1995 ANNUAL REPORT

SANREM CRSP

The Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program (SANREM CRSP) is a 5-year research, training, and information exchange program funded by the United States Agency for International Development. This is the Annual Report for Year 3 of the project. Additional copies may be obtained from SANREM CRSP, University of Georgia, Georgia Station, 1109 Experiment Street, Griffin, GA 30223-1797.

The mission of the SANREM CRSP is to implement a comprehensive, farmer participatory, interdisciplinary research, training, and information exchange program that elucidates and establishes the principles of sustainable agriculture and natural resource management on a landscape scale. A landscape ecology approach is used to describe and understand the complex internal, external, and interactive processes within and between the individual ecosystems of a toposequence transecting two or more agroecological zones. This includes human and social, as well as physical and biological dimensions of ecosystems. Interventions, appropriate to the farmer (male and female) and other end-users, are designed and evaluated in concert with those end-users in terms of agricultural, environmental, economic, and social sustainability. The wide applicability of these principles and methodologies in fragile environments are being demonstrated. Through training, institutional strengthening, and networking, local and regional contributions to agricultural sustainability and improved natural resource management are enhanced.

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Acknowledgements

Writer, Editor:
Kim B. Foglia

Assistant Editor:
Carla Roncoli

Creative Director, Graphic Production:
Sally Morgan, Columbus, GA

Cover Photos:
Niger market: William Hargrove
Filipino farmer, Princeto Lucbo and his son, Julbert: Bill Deutsch

Contributing Photographers:
R. Balakrishnan, D. del Castillo, B. Deutsch, T. Gardiner, W. Hargrove, E. Kanemasu, S. Louis, D. Midmore, V. Nazarea, C. Neely, T. Nissen, M. Piniero, D. Poudel, G. Prain, J. Roberts, C. Roncoli

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FROM THE DIRECTOR

We have just completed a third productive year in the SANREM CRSP and we have many accomplishments to highlight. In the past year, we have initiated major new activities in Ecuador and Cape Verde. In the Philippines, we have on-farm trials in improved commercial vegetable production systems, home gardens, and agroforestry systems, and we have a team focused on bioreserve buffer zone management. Our efforts in water quality monitoring and enhancing local communities' environmental awareness are paying big dividends as local people are engaged in water quality issues and how to address them. Our farmer-participatory field research is leading to improved understanding of sustainable technologies and also to keen interest by local farmers in addressing sustainability issues, in understanding linkages between on-farm and off-farm activities, and in actively participating in designing solutions to complex problems.

Methodologically, we have many "lessons learned." Our conference on "Indicators of Sustainability" and our workshop on "Participatory Research Methodologies" reviewed the available knowledge on these important topics and enabled us to both learn from the experiences of others and share our own experience.

At the project level, we have implemented a strong and innovative Monitoring and Evaluation Program, which will not only assist us in assessing progress and in meeting our goals, but which is breaking new ground in defining and measuring impacts of participatory research. We have vastly improved our Information and Communications Office, adding a full-time professional Communication Coordinator.

These and many more accomplishments are detailed in this report. For these accomplishments and the impacts to date, we are proud. But, our expectations for the future are even greater.

Now that we have completed the start-up activities at all sites, including diagnostic activities, group planning, and building collaboration, we are ending the crucial planning phase and entering the participation implementation phase. Having spent much effort in diagnostics and planning, we anticipate a very fruitful implementation phase with immediate impact on all who are participating. We have built a strong foundation based on participation and collective negotiation. We stand ready to capitalize on our investment in participation. We anticipate that field research will lead to both improved understanding and readily adoptable technologies. We are building a rich experience in participatory research methodologies that we hope to enhance and to share with others. And, we intend to continue to improve program management and the services that we provide.

We thank you for your past and future contributions and look forward to reaping the rewards from our investments. We pledge to continue to work with you to accomplish our mission and meet our goals.

W. L. Hargrove

Debra Belvin, Administrative Assistant; Laura Bass, Secretary; Ionia Davis, Accountant; William Hargrove, Director; Galen Harbers, Data Base Manager; Kim B. Foglia, Communications Coordinator; Carla Roncoli, Post-Doctoral Associate; Constance Neely, Assistant Director

SANREM CRSP

The Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program (SANREM CRSP) seeks to develop and promote more sustainable ways of using natural resources. We are most concerned with those environments that are especially vulnerable to degradation, such as the humid and semi-arid tropical regions of the developing world. Sustainability is achieved when the resources with which we are entrusted are used in ways that do not deny the same opportunities to future generations. Developing a less damaging relationship with the earth requires that we also establish better relationships amongst ourselves. The SANREM CRSP addresses these challenges through an innovative research methodology that respects the ideas of local peoples and invites their equal participation in the research agenda.

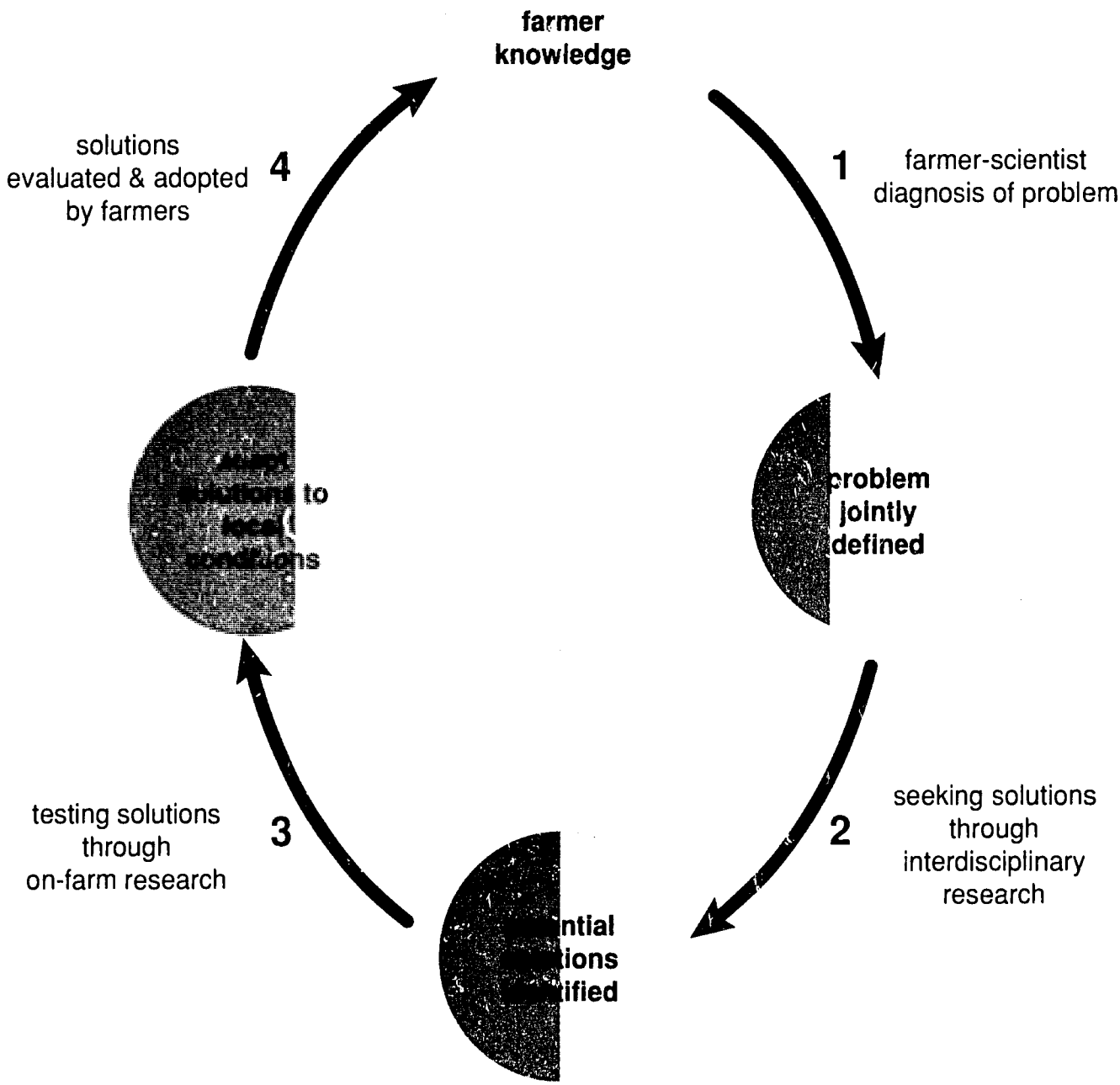
Burkinabe farmer discussing his farming practices with William Hargrove, SANREM CRSP Director.

The novelty and uniqueness of the SANREM CRSP approach rests in its four "cornerstones:" landscape-lifescape interactions, interdisciplinary teamwork, institutional partnerships, and participatory methodologies. Our research looks at an entire watershed as a dynamic whole, to understand how it is being affected by the interaction of biophysical (*landscape*) and socioeconomic (*lifescape*) factors at play within and around it. Because of the increasing complexity of these interactions, we feel that the age of "Lone Ranger" research is over and interdisciplinary teamwork is the way of the future. Therefore, our work combines methods and insights from a variety of scientific disciplines, such as ecological, agricultural, and social sciences into an integrated research paradigm. Our teamwork reaches beyond the doorsteps of academia to integrate the expertise and experience of a diversity of partners, bringing together US-based and host country researchers and representatives of development agencies, government institutions, grassroots organizations, and rural communities in an institutional partnership. This is a partnership among equals around a common commitment to preserving the earth. Some of these partners have never worked together and some have never been actively involved in scientific research, such as farmers of developing countries. Participatory methodologies combine the indigenous knowledge and adaptive creativity of farmers with the scientific expertise and comparative perspective of scientists.

The farmer-back-to-farmer model is at the heart of the SANREM CRSP research process. This model provides a framework for research to build on the experience and knowledge of farmers, beginning with their assessment of problems and priorities and ending with their testing and adaptation of proposed solutions. Accordingly, in each of its research sites, the work of the SANREM CRSP begins with a Participatory Landscape Lifescape Appraisal (PLLA), carried out jointly by farmers and researchers to identify the main problems to be addressed. The findings of this community assessment are used to generate a Framework Plan which outlines the priority research questions for the project and serves as a guide for developing research work plans that are implemented by collaborative community-researcher teams.

