a result of the SANREM project.

Development Impacts: This objective informs policy, programming, and technologies related to in situ conservation and repatriation.

Timelines: The project timelines were met and no major obstacles were encountered.

Objective 3: Knowledge Base

Tasks Accomplished: The activities of this objective were: 1.) complete the CD "People, Land, and Resources of Cotacachi, Ecuador"; 2.) Publish Cotacachi Atlas; and 3.) deliver data to SANREM ME. All activities have been accomplished.

Key Findings: The activity "Sustainable Mountain Futures: The SANREM Knowledge Base for Cotacachi in Toolbook CD-Rom" is completed with 400 copies of the CD released by Abya Yala of Quito. The toolbook CD presents (based on the SANREM-Andes research framework) all of the basic data, analysis, reports, publications, photographs, and much more in a multi-level and accessible database in an integrated way. The product is user friendly for both policy makers and scientists. The toolbook approach was an effective interaction tool for helping the SANREM-Andes team

integrate their data. The CD is in both Spanish and English. Copies of the CD will be sent with the English CABI publication and the Spanish version. Four hundred copies have been produced.

The Natural Resource Atlas of Cotacachi (CD-Rom and hard copy Atlas) entitled *El Canton Cotacachi" Espacio y Sociedad* has been published by Ediguias C. Limited, Quito and copies distributed within Ecuador. The Atlas is now with the authorities of Cotacachi for their use in natural resource planning. Monsarrath Mejia (graduate student at Catholic University) was the coordinator in charge of the Atlas project and completed her master's degree in geography at Catholic University this year. Although she received no funding from bridging SANREM, her thesis was based in part on the atlas research.

The toolbook CD and atlas have been delivered to the ME.

System Levels

While the SANREM CD on Cotacachi will receive global distribution (along with the project book in Spanish and English), the atlas is mainly for local consumption. Within Ecuador, the Cotacachi study provided the best documentation on integrated conservation in development in the country and will serve as a model for other projects.

Development Impact: Excellent examples for other development projects on how to integrate interdisciplinary data at multiple scales.

Timelines: All project timelines were met and no major obstacles were encountered.

III. Degree and Non-Degree Training Activities

One Colombian Ph.D. student (Juana Camacho) began her dissertation with SANREM, but due to illness in the family decided later to do research in Colombia and thus dropped the Peruvian research. Nearly 150 community members and genebank managers learned about in situ conservation during field days and a Seed Fair and Exchange held in collaboration with local organizations. A workshop on the impact of climate change on mountain glaciers highlighted issues of water for agriculture for 25 community members and policy makers. Virginia Nazarea fielded a graduate student, Kristine Skarbo, on an NSF Ethnographic Training Grant to work in the Potato Park, Cusco, Peru, from May-August 2006. Although not part of the SANREM-Andes program, Robert Rhoades served as thesis advisor and major professor for Todd Crane who worked in Mali with SANREM-West Africa project in Phase II of SANREM. His dissertation "Changing Times and Changing Ways: Local Knowledge, Political Ecology and Development in the Niger River Inland Delta of Central Mali" was approved and Todd received his Ph.D. in August 2006.

IV. Publications, Presentations, and Other SANREM CRSP Products

See table below.

V. Networking

Networking has been with the Global Mountain Initiative and The Mountain Institute on using SANREM-Andes methods and tools. Collaboration has been with Associación Andes (NGO) and International Potato Center on repatriation and in situ conservation in the Andes. Dr. Nazarea was an invited guest speaker at a U.S. Conference (travel covered by ARS-USDA) on cultural dimensions of plant and animal genetic resources held in conjunction with the Society for the Advance of Science among Native Americans and Chicanos. The conference, organized by Dr. Henry Shands, Director of the U.S. National Germplasm System, also had an educational and informational component as a way to bring minority groups into research on genetic resources.

IV. Project Highlights

- Land Use Change Scenario tools developed and disseminated.
- Institutional agreements on repatriation of native crops signed between the International Potato Center, Associación Andes (NGO), and the University of Georgia Ethnoecology/Biodiversity Lab.
- First significant research on human dimensions of climate change in the Andes conducted, written up, and published.
- Global alliances for extrapolation of SANREM research developed, especially for mountain areas.
- Research on in situ conservation and repatriation conducted in Peru/Ecuador and genebank-community exchanges arranged.
- Policy guidelines for community gene banking developed and disseminated.
- Project yielded five books, one journal article, five book chapters published, and eight conference presentations.
- Two national radio programs (NPR and Earthwatch radio) developed on SANREM-Andes research