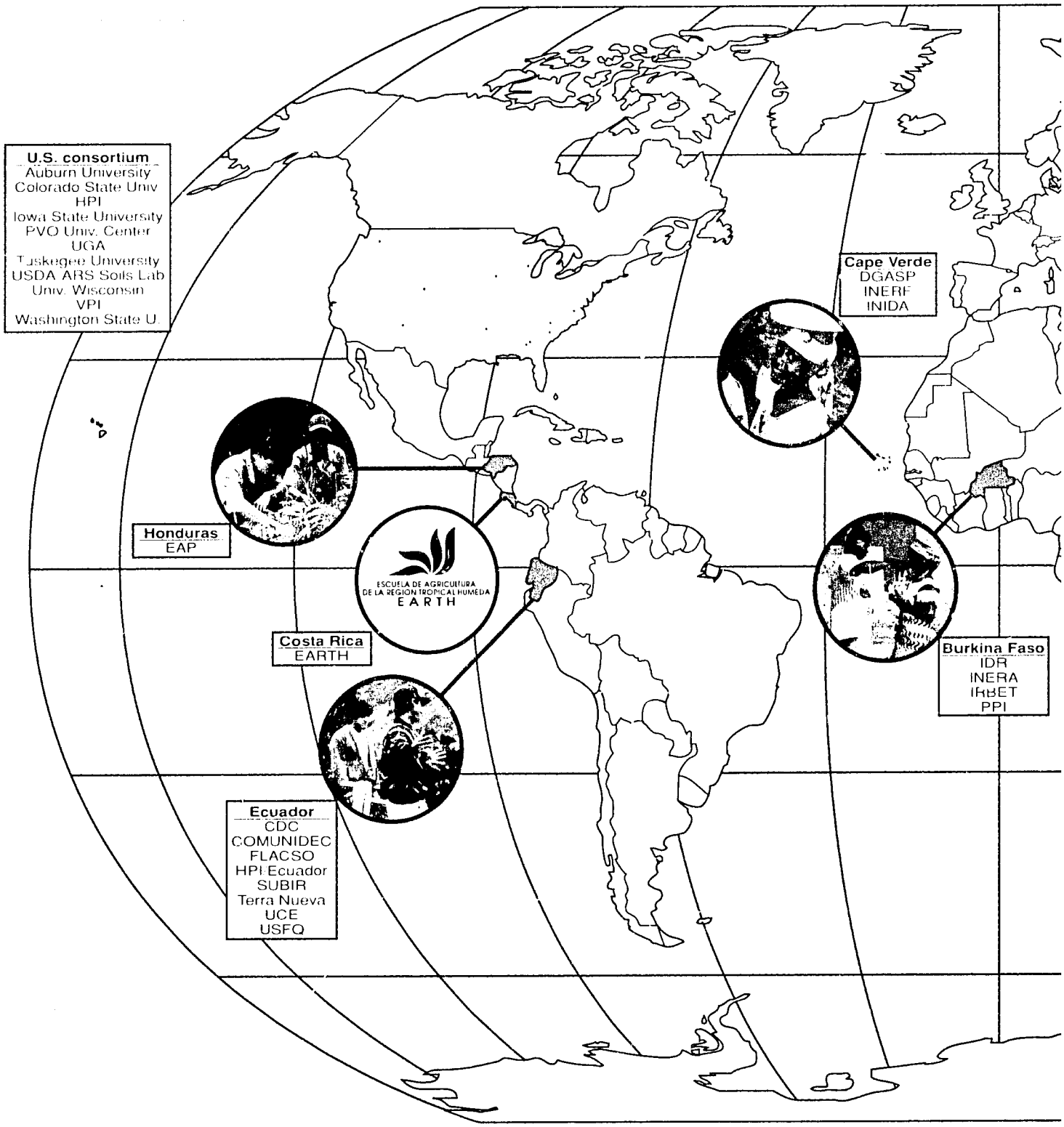
Local communities, including those groups within them whose voices are not commonly heard, such as the poor, the young, and the women, are therefore involved at each stage of the research process. We believe that only by integrating our concerns for food security and for environmental sustainability our work will effectively contribute to bringing about a better quality of life in a more peaceful society on a healthier earth.

FARMER-BACK-TO-FARMER MODEL

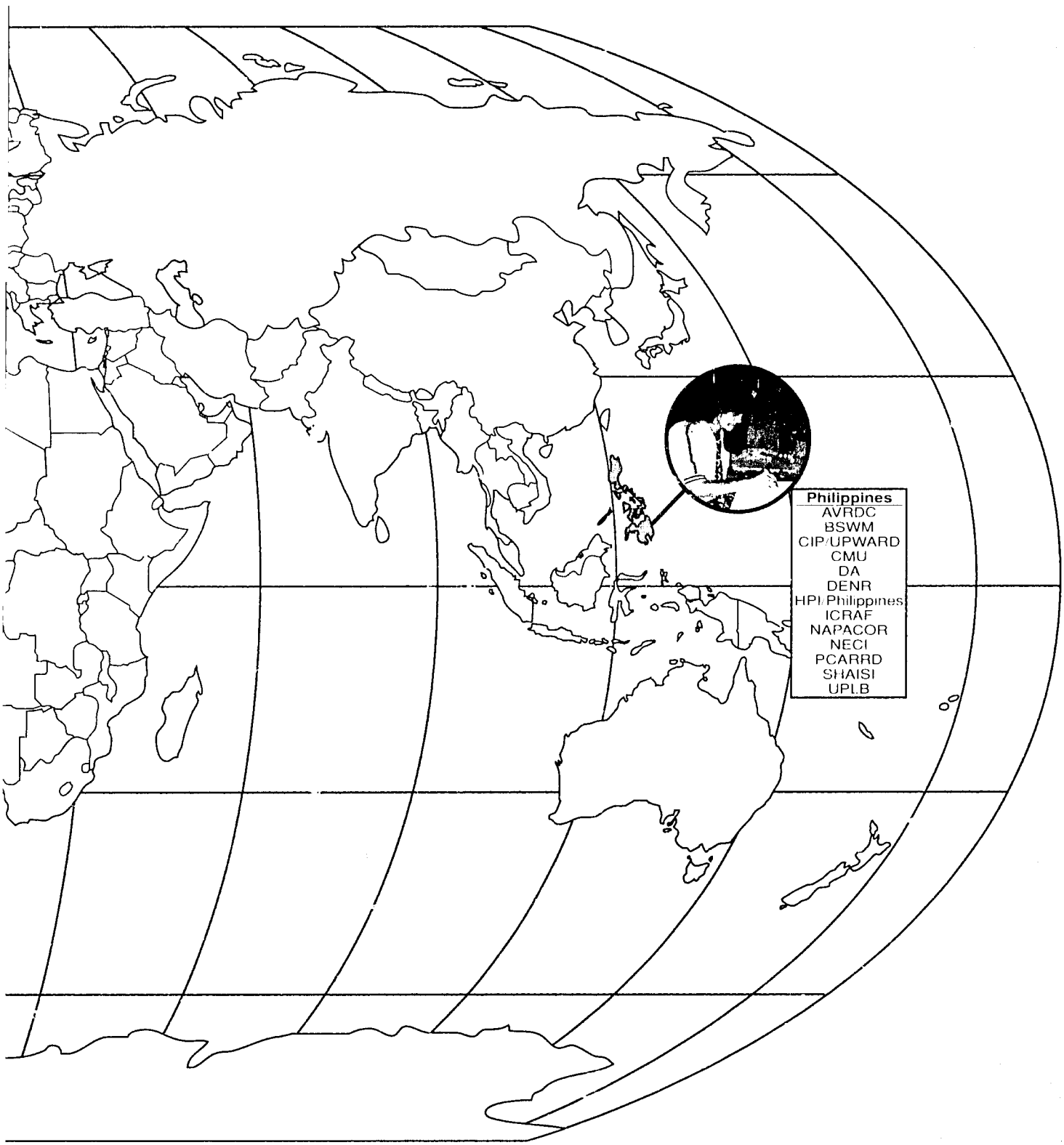


In the Farmer-Back-to-Farmer model, farmers and scientists work together in defining a problem, seeking solutions, and assessing and adapting alternative practices to on-farm conditions. But the ultimate decision on the utility and feasibility of proposed solutions rests with the farmers. Once the new practices are incorporated into the farmers' repertoire of knowledge, the process can recycle as new problems emerge. (Rhoades, R.E. 1984. Breaking New Ground: Agricultural Anthropology. Lima, International Potato Center.)

PARTNERS ARO



ND THE WORLD


Philippines
AVRDC
BSWM
CIP/UPWARD
CMU
DA
DENR
HPI/Philippines
ICRAF
NAPACOR
NECI
PCARRD
SHAISI
UPLB

Progress Towards Impacts

The SANREM CRSP is an ambitious program that is designed to effect *long-term* change, therefore identification of *short-term* impacts can be a difficult task. To monitor both the short- and long-term aspects of the process, the program has adopted a classification system to recognize and document impacts and progress toward impacts. An impact is defined as a change in the awareness, attitude, or behavior of participants that results in an enhanced quality of life or improvement in environmental conditions, such as the quality or quantity of natural resources. This hierarchical classification scheme illustrates an ordered process of progress toward impacts. It begins as *changes in people's involvement in or reaction* to sustainable resource management activities and issues. As these first-order changes crystallize they form a foundation for *changes in people's knowledge, attitudes, skills, or aspirations* regarding sustainable resource use. To produce an impact with truly long-term significance these second-order changes must ultimately bring about *changes in practice* regarding sustainable agriculture and resource management. We consider the adoption of the SANREM CRSP approach of participatory methodologies in the research and development practice of institutions and organizations to be at this level of third-order change. The following is a summary listing of the overall progress toward impacts that the SANREM CRSP has achieved through its accomplishments across all research sites.

Changes in Practice

- farmers adopt alternative production practices to reduce environmental degradation
- host country institutes adopt participatory methodologies in agricultural research & community development; US institutions & agencies adopting participatory research methodologies

Changes in Knowledge, Aspirations, Skills, or Attitude

- training of farmers to collect baseline data on biological & physical characteristics of their watershed; community monitoring projects initiated
- independent experimentation by farmers to test solutions to environmental problems
- farmers empowered & consider themselves equal partners in research & development projects
- monitoring of environmental parameters by community members
- establishment of unprecedented collaborations between communities, NGOs, host country government agencies, & research institutes in sustainable resource management research & development projects
- science education curriculum in US & host country schools incorporate global environmental issues through international linkage
- training of host country students, research institute staff, government officials, extension agents, grassroots workers in participatory research methodologies
- development of skills & capacity of host country research institutes improving their ability to compete in international grant programs

Changes in People's Involvement or Reactions

- heightened community awareness of local environmental problems & constraints to sustainability
- heightened awareness of linkages in the landscape & lifescape including upstream-downstream relationships, nutrient cycles, & farm-market connections
- establishment of new linkages between communities, NGOs, host country government agencies & research institutes
- high level of voluntary community participation in natural resource management research projects
- requests for involvement in participatory resource management research projects initiated by communities & NGOs
- requests for training in alternative agricultural practices including IPM, agroforestry, conservation cropping systems, composting, & increased crop diversity.
- requests for training in participatory research methodologies initiated by host country governmental agencies & research institutes.
- heightened teacher awareness to local environmental problems & constraints to sustainability; introduction of issues into local school curriculum
- US & host country elementary students correspond internationally
- establishment of network of investigators involved in participatory research world-wide

ACCOMPLISHMENTS AND IMPACTS

PHILIPPINES

Data Collection & Analysis

- collection of data on indigenous knowledge & scientific classification of insects & insect biodiversity
- collection of water quality data & stream invertebrate inventory by community members
- plant & animal biodiversity inventory completed at sample sites in upland zones
- correlation of scientific & indigenous knowledge of plants & their uses
- analysis of resource use patterns & concepts of sustainability completed through interviews with over 50 members of Lantapan ethnic groups
- development of GIS datasets characterizing physical aspects of watershed
- establishment of weather station network
- community workshops held to discuss data, monitoring issues & historical trends with farmers.

Education, Training & Capacity Building

- 30 farmers attended workshop on sustainable vegetable production practices
- 130 women participated in workshops on home gardening resulting in the establishment of pilot gardens to test alternative production practices
- 24 gardeners trained in composting techniques
- community members trained in biodiversity monitoring methods
- low-technology, user-friendly tissue culture method for plant propagation developed; 4 local women trained
- germplasm conservation projects established through local elementary schools; mothers, students & teachers maintain culturally important crops in communal gardens
- over 100 teachers trained in group decision-making, cooperative practice & sustainable agriculture
- over 700 farmers participated in on-farm experiments to test alternative farming & conservation practices
- 4 IPM pilot gardens established; evaluation of alternative crops & IPM technologies ongoing
- 24 potato farmers trained in True Potato Seed production resulting in the establishment of 11 farmer-managed experimental plots
- 40 women attended workshop to discuss opportunities for collaboration & concerns regarding natural resource management
- over 220 local government officials participated in workshops & field trips on local environmental & sustainability issues
- workshop held to coordinate research in buffer zone management.

Impacts

- heightened community awareness of local sustainability issues including local & global water pollution issues
- independent experimentation by farmers in alternative pest management & soil conservation practices & water quality monitoring of local rivers
- women testing alternative production practices in home gardens & building composting bins on their own
- commercial vegetable farmers implementing alternative production practices to reduce soil erosion & nutrient runoff
- crop biodiversity enhanced through germplasm conservation collections in community gardens
- community environmental monitoring group seeks NGO status to become official, independent, self-sustaining organization
- new collaborations initiated between local research institutions & communities
- new linkages established between women's grassroots groups, government & academic institutions
- enhanced commitment to participatory methods by university faculty & government representatives
- teachers incorporating sustainability issues & lessons in local school curriculum

BURKINA FASO

Data Collection & Analysis

- development of GIS datasets characterizing physical aspects of watershed
- establishment of weather station network
- farmers collecting baseline data

Education & Training

- introduction of new soil conservation practices to farmers
- tree preserve planted in deforested area
- participatory use of photography successfully tested as tool for documenting environmental problems & agricultural practices

Impacts:

- heightened community awareness of soil erosion & deforestation
- adoption of new soil conservation practices by farmers

ECUADOR

Data Collection & Analysis

- community-led appraisal of local environmental & resource management issues including agricultural production practices & community health
- weather station network established
- collection of baseline data & development of classification system developed on land use patterns, livelihood strategies & production practices
- GIS datasets developed characterizing physical aspects of the watershed

Education, Training & Capacity Building

- 30 community members, students, & NGO staff trained in water quality monitoring techniques
- reference collections of stream invertebrates developed
- stream monitoring program established

Impacts:

- heightened awareness in communities of sustainability issues including local & global water pollution issues
- independent monitoring of water quality in local rivers
- new collaborations initiated between researchers, NGOs, & communities
- neighboring communities have expressed interest in participating in the SANREM program

CAPE VERDE

Data Collection & Analysis

- community-led appraisal of local environmental issues & constraints to sustainability
- identification of priority questions & agenda for research on natural resource management

Education, Training, & Capacity Building

- host country research institute & government agencies staff, NGO staff, & community organizers trained in scientific proposal writing & in the monitoring & evaluation of research projects
- 4 host country students enter graduate program at US universities to be trained in agricultural & participatory research methodologies

Impacts:

- heightened community awareness of local sustainability issues
- new collaborations initiated between local research institutions & communities
- farmers & government agencies working in collaboration on natural resource management projects for the first time
- enhanced skills & capacity of host country research institutes & grassroots organizations including improved ability to compete in international grants programs for funding local

research & development projects in resource management
- community groups require treatment as equal partners in local research & development projects
- increased capacity & expertise of host country research staff through graduate training in agricultural & participatory research

COSTA RICA & HONDURAS

Data Collection & Analysis

- community-led appraisal of local environmental issues & constraints to sustainability
- development of a simplified surveying techniques to allow community members to gather baseline data on the physical characteristics of a watershed

Education, Training & Capacity Building

- 30 workshop participants compared participatory research activities across SANREM sites & evaluated them as tools to identify indigenous & scientific indicators of sustainability
- development of a 'tool kit' to teach participatory concepts & methodologies for researching indicators of sustainability
- training of 22 undergraduate students from EARTH University in participatory research methodologies & designed community projects
- senior students at Zamarano University designed participatory research projects to identify & test scientific & indigenous indicators of sustainable resource use
- farmers, teachers, NGO workers, & extension trained in procedures for gathering baseline data

Impacts:

- incorporation of participatory research methodologies as curriculum component in education & training programs at EARTH & Zamarano universities
- community members collecting baseline data with accessible monitoring techniques

GLOBAL

Education, Training & Capacity Building

- 37 graduate & 9 undergraduate students, from 19 countries, undertaking participatory research at SANREM sites
- 28 participants, from 12 Southeast Asian countries, trained in GIS technology & applications
- over 100 people, from 76 organizations, participated in conference to discuss the state-of-the-art on indicators of sustainability
- over 70 people, from 18 countries & numerous organizations, participated in a workshop to share experiences from applications of participatory collaborative research methodologies in a variety of settings
- elementary students correspond internationally
- global environmental & sustainability issues incorporated into local school curricula
- GM&E committee was formed & devised a standardized methodology to assess technical accomplishments & progress toward impacts
- participatory monitoring & evaluation workshops conducted at each research site to develop scientific & community-based indicators of success

Impacts:

- students in US universities benefiting from research & training in use of participatory methodologies
- researchers throughout Asia equipped with GIS skills as a new tool to understand natural resources issues & improve management strategies
- science education curriculum in US & host country schools enhanced through international linkage
- organizations throughout the world with similar goals in improving natural resource management set guidelines for assessing participation & their programs' impacts on sustainability
- documentation of program process & progress have ensured a self-reflective, dynamic program that can quickly move from assessment of progress toward impacts to incorporation of lessons learned in planning & implementation

Institutional Capacity Building

In each of its research sites the SANREM CRSP has catalyzed an unprecedented partnership of international, national, and community institutions. It has enabled researchers from government programs and universities to work together with NGOs and thereby integrate their field experience and farmer-centered methodologies into the research. Involvement in SANREM activities has also brought the researchers in close contact with farmers, enabling them to develop a better understanding of natural resource management issues from the farmers' perspective. In addition, representatives of local organizations and community groups have had the opportunity to develop new skills and linkages with national and international institutions that can be utilized in accessing relevant information and mobilizing resources more effectively.

In the Philippines, Dr. Willie Dar, member of the SANREM CRSP Global Technical Committee and Chair of the Philippines National Coordinating Council was named Executive Director of PCARRD, the umbrella institution that oversees all research in agriculture and natural resource management in the country. His commitment to the SANREM CRSP approach and goals ensures that collaborative and participatory research methodologies will be key ingredients in the scope of PCARRD.

In Burkina Faso, the SANREM CRSP cornerstones have been incorporated into the Ten-Years Strategic Plan that will guide the two main national agricultural research program, INERA and IRBET. These institutes have also established closer collaborative links with NGOs and other regional institutions for crop and agroforestry research.

In Cape Verde, the SANREM CRSP is working closely with INIDA, the lead institution in agricultural research, to improve the effectiveness and outreach capacity of its programs. The institute's researchers are working directly with farmers for the first time. In addition, training and experience acquired through SANREM activities has significantly enhanced the capacity of INIDA's staff to formulate research hypothesis, gather and analyze data, and write scientific documents. This has strengthened its standing with international development agencies, such as FAO, and its ability to develop effective proposals for obtaining external funds. Closer collaborative links with other agricultural institutions, such as *Animaçao Rural*, have been established and participatory approaches are not only being adopted by other research and development institutions, but also demanded by the farmers themselves.

In Costa Rica and Honduras, the SANREM CRSP has strengthened the curriculum of agricultural universities, such as EARTH University and EAP (Zamarano) which train students from all over Latin America. The program has provided support for student research on questions of sustainability and in the development of training and materials on participatory research techniques.

Benefits to U.S.