Non-degree Training

Program type (workshop, seminar, field day, short course, etc.)	Date	Audience	Number of Men and Women Participants	Training Provider (US university, host country institution, etc.)	Training Objective
Field Day	09/9/05	Community Members and Genebank Managers	150 (40M, 110 F)	UGA, UNORCAC (Union de Organiciones Campesinos e Indigenas de Cotacachi)	In situ conservation; Seed Fair and Exchange held in collaboration with local organizations.
Workshop	09/07/05	community members and policy makers	25 (20M, 5F)	UGA, UNOPAC (Union de Organiciones de Cayambe)	Impact of climate change on mountain glaciers highlighted issues of water for agriculture

SANREM CRSP Degree Training Participants

Student Name	Sex (M/F)	Nationality	Discipline	SANREM thesis/research	Country(s) Supported	Sandwich Program (Y/N)	Program		Completion		Funding		SANREM CRSP Advisor/PI	Degree Granting University
							Start Date	End Date	Degree	Graduation Date	SANREM CRSP	Non-SANREM CRSP		
Juana Camacho	F	Colombian	Anthropology	Cultural Dimensions of Biodiversity	Ecuador and Peru	N	Jan-05	May-06	PhD	May-07	Y	N	Nazarea	University of Georgia

Publications, Presentations and Other Products

Category	Bibliographic Citation*
Articles Published in Refereed Publications	Nazarea, Virginia. 2006. Local Knowledge and Memory in Biodiversity Conservation. *Annual Review of Anthropology* (October, 2006).
Books/Book Chapters	Rhoades, Robert. 2006. Development with Identity: Community, Culture, and Sustainability in the Andes. Editor. Oxon, U.K.: CAB International Publishing. Rhoades, Robert. 2006. Desarollo con Identidad: Communidad, Cultura, and Sostenilibidad en los Andes. Editor. Quito, Ecuador: Abya Yala Press. Nazarea, Virginia, Juana Camacho, and Natalie Parra. 2006. Recetas Para La Vida: Cocinas, Consejos, y Costumbres de Fugones de Los Andes. Compilers. Quito, Ecuador: Abya Yala Press. Nazarea, V. 2005. Heirloom Seeds and Their Keepers: Marginality and Memory in the Conservation of Biological Diversity. Tucson, AZ: The University of Arizona Press. SANREM-Andes. 2005. El Canton Cotacachi: Espacio and Sociedad. Quito: Ediguias C. Ltda. Rhoades, Robert E. and Virginia Nazarea. In Press. Forgotten Futures: Scientific Models versus Local Visions of Land Use Change. In P. Sillitoe (ed). Local versus Global Science. Oxford, U.K. and New York, NY: Bergham Books. Mejia, M. 2005. The Natural Resource Atlas of Cotacachi (CD Rom and hard copy Atlas) entitled El Canton Cotacachi" Espacio y Sociedad, Quito, Ecuador: Ediguias C.Limited, <u>Book Chapters</u> Rhoades, Robert. 2005. Are Traditional Mountain Governance Principles still relevant in a Global World? <u>in</u> Leslie Taylor and Anne Ryall (Eds). Governance and Decision-Making in Mountain Areas. Proceedings of a Conference held June 4-8, 2005 in Banff, Alta. Banff Center. pp. 237-244. Rhoades, R. 2005. Seeking Half our Brains: Constraints and Incentives in the Social Context of Interdisciplinary Research and Development. In M. Cernea and A. Kasam (eds.) Understanding Culture in Agriculture. Oxon, UK: CAB International Publishing, pp. 403-420

	Rhoades, R. 2005. Agricultural Anthropology. In S. Kedia and John van Willigen (eds.). Applied Anthropology: Domains of Application. Westport, CT: Greenwood Publishing Group, pp. 31-36. Rhoades, R. in press. Mama Cotacachi: History, Local Perceptions, and Social Impacts of Climate Change and Glacier Retreat in the Ecuadorian Andes. *In* Benjamin Orlove (Ed). Darkening Peaks: Mountain Glacier Retreat in Social and Biological Contexts. Berkeley: University of California Press (projected, October, 2007).
Theses and Dissertations	None
World Wide Web Sites and Documents	Website on repatriation http://repatriation.uga.edu
Electronic Presentations	People, Land and Resources of Cotacachi. CD Toolbook Database of SANREM-Andes Project (compilers Robert E. Rhoades and Xavier Zapata).
Posters	Camacho, J. 2005. Food and Culture in Cotacachi Ecuador. Presented at the Society for Economic Anthropology annual meeting in Atlanta during spring, 2005.
Videotapes	"conservation with a small 'c'" produced by Dr. Nazarea (20 min)
Bibliographic Databases and Miscellaneous	Rhoades, R. 2006. Review of Farmers' Bounty (Princeton University Press) by Stephen Brush, Journal of Ethnobiology, 25(1): 150-154.