- At UGA, the lead institution in the SANREM CRSP consortium, the program has strengthened inter-departmental linkages and provided opportunities for graduate students to acquire research experience through interdisciplinary and international collaboration. The SANREM approach is keeping with the University President's agenda of environmental awareness and is being incorporated in newly established research programs concerning U.S agriculture.
- Involvement in the SANREM CRSP consortium has enriched the curricula at Tuskegee University, WCU, and VPI by expanding their international programs and promoting the study of environmental issues from a global perspective.
- The SANREM CRSP approach has influenced Iowa State University's collaborative work with the Rural Community Assistance Program of the US Forest Service. This has resulted in the adoption of community-based indicators to assist rural communities in assessing their own progress towards environmental sustainability.
- A linkage has been established between the EPA's Alabama Waterwatch Program implemented by Auburn University and the Citizen Water Monitoring program in the Philippines. The exchange of experiences has enriched both programs and increased the understanding of global environmental issues among participants at both sites.
- Participation in the SANREM CRSP has provided US-based NGOs, such as members of the PVO University Center, new opportunities to integrate research with development and to expand their international scope and collaborative networks.
- Involvement in the SANREM CRSP has enriched the work of HPI, which has wide international scope but its focus has been limited to development work. The collaboration has enabled HPI staff to work with research-oriented institutions and to develop skills for integrating research into their own projects.
- A linkage has been established between the Margaret Beeks Elementary School in Blacksburg, VA and the Vincencia Tavares School in Cape Verde in which students correspond and discuss their cultures and local environmental issues. The international exchange has enriched the curriculum in both schools. (see p. 35)

International Research Sites

P H I L I P

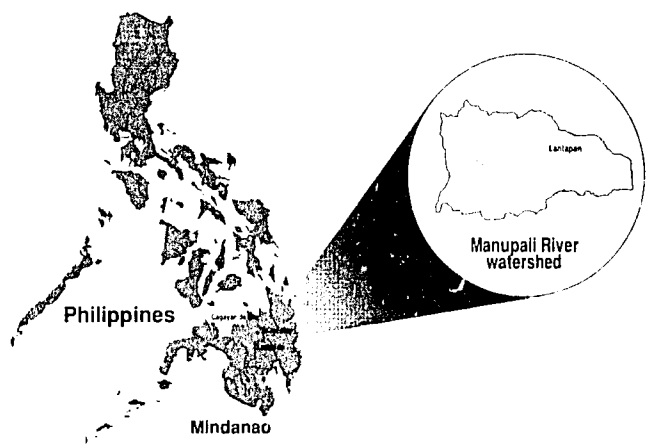
Landscape

The SANREM Philippines program is being implemented in the Manupali watershed, incorporating the municipality of Lantapan, in central Bukidnon province on the southern island of Mindanao. Lantapan is 15 km south of the provincial capital Malaybalay, and 130 km southeast of Cagayan de Oro, the closest major trading center and port. The watershed is located on the steep slopes of Mt. Kitanglad and Mt. Kalatungan, volcanic peaks which dominate the landscape. The Manupali River forms the southern boundary of Lantapan and the watershed, interlaced with its tributaries, drains about 40,000 hectares. It is a landlocked region with river flatlands descending towards the coast to the north, and climbing in all other directions through rolling hills to some of Mindanao's highest mountain ranges from 1100 to 2200 meters. Almost half of the land in the watershed has slopes of 40% or more and much of the soil is a deep clay. The upper Manupali watershed has been subjected to heavy deforestation as agriculture has intensified; these higher elevations are now experiencing losses in biodiversity and critical levels of soil erosion. The region has a 6 month monsoon season with annual rainfall averaging 2300 mm (92 inches).

Lifescape

Lantapan is home to tribal groups indigenous to Bukidnon, primarily the Talandig, and to settlers, the Dumagat, Ilocano, and Igorot, who have arrived from coastal Mindanao and other Philippine islands. The watershed is divided into smaller political divisions called *barangays*. Population increase has been rapid in the last three decades, rising at least 4% annually from 14,500 in 1970 to 39,500 people today. Agriculture dominates the economy; most farms are smaller than 5 ha and most families live close to subsistence level. Low altitude flatlands, where irrigation is available, are devoted to rice or sugar cane production. At higher elevations, potatoes, vegetables, maize and coffee are the major cash crops with root crops and banana grown as subsistence crops. There is some livestock production in pigs, goats, and fowl, with cattle and water buffalo raised as draft animals.

As the first SANREM CRSP research site, the Philippines program began in November 1992 and has just completed its first phase of research implementation.



"Based on our experience, I can say that SANREM has been a good project for the community; likewise, the community has done well for SANREM. I look at the link between SANREM and the community as that of the body and soul for one's life: SANREM and its technologies act as the body while the people and their cooperation and support act as the soul. They have worked together to bring more life to Lantapan."

-Jojo Altomera (Tigbantay Wahig)

Program Highlights-Philippines

Farmers Experiment to Reduce Soil Erosion

How can vegetable production systems in the Manupali watershed be improved for more sustainable yields? This question has been the thrust of research led by David Midmore, of the AVRDC, in collaboration with Leallyn Ramos, of Philippines DA. A workshop, attended by 30 farmers including three women, was held to present the 1994 survey results to commercial vegetable producers to validate the data. Discussions focused on cropping systems, inputs, soil quality data, land productivity, and pests and diseases. Farmers expressed their desire to know how to improve their land productivity, and were especially interested in receiving the data on the soil fertility and chemical properties of their fields. Researchers and farmers discussed specific options for potential improvement in vegetable production systems, such as principles of simple soil erosion control practices, like mulching and contour planting. Farmers stated an interest in managing research plots on their farms and requested assistance in setting up hypothesis-testing experiments. As a result of this collaboration, 12 farmer-designed and managed plots and 24 researcher-managed plots were established to measure soil erosion, and water and nutrient runoff under various management practices.

Installation of these plots represents a great step towards quantifying one of the main premises in the watershed hypothesis, that soil erosion is worsened by vegetable production practices but that it can be reduced by increasing farmer awareness and by designing and implementing sustainable management alternatives. Already farmers are surprised by the amounts of soil eroded from their plots and are implementing some of their own remedies, such as constructing physical barriers and planting hedgerows to reduce runoff. The research plots have generated great interest in farmers not yet in the project and have also increased communication between participant farmers as they visit each other to compare management of the plots. This work has shown that vegetable farmers are motivated to improve and diversify their production systems and are willing to have experimental plots installed on their land as a means to that end.

A parallel activity involving the work of UGA graduate student, Todd Nissen, is seeking to clarify the land fallow system utilized by farmers in the watershed. Declining productivity and a build-up of pests and diseases drive farmers to abandon lands. Solutions being investigated to reclaim the productivity of these lands range from low maintenance tree crops to a more systematic fallow system. A corollary benefit from the work with vegetable farmers has been the training received by the local Department of Agriculture staff in comprehensive surveying methods. Through this process they evaluated farmer knowledge on his/her production system and were introduced to the participatory methodology of using information collected from farmers to drive the design of a research project.

Community Volunteers Monitor Water Quality

Out of a growing concern for environmental degradation, members of the Lantapan community have volunteered to monitor water quality in the major rivers of their local watershed. The water quality monitoring group, or *Tigbantay Wahig*, has been organized by Bill Deutsch of Auburn University and Jim Orprecio of HPI. Deutsch has developed a water quality training manual for general use with citizen monitoring teams; it has been translated and revised for the Philippines program. The teams are monitoring for total suspended solids as a measurement of soil erosion, general water chemistry, and aquatic biodiversity. A total of 25 sites have been monitored with 400 samples collected. The group also has collected an initial stream invertebrate inventory for the watershed and plan to use the information for the development of biotic indicators of stream quality and also to enhance local environmental education programs. After an initial training period, the *Tigbantay Wahig* continue their work supervised by the local field coordinator, and thus provide a good example of the developing capacity among community members to undertake research and to train others to perpetuate the project. The group is now posting their results at a central public gathering site to increase community awareness of the water quality of local rivers. As a result of their experience with the monitoring teams, members of the group are expressing interest in learning more about the relationships that are reflected in the data they are gathering. The *Tigbantay Wahig* have also applied to become an official Filipino NGO which would both formalize their status at the national level and enhance their ability to become a self-sustaining group.

Pest Management: Old Knowledge, New Partnerships

Vegetable farmers in the Manupali watershed are frequently forced to abandon lands due to declining productivity, soil erosion, and a build-up of pests, particularly soil-borne diseases such as bacterial wilt. As previously cultivated lands are left fallow, farmers must turn to clearing forest to maintain their livelihood. Research led by Gordon Prain and Maricel Piniero of CIP UPWARD has established a community-based integrated pest management (IPM) program which aims to make vegetable farming more viable, less costly, and—particularly in the case of potatoes—less likely to encroach on the forest.

Interviews with 20 farmers have provided information on indigenous classifications of insects and the history of insect pests in the region. These folk taxonomies categorize insects primarily on the basis of whether or not the insects cause crop damage, rather than based on morphology as with scientific classification systems. This makes folk taxonomies powerful tools for the study of insect pests and their management, however, it was found that they are weak at classifying beneficial insects. Investigators and local farmers have been sampling insects in the 4 main vegetable growing areas of the watershed to develop a biodiversity collection. This has led to the identification of beneficial insect parasites and predators. One communal and 4 individual IPM pilot sites have been established in different areas of the watershed. Farmers are testing alternative crops and a range of IPM technologies.

In another component to the pest management research, more than 24 potato farmers in 7 *barangays* have been trained in the new technology of True Potato Seed (TPS) production as a potential source of clean potato planting material. Researchers and farmers, in partnership, have designed and established 11 farmer-managed experimental plots to evaluate TPS crops on farmers' lands. Farmers experimented on their own by choosing the parameter that would be tested in a particular plot, such as depth of sowing, exposure to disease, or comparison to traditional tuber seed. Participants have experienced mixed results from the TPS trials. Some farmers had crop failures while others produced increased yields. Monitoring and evaluation of the test crops has been based on technical expertise as well as the farmers' perspective. A workshop held to present and discuss with farmers the results of the TPS trials found that lack of success in individual trials did not dampen either farmers' interest in alternative pest management technologies or their determination to succeed. Farmers have expressed a strong desire for greater access to information about TPS, insect pests, and natural enemies.

Biodiversity Threatened by Deforestation

In order to establish a base level of data for biodiversity studies, investigators from Green Mindanao and CMU conducted a plant species inventory and diversity survey on Mt. Kinasalapi at 2700 and 2100 masl. Species of plants representing the full range of botanical orders were collected and identified at each site. However less than half the number of species were found at the lower altitude site than at higher altitudes indicating a loss of biodiversity in agriculturally active areas. Endangered plants and species with economic value were discovered within the sampling area; their local names were recorded.

An animal biodiversity survey was undertaken by researchers from MSU. Members of FPE and two Tala-andig ethnobiologists were trained in these biodiversity monitoring methods. Investigators were only able to locate 30% of the bird species known to be found in the Kitanglad range. Deforestation, and therefore loss of habitat is believed to be the cause of this decline. Extensive deforestation exists up to 1700 masl, with areas cleared for cultivation of cabbage, potato, radish, and corn. The only signs that these areas were once forested are the presence of large burned and crownless trees. The first line of forest starts at 1800 masl and it too shows signs of being slowly cleared for agriculture. Virtually all the highly commercial lowland tropical rainforests are gone. Only upper altitude forests, from 2000 to 2900 masl, are still intact. Researchers consider this situation disheartening when compared to the other municipalities around the Mt. Kitanglad range such as San Vincente, Baungon, located in the northwestern part of Bukidnon, where at 800 masl lowland tropical rainforests are still untouched. All findings have been shared and discussed with the community through meetings and workshops.

Program Highlights-Philippines

Women's Gardens Cultivate Biodiversity

More than 130 women home gardeners, representing all but one of Lantapan's 14 *barangays* and more than 25 organizations, attended a workshop to discuss their roles as providers of household needs and as protectors of biodiversity. The workshop was organized by researchers with CIP UPWARD and NOMIARC studying how home gardening can enhance biodiversity conservation and household nutrition. Women mapped out their gardens, listing species and varieties grown, and drew calendars of garden activities and food production, as well as describing key problems experienced. Self-drawn maps of the women's home gardens provided researchers with an extensive inventory of cultivated species and varieties which now serves as an ethnobotanical and management knowledge-base on home gardening.

In an effort to augment household food supplies, 88% of the women cultivated a wide range of crop species and varieties. An equal percentage of gardeners grew a selection of ornamentals for their aesthetic value. For the sake of "beautification," some of these women are conserving different forest species. Medicinal plants were cultivated in home gardens by 65% of the women. Most of the women maintain their own planting materials or obtain them from neighbors' collections.

The women identified 24 pilot home gardeners, from across the watershed, who will work in partnership with researchers to test and demonstrate gardening innovations. Each village group identified technical options which would be evaluated in these pilot gardens, such as new varieties or crops, new cropping patterns, or composting techniques.

A workshop on composting was offered to these pilot home gardeners, in an effort to help them improve the management of their gardens. Discussions included benefits of composting, how-to demonstrations, and visits to home gardens with composts already in operation. One of the main messages was to treat "wastes" as resources within each household. Compost bins, showing innovative adaptations of the techniques demonstrated at this workshop, have already sprung up in participants' gardens.

Landscape Models—Valuable Research Tools

One of the goals of the SANREM program is to characterize the biological, physical, and social aspects of each research site. The GIS and weather station research projects, led by Ian Flitcroft of UGA, are designed to gather and organize information describing the soils, topography, land use, and climate of each site. The specific purpose of the GIS work is to create a set of digital (computer) maps depicting different parameters which can be overlain to investigate correlations. For example, by putting together maps of soil type, topography, and land use, a map of soil erosion potential can be created. This composite map is a powerful tool in developing a plan for changes in resource management. In the Philippines, the following datasets and maps have been generated: elevation and slope, land use, soil type, political boundaries and towns, and roads and rivers. These maps are a valuable resource for other investigators; NECI, AVRDC, and IRRI are all making use of GIS datasets developed in this research.

Clearly, the weather plays an important role in determining agricultural production; monitoring the weather over at least a 3 to 5 year period allows researchers to determine climatic trends. In the Philippines, a weather station network has been established across the watershed to gather this baseline data with farmers responsible for monitoring specific parameters. The weather data is being distributed to all interested groups and institutions, including the community, local governmental and non-governmental organizations, and researchers. The weather stations are equipped with sensors to measure rainfall, air temperature and humidity, wind speed and direction, soil temperature, solar radiation, and photosynthetically active radiation. Lucio Laurente, the work plan partner at CMU, is conducting workshops in the community to discuss the recent data, the reasons for collecting the data, and to gather farmers' memories of past weather conditions.

The Economics of Sustainability

Farmers' decisions and resulting practices are among the main factors that can ensure or undermine the sustainability of land use. Therefore it is particularly important to understand what are the main influences that shape such decisions, especially in areas, such as the Manupali watershed, where land degradation is reaching levels that may result in ecological disaster, unless current land use practices are modified. Economic research, led by Ian Coxhead of the University of Wisconsin and Agnes Rola of the University of Philippines, is seeking to clarify the role of factors stemming from the broader political economy, such as government policies, access to markets, and commodity prices, in shaping Lantapan farmers' decisions about more or less sustainable ways of using their land.

A farm survey of the upper regions of the watershed established that corn dominates the land use and cultivation of coffee, once the principal cash crop, has declined as world prices have fallen. The conversion of coffee plantations to vegetable crops, mainly cabbages and potatoes, causes significant environmental consequences. Soil erosion under well-established perennial crops such as coffee is much lower than that under short-season crops (corn, vegetables).

Initial analysis of price monitoring of agricultural goods grown and traded in the watershed indicates that agricultural prices are determined mainly outside the watershed, rather than by production within Lantapan. National compliance with GATT and AFTA will undoubtedly lead to price changes for local farmers. Since policy changes at the national level could influence relative prices in the watershed thereby altering local farming practices, national agricultural pricing policies should be seen as important elements of environmental policy. Currently, the high cost of capital and reliance on informal credit markets is a major constraint to adoption of soil conservation practices and also an incentive to produce short-season crops which increase soil erosion. Deregulation of the domestic banking industry and the lifting of restrictions on the operations of foreign banks therefore should have strong positive environmental benefits in areas like Lantapan.

This research indicates promising areas for producing economic and environmental impacts. Promotion of investments in soil-conserving structures, such as contour strips on corn and vegetable lands; conversion to alternative, less erosion-prone crops, such as coffee; developing value-added enterprises and niche markets, such as specialty coffee blends utilizing local processing facilities, would all contribute to greater economic stability and to reduced soil erosion and land degradation.

Women's Concerns on the Landscape

The collaborative work of Revathi Balakrishnan, of VPI, with the End-User/Gender Working Group has catalyzed the development of new linkages with host-country institutions and generated a wealth of new information and insights on women's perceptions and concerns in the area of natural resource management.

A 3-day forum brought together 40 women representing 35 women's groups, 14 barangays, and the 5 agroecological zones that make up the municipality of Lantapan. The objective was to identify women's primary concerns regarding natural resource management, opportunities for collaboration and mobilization of resources, and criteria for the integration of gender issues in research plans being implemented in the Philippines. Special efforts were made to ensure the representation of all categories and classes of women living in Lantapan, including women of different ages, ethnicities, occupations, socioeconomic status, and educational levels.

A series of innovative, interactive exercises enabled the women to compare and combine their environmental concerns and development priorities and to collectively develop resource maps and historical narratives concerning the physical and social landscape of the Lantapan area. The findings are being made available to grassroots organizations, local government institutions, and researchers that have expressed an interest in integrating the women's concerns in their activities.

By providing opportunities for women's organizations to network and to develop linkages with broader-scope institutions, the forum also enhanced the women's ability to access information and resources, and promoted the value of participatory approaches and gender issues in research and development. For instance, as a result of their involvement in the women's forum, faculty from CMU have expressed a strong interest in receiving further training in participatory methodologies.

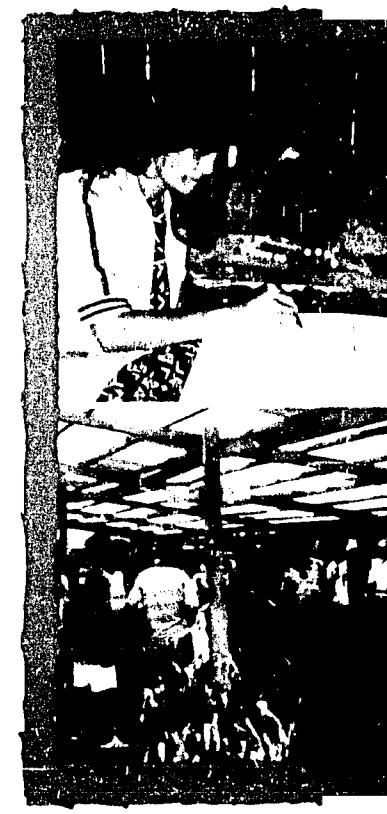
Program Highlights-Philippines

Ethnoecology—Other Ways of Knowing

How you interact with the world depends on how you perceive it. And how you see the world depends, in a large part, on the social and cultural context in which you were raised. Do women see the world and use resources differently than men? Do different ethnic groups hold a different vision of their environment? These are some of the questions being explored by the ethnoecology research team led by Virginia Nazarea and Robert Rhoades of UGA and Linda Burton of RIMCU at Xavier University. Ethnoecology is the study of how local people view and categorize the natural world.

Through extensive interviews with over 50 members of the Lantapan community, from the Tala-andig, Dumagat, Ilocano, and Igorot ethnic groups, the investigators have completed an in-depth analysis of patterns of resource use and concepts of sustainability as a function of ethnic group, gender, and age. This has been complemented by a demographic study reconstructing the historical migration patterns of these different ethnic groups and history of resource use in the watershed. To tap people's internalized vision of their world, investigators asked them to draw maps of the watershed and weave stories about what they saw in photographs depicting different agricultural scenes around Lantapan. In this way, researchers are exploring the way a person or group thinks about the world and which aspects are most important to them. Analysis of these findings brings researchers closer to understanding local people's concepts of sustainability and how this translates into their resource management practices.

In parallel participatory action work, investigators have undertaken several projects to increase local access to and control over plant genetic resources. To introduce local women to the principles of biodiversity conservation, the ethnoecology team organized a field trip for more than 25 participants from Lantapan. They visited the germplasm collection of sweet potatoes in Libona, the flower farms in Malaybalay, and the tissue culture laboratory in Cagayan de Oro. Many of these women will, in the next two years, be taking the lead in germplasm conservation of culturally significant plants in the planned tissue culture lab in Songco. The field trip emphasized the pivotal role of women in the maintenance of biodiversity of important local crops. The team has developed a low-technology, user-friendly tissue culture method for plant propagation and trained 4 local women in the protocol. In addition, germplasm conservation projects have been established through local elementary schools in which students, with their mothers and teachers, maintain different varieties of culturally important crops in communal gardens.

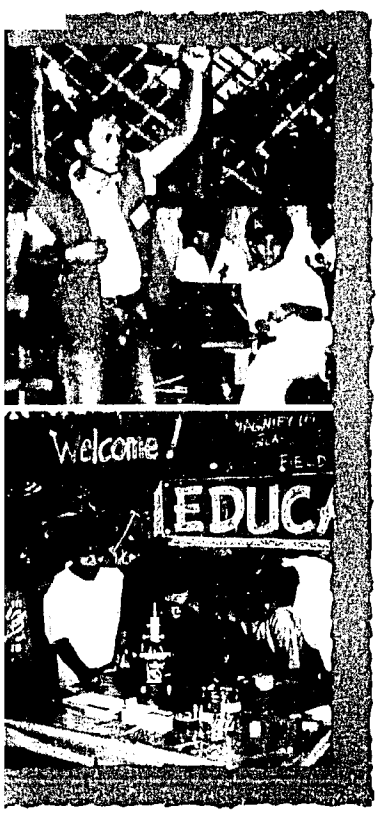


On-Farm Experiments Testing Solutions

User-First research, led by HPI & Philippine DA, is organizing on-farm agricultural research in *barangays* throughout the Manupali watershed. An HPI orientation workshop apprised 198 barangay officials of the role of local government in the community research activities. User-First teams facilitated diagnostic workshops with 119 *pundoks*, informal groupings of farm households, from the 5 agroecological zones across the Manupali watershed. Participants identified and prioritized environmental problems on their farms, mapping the relationships between the problems and potential causes. Farmers then evaluated possible solutions based on their perspectives on sustainability, feasibility, risk, and cost. Farmers then designed on-farm experiments to evaluate the effects of alternative farming and conservation practices on soil erosion control, soil fertility, weed control, and pest control. HPI has also established bulletin boards at local gathering spots to serve as a means of sharing information about SANREM CRSP activities with the whole community.

Farmers Map a Vision of Their Future

NECI is working with *bugpongs*, informal networks of farm families, in 3 upland *barangays* on agroforestry issues. Through a series of 8 workshops the group discussed with farmers the importance of sustainable farming and resource management issues. NECI is also working closely with the Mayor's office and Barangay Development Councils. To study local agriculture cycles and environmental effects, NECI facilitated field trips for over 100 farmers and 30 BDC members to the Cagayan de Oro city markets where Lantapan farm products are sold; to agroforestry research projects, tree nurseries, and demonstration farms where they learned about other farmers' conservation efforts; and to the hydropower plant which is plagued by silting from agricultural runoff. Before the field trips, farmers mapped their present land use; then after the visits they were asked to repeat the exercise, this time showing what they wish their farms would become. These maps are now being used as goal-setting guides for on-farm research. Additional interviews conducted with 125 farmers have yielded extensive data on land use patterns, farming systems, agroforestry practices, indigenous perception of biodiversity in the upland *barangays*. NECI and ICRAF also facilitated a national workshop, *Buffer Zone Management and Agroforestry*, to gather the many research institutes and development agencies working in and around the Mt. Kitanglad Protected Area. The objective was to coordinate research efforts and to develop a consensus on practical methods for buffer zone management.



Teaching the Children Well

SHAISI is a well-established folk high school in Lantapan for the study of agriculture and environmental issues. In addition to their work with local farm families, the group trains teachers to increase their awareness of sustainability issues so that they may then educate the next generations who will live in and care for the watershed. One hundred teachers in the watershed have participated in experiential trainings in group decision-making, cooperative practice, sustainable agriculture and natural resource management. Exercises are designed to stimulate discussion about the causes and possible remedies for poverty and ways to teach about sustainability. In order to highlight landscape lifescape interactions, the classroom training is followed by field trips from Mt. Kitanglad down to the dam that controls the flow of the Manupali River, and includes visits to demonstration farms as well as to locations that exemplify the consequences of mismanagement of natural resources. Participants design a farm development plan which they can implement in their school gardens and on their home farms. The teachers have made plans to establish "enlightenment gardens" on school campuses as showcases of sustainable farming. SHAISI has also fostered a linkage between the SANREM Environmental Education Working Group and the teachers of Lantapan which can potentially lead to close integration between local school curriculum and SANREM research.

New & Ongoing Activities

- maintaining weather station network & collection of daily weather data (UGA & CMU)
- validation of watershed simulation model to be used for evaluating land use effects on water quality (UGA)
- initiating aquaculture research based on feasibility study completed last year (Auburn & SHAISI)
- completing inventory of economic forest plants (DENR)
- completing demographic study (UPLB)
- conducting survey of corn farming systems to improve sustainability of production (CMU)

"I consider education on agriculture through the various trainings, as the big contribution of SANREM. We have become more aware that the population continues to increase while our main resource has remained fixed. We are thankful that through SANREM, we learn more about how to use properly the small piece of land that we till. If all of us who have gotten involved with SANREM get organized, we can better share the knowledge that we have gained so far, with other members of the community."

-Flor Hing-on
(User-First Farmer Partner, Victory)

B U R K I N

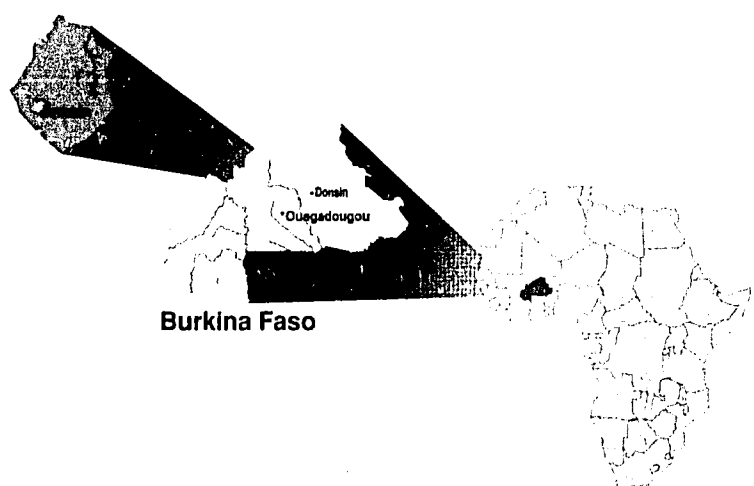
Landscape

Burkina Faso is a land-locked country in the Sudano-Sahelian region of West Africa which lays between the Sahara desert and the forested coastal region, and one of the poorest in the world. The SANREM research site lies within the watershed surrounding the village of Donsin, located about 100 km northeast of the capital, Ouagadougou. This semi-arid region has among the highest rates of land degradation in the country. It covers about 6400 ha and is surrounded by severely eroded and deforested escarpments, with a seasonal river along its northern boundary. Loss of soil fertility and scarce, erratic rainfall (an average of 650-750 mm, or 25-30 inches, per year) are the main constraints on agricultural production. Rainfall occurs during a period of three or four months (from June to September), and mostly in the form of heavy downpours, which means that much can be lost and even damaging to crops and soils. The low water retention capacity of eroded soils also hinders the ability of crops to make the most of the available rain water. Water quality is also a major problem affecting animal and human health.

Lifescape

Almost 200 "compounds", that is homesteads which include an extended family and surrounded by a family farm, are scattered throughout the watershed of Donsin. This is home to 1550 people, mostly belonging to the Mossi ethnic group. Men, women, and older children work on family fields, where they grow millet and sorghum as the staple crops, and cowpeas, peanuts, rice, and vegetables for cooking ingredients. But, despite their hard work, most families suffer food shortages during the months preceding the new harvest, when most of their food supplies are exhausted. Cash earning opportunities, except for the sale of poultry and small ruminants, are scarce. Young men migrate to the Ivory Coast to work as farm labor and women engage in petty trade during the dry season. Access to markets is limited by the lack of transportation and of an all-weather road to cover the 18 km distance between the village and the nearest town of Boulsa.

The SANREM Burkina Faso program was initiated in August 1993; research plans have begun their first phase of implementation.



Burkina Faso

"We praise the participative aspects of the program. The fact that at every stage of the program, the population was convened and consulted, and had plenty of chance to give their point of view. Among other things, the priming project has enabled us to obtain materials needed to plant trees."

-Chief of Donsin

Program Highlights-Burkina Faso

Farmers Adopt New Soil Conservation Measures

To bridge the time gap between the community assessment and the implementation of SANREM research projects, a series of priming activities have been initiated in Donsin by in-country partners. The overall goals of these activities are to increase the farmers' understanding of and participation in the SANREM program and to integrate community members into the planned research projects. The individual projects center around introducing farmers to innovative sustainable agricultural practices that would reduce soil erosion and land degradation. Field trips to other provinces where the fight against soil degradation is ongoing were initiated so that Donsin farmers could learn directly from the experiences of other farmers struggling with similar problems.

Community members have established a *Bosquet de l'Amitié* or "Friendship Grove", to encourage farmers to replant deforested areas. In this project, a small tree preserve is replanted and cordoned off to allow traditional species of trees to grow undisturbed. This will decrease erosion and improve shade in the area to enable future underplantings. The activity has raised awareness in the Donsin community of the problems of deforestation and of the need to protect trees. On their own initiative, residents have begun planting trees along the roads within the village.

The *zai* project began with the training of 4 Donsin village smiths at a center located in northern Burkina Faso where they learned to make specialized planting hoes. The *zai* method, introduced to the region by INERA in 1992, is a labor-intensive soil conservation practice in which seeds and manure are placed in holes in the fields before the planting season. The advantage of the *zai* method is that it improves soil fertility and water holding capacity. Since fields are planted before the heavy rains and the runoff can collect in the *zai* holes, this practice gives farmers a headstart on the short cropping season. The early planting and the increased soil water retention results in more abundant and stable yields of sorghum and millet. The feasibility and effectiveness of these sustainable agriculture practices are being examined and tested further through research projects that focus on the role of agroforestry and the *zai* technique in conserving or restoring soil fertility.

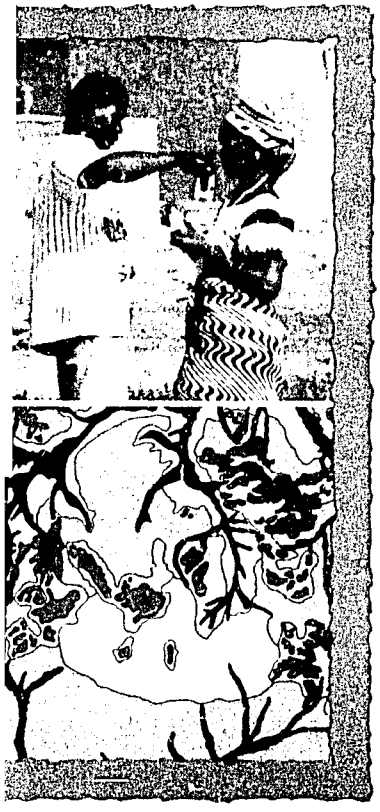
As part of the priming activity in Donsin, a learning program in holistic resource management was initiated through a series of workshops led by HRM educators, Arne Vanderburg and Sam Bingham. The first phase of the program trained a group of 12 community facilitators, including extension agents and development workers from World Neighbors and PPI, in a community decision-making model for a holistic approach to natural resource management. These facilitators will utilize their training to introduce this methodology to the villagers of Donsin.

The advantages of the zai method are many: increases in soil water retention and fertility and it gives farmers a headstart on the increasingly shortened farming season. Its use has allowed land that was abandoned or relegated to cattle grazing to be brought back into agricultural use.

Pictures Where People Matter

Can photographs be used as a communication tool to enable minorities and marginal populations to convey their own views of their world—overcoming barriers of culture and literacy? In an effort to expand the participatory approach to the development of educational materials, anthropologist Carla Roncoli and UGA journalism graduate Margery Sendze tested the innovative methodology of using photographs taken by farmers to elicit and to communicate information about issues of agricultural sustainability.

A training was held in the village of Donsin, involving 18 farmers (12 men and 6 women) with the assistance of NGO field staff and a local photographer. The program included a group discussion of the themes identified as priority research areas for the SANREM Burkina Faso program (soil, water, biodiversity, livestock management, human health and nutrition); a ranking exercise to determine farmer's criteria for judging photographs; and instruction in photographic technique. After the training, participants, using disposable cameras, were given 2 days to take photographs focusing on the most severe problems in each research area and on the ways of addressing them which are currently being implemented. A selection of photographs and commentaries by the farmers was assembled in a community photo album documenting environmental problems and agricultural practices from the farmers' point of view.



From this pilot study, the researchers conclude that participatory use of photography can serve as an effective tool for a range of research and development activities, such as problem assessment, resource inventory, holistic planning, or monitoring and evaluation. Because the SANREM CRSP mainly works among people with low literacy rates, the possibility of expressing themselves through images will increase their capacity to be active partners in every step of the research process. This approach provides an innovative medium to create educational and communication linkages between farmers, enabling the exchange of ideas and experiences through farmer-produced images, both across SANREM research sites and with US agricultural programs. Another opportunity being explored will use these photographs to develop interactive, multimedia teaching modules to be used in US schools for interdisciplinary and multicultural curricula in such subjects as environmental science, geography, and social science.

Models of the Landscape

One of the goals of the SANREM program is to characterize the biological, physical, and social aspects of each research site. The GIS and weather station research projects, led by Ian Flitcroft of UGA, are designed to gather and organize information describing the soils, topography, land use, and climate of each site.

The specific purpose of the GIS work is to create a set of digital (computer) maps depicting different parameters which can be overlain to investigate correlations. For example, by putting together maps of soil type, topography, and land use, a map of soil erosion potential can be created. This composite map is a powerful tool in developing a plan for changes in resource management. In Burkina Faso, GIS researchers have developed baseline maps for the Donsin area which are properly rectified. This work is essential to correct maps developed earlier by host country institutions which had incorporated distortions resulting from the original aerial photography. In addition, the following datasets and maps have been generated: land use, soil type and geomorphology, settlement boundaries, and aerial and satellite images of the site.

New and Ongoing Activities

- study of indigenous knowledge in ethnoveterinary medicine and the role of livestock in nutrient management (INERA & Univ. of Wisconsin)
- study of the relationship of sustainable agriculture and natural resources management on nutrition & quality of life (INERA & VPI)
- analysis of sustainable livestock production systems and soil fertility management (INERA & WSU)
- impact of water resources on farming & biodiversity (IRBET & Tuskegee Univ.)
- effects of agroforestry on sustainability (IRBET & Univ. of Wisconsin)
- study of land tenure & natural resource management (INERA & Tuskegee Univ.)
- improvement of small ruminant livestock management for productivity & sustainability (INERA & Tuskegee Univ.)
- study of soil fertility & cropping systems (IDR & UGA)
- the role of women's vegetable gardens in farm food self-sufficiency (INERA & UGA)

E C U A

Landscape

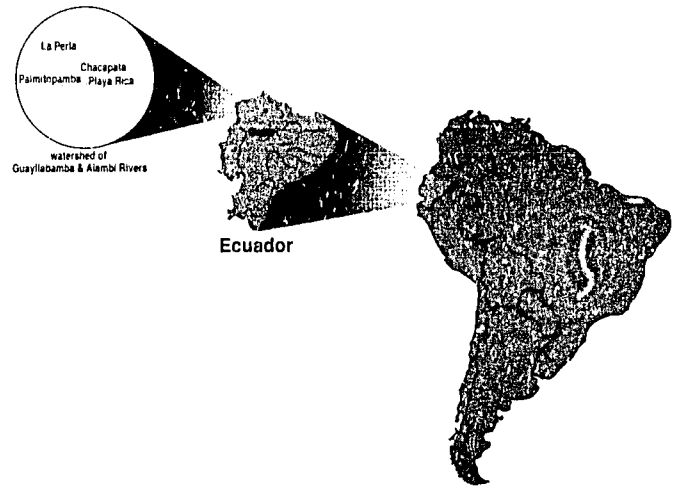
The research site for the SANREM Ecuador program is a 34,000 ha watershed within the Alambi River and Guayllabamba River basins in the buffer zone south of the Cotacachi-Cayapas Ecological Reserve, a major national park. The watershed is perched along the steep slopes of Ecuador's northwestern Andes mountains about 100 km from the capital city of Quito. This area is aptly situated in the middle of four nature reserves.

The Andean landscape, relatively dry and peppered by plots of corn, sugar cane, vegetable crops, eucalyptus trees, and scattered homes, changes as the road descends toward the coastal provinces. The mountain ridges in the protected reserves are still carpeted with a dense tropical cloud forest. But along the slopes and in the river valleys, the landscape is an agricultural patchwork. Villages have gathered along the wide terraces carved by the waters of the Guayllabamba River. In this region, the hillsides are a mix of scattered forests and crops where the slopes are steep, separated by wide expanses of crop and grazing lands on the high plains.

Lifescape

Attracted by employment opportunities and the favorable soil and climate conditions, settlers have been flowing into this region continuously for the last 100 years, in a drive to extend the agricultural frontier. The watershed, home to about 3000 people, is inhabited by a mixture of farmers from large hacienda owners to small-scale subsistence farmers to medium-sized sugar cane farms. Because of its accessibility to the markets of Quito, this region has been utilized for the production of sugar cane, fruit trees, and cattle. Crops are mainly grown close to town on clustered plots separated by living fences: a mosaic of banana and citrus groves, sugar cane fields, and family gardens growing cassava, plantain, yucca, sweet potato, maize, and beans. Further away from town, along the hillsides, the land is used for grazing cattle and the landscape is transformed into pastureland and forest.

The SANREM Ecuador program began in September 1994; the diagnostic phase is completed and implementation of research is about to begin.



"This is a great opportunity to have world level scientists in our community. With their very well detailed explanations based on their experiences in other countries, it helps us to reflect and realize the gifts our Nature gives us and also the risks we face if we do not take good care of Her."

-Resident of Cuellaje community,
participant in water quality monitoring workshops

Program Highlights-Ecuador

Autodiagnosticos—Community Self-Portraits

As the initiation of the SANREM Ecuador program, a series of community-led appraisals was held in the watershed. The leadership of COMUNIDEC, a host country NGO with extensive experience in the region, was enlisted, because they have devised an extremely successful model for working with communities. The 4 communities, or *comunas*, participating in the SANREM program are home to 280 families and 53% of them actively participated in the *autodiagnosticos*. Community members, or *comuneros*, gathered—men, women, and children—to reflect on their community, its social and ecological history, its social and political structure, the local environment and biodiversity, the pattern of community activities, family structure and livelihood strategies, environmental and resource problems and potential solutions. Collectively, the *comuneros* described their world through words, drawings, and diagrams.

The *comuneros* conceptualize the landscape in categories that were akin to agroecozones, such as the river, swamp, short cycle crops, long cycle crops, residential areas, home production areas, hilly and mountain lands, and bad (unusable) lands. *Comuneros* showed an extensive knowledge of the biodiversity in the area and a clear awareness of the ecological changes occurring around them. The *autodiagnosticos* were summarized and later validated at community assemblies. Information and issues raised were then developed into the Framework Plan which will serve as the guideline for the SANREM Ecuador program and for research work plans. The *autodiagnosticos* have also helped to establish the foundation for a trusting relationship with the comunas in the SANREM work zone.

Mosaic of Livelihood Strategies

As part of the initial assessment activities for the Ecuador program, Laura German, a graduate student under the direction of Robert Rhoades at UGA, conducted an inventory and rapid field appraisal of communities lying within the Guayllabamba River watershed. Through direct observation and discussions with local community members, her work identifies and categorizes settlement patterns, livelihood strategies, and production practices in the region. This detailed study shows how variation in agroecological zones, land use patterns, and socioeconomic levels all contribute to a great diversity in livelihood strategies and a stratified community structure. A classification scheme was devised to describe the distinct patterns in farm ownership and land management: large-scale haciendas with owners in residence or with absentee owners, subsistence farmers and small-scale cattle operations, medium-scale sugar cane operations, and small-scale business entrepreneurs. Each of these categories is correlated with distinctive patterns of land holdings, resource use, social status, political power, and environmental impact. In particular, the most severe land degradation occurred on large-scale haciendas with absentee owners and on small subsistence farms which are concentrated in more isolated regions and on marginal lands. Such a classification system enriches our understanding of the diversity and complexity of natural resource management patterns and provides an essential baseline of data to guide future research.

Priming Activities—A Bridge to Progress

To maintain the momentum of the SANREM Ecuador program until full implementation of proposed research projects, a constellation of priming activities has been initiated in the 4 communities of the watershed. These endeavors also provide additional information on the watershed to researchers. The priming activities stress equal participation of farmers and investigators in a mutual teaching-learning process and take place directly in the communities. Farmers participated in research in crop and livestock production practices and marketing systems currently in use in the region. This research reveals that farmers are at a disadvantage because of inadequate information on production and prices that affect farm management and family livelihood. Moreover evidence shows that the marketing system for farm products is almost completely in the hands of middlemen which allows for manipulation of supplies and prices in ways that are detrimental to producers.

Collaboration with SUBIR

The SANREM Ecuador research site is within the SUBIR project's area of interest. SUBIR, also funded by USAID Ecuador, is working on issues related to sustainable management in the Cotacachi-Cayapas Ecological Reserve, a major national park that borders the watershed to the north. A Memorandum of Understanding was signed between SUBIR and the SANREM CRSP outlining a collaborative program and detailing future projects and workshops to be conducted jointly. The proposed SANREM activities that are being considered for joint study with the SUBIR project are 1) environmental impact of *cabuya* processing, 2) biodiversity of the Cotacachi-Cayapas reserve boundary, and 3) feasibility assessment of lowland fish culture within the buffer zone of the bioreserve.

Volunteers Monitor Local Water Quality

Water quality monitoring workshops, facilitated by Bill Deutsch of Auburn University, were conducted to train 30 participants including community members, high school students of the Parish Seis de Julio de Cuellaje in the Province of Imbabura, students from USFQ, and *paratecnicos* and to provide these volunteer teams with monitoring skills and water quality testing equipment. During the workshops, mornings were spent in the classroom and afternoons were spent in nearby streams, demonstrating and practicing water quality monitoring techniques. Bilingual workbooks explaining the principles and methods for monitoring streams were distributed to the participants. The group has also developed 3 reference collections of stream invertebrates for use by monitoring teams. As part of the collaborative work with SUBIR, a stream monitoring program was designed in the Cristopamba River watershed to assess the impact on water quality of *cabuya* processing in the manufacture of the fiber, sisal. Fourteen additional sampling sites across the watershed were selected to monitor water quality in streams with and without cabuya processing. A plan for continued monitoring was developed with on-site SUBIR and SANREM personnel. The *paratecnicos* will sample all sites monthly and transmit the data to Auburn University.

Mapping the Landscape

One of the goals of the SANREM program is to characterize the biological, physical, and social aspects of each research site. The GIS research projects, led by Ian Flitcroft of UGA, is designed to gather and organize information describing the soils, topography, and land use of each site. The specific purpose of the GIS work is to create a set of digital (computer) maps depicting different parameters which can be overlain to reveal correlations. For example, by putting together maps of soil type, topography, and land use, a map of soil erosion potential can be created. This composite map is a powerful tool in developing a plan for improving natural resource management. The Ecuador site is an area of steep mountain slopes, and fast flowing rivers and streams. The pattern of agricultural activity is dominated by these land forms and the need for a detailed model of the topography is paramount. Through a close collaboration with the Ecuador partner, CDC, the GIS project has compieted the sizable task of assembling a very detailed Digital Elevation Model, a computer topographic map of the site at 10 meter resolution.

A weather station network also has been established across the watershed to gather baseline data, with farmers responsible for monitoring specific parameters. Rain gauges have been located on the grounds of local schools and will be read by teams of teachers and sixth grade students. This will promote distribution of the information to the community. Otherwise, the weather data is being disseminated to all interested groups and institutions, including the community, local governmental and non-governmental organizations, and researchers.

New & Ongoing Activities

- biodiversity survey in the buffer zone (SUBIR and SANREM)
- study on indicators of sustainability in the buffer zone (UGA & SUBIR)
- maintaining weather stations network and collection of daily weather data (UGA & CDC)
- aquaculture feasibility study (Auburn, SUBIR & USFQ)

C A P E

Landscape

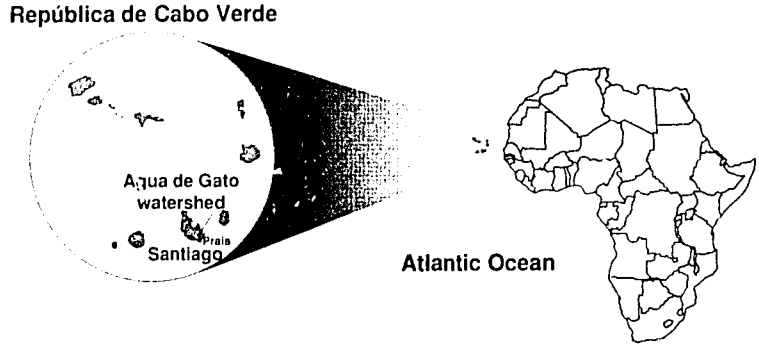
The Republic of Cape Verde is an island archipelago lying in a crescent in the Atlantic Ocean between the Tropic of Cancer and the Equator, 500 km off the coast of Dakar, Senegal, the westernmost point in continental Africa. The archipelago is volcanic in origin; it is a country made up of 10 islands and 8 islets.

The *Água de Gato* watershed, located in the south central part of the Island of Santiago, 18 km from the capital city of Praia, is the research site for the SANREM Cape Verde program. It has a rugged relief, with altitudes that vary between 350 and 750 masl, and extreme slopes that create abrupt transitions in the landscape. This varied relief is characterized by volcanic rock with steep, gravely hillsides and valleys of loamy-clay soils. The soils, affected by the climatic conditions of the region, are shallow, poor in organic matter and fertility, and extremely susceptible to erosion. Cape Verde endures perennial drought conditions. On the island of Santiago the annual rainfall between 1970 and 1980 varied from 31 mm (1.2 inches) to 1200 mm (47 inches), and 1994 brought only 150 mm (6 inches) of rain.

Lifescape

The *Água de Gato* watershed, comprising 350 hectares, is home to 177 families (about 1000 residents) making their livelihood through subsistence agriculture in the cultivation of maize, beans, peanuts, vegetables, fruit, and small-scale raising of livestock such as cattle, goats, chickens, pigs, and donkeys. A skewed land tenure system reserves the best lands to large landowners leaving small farmers as tenants who inherit the rights to only rent land. Agricultural production is limited by the irregularity of rainfall. Most families cultivate rainfed crops; less than a quarter of the community has the benefit of irrigation. Irrigated lands are mainly reserved for vegetable crops, fruit trees, and sugar cane, the predominant cash crop. The residents of *Água de Gato* have shown a desire to be active players in the development of long-term solutions for local problems and possess the community dynamics to implement such endeavors.

The SANREM Cape Verde program began in August 1994; research plans are now being finalized and implementation will begin in the near future.



"In the past, farmers did not have the chance to give their opinions and get training. Now people are convinced that the farmers' participation is different. Now farmers are participating in every workshop where they can give their point of view and exchange ideas about the activities that will take place in their community."

-Marla Fernanda Mendes,
a farmer representative on the
National Coordinating Committee

Program Highlights-Cape Verde

Cape Verde has a history of famines with tragic death tolls caused by frequent crop failures. Presently this condition is being mitigated by extensive food aid and other international intervention. In hopes of nurturing a more sustainable in-country program, the USAID mission in Praia contacted the SANREM CRSP in 1993 to seek the program's assistance in implementing the research component of the Cape Verde WARD project. The Cape Verde program stands apart from other SANREM programs in that it is bounded within a two-year agreement. We see this as a unique opportunity and challenge to implement the SANREM process, distilled to its essential elements, in a condensed time frame. The following description of the Cape Verde program serves as an illustration of the SANREM CRSP implementation process.

Watershed Identified for Research Program

After surveying a number of potential sites, the SANREM team selected the *Água de Gato* watershed as the research site for the Cape Verde program. This watershed was chosen because it represented a wide range of topographical conditions–from plains to pronounced slopes–with a diversity of land-use systems, and it has an urgent need for soil and water conservation. The residents of *Água de Gato*, through its community development association, *Associação do Desenvolvimento Communitário*, have demonstrated a willingness to participate with other institutions in the identification of the limits and potential of its resources. The community has shown a special enthusiasm for opportunities to study natural resource management methods through an integrated approach and a long-term perspective. The program is overseen by a US Project Coordinator and a Site Coordinator who resides in Cape Verde. A National Coordinating Council has been established as an in-country committee to oversee the planning and implementation of this project. Serving on the council are representatives from the Cape Verde partners, as well as 2 farmers' representatives from the watershed.

PLLA—Self-portrait of a Community

The Cape Verde program was formally launched with the community-led assessment, the Participatory Landscape/Lifescape Appraisal (PLLA). This community assessment provided a forum to the residents of *Água de Gato* to discuss the constraints which limit their livelihood strategies and the possible solutions they can implement to better manage their resources. It provided investigators an opportunity to gain a comprehensive understanding of the watershed and its inhabitants from the residents' perspective.

The PLLA teams were composed of 6 farmers from the watershed (3 men and 3 women) and 20 *técnicos* from collaborating Cape Verdean organizations: *Animação Rural*, ACDI, and the 3 Cape Verdean development institutions: INIDA, DGASP, and INERF. The PLLA was a significant occasion for this site given that researchers from the national development and research institutes had never worked collaboratively with farmers, or worked in either an interdisciplinary or inter-institutional team. Building on the experiences from SANREM's other sites, the PLLA team was first trained in participatory methodologies by facilitators from the US and Burkina Faso. Discussions amongst team members identified 7 major areas to be addressed during the community appraisal: agroclimatic conditions, soil resources, water resources, agro-silvo-pastoral production systems, agrarian systems, social/economic infrastructure, and health, nutrition, and food security.

All team members spoke Portuguese and most spoke *Crioulo*, the local language. The initial team was divided into smaller field groups. A core group of members from each team remained in the watershed throughout the whole activity so that they could interact more fully with the residents to develop a rapport and participate in the various cultural activities hosted by community members. The close contact with community members fostered communication between the *técnicos* and the farmers. Over 80 village residents participated closely in the community self-diagnosis.

The principal limitations directly affecting the population of the watershed are the continual lack of water and the shortage of energy sources, such as firewood, due to the almost complete depletion of forestry resources. Agricultural development is also constrained by the land tenure system in the watershed; the Catholic Church owns almost half of the 350 ha in the watershed with the remainder primarily divided amongst a few big land owners. Most other farmers remain renters or sharecroppers. On the final day of the appraisal, the team presented a summary of its findings to the community for comment and validation. The presentation ended with a watershed-wide dinner accompanied by local music and dance.

Framework Plan—A Blueprint For Sustainability

At each of the SANREM CRSP sites, the findings of the PLLA, the community-led assessment process, are used to generate a research agenda, the Framework Plan, which serves as an implementation guide directing the course of the host country program. Research priorities for the SANREM Cape Verde program were formulated at a Framework Plan Development Workshop which gathered 35 participants, including farmers from the community and representatives of collaborating research institutions and government agencies. The 4 areas identified as research priorities from the community appraisal are: agroclimatology and water, soils, agrosilvopastoral production systems, and the socio-economic situation. The expected results of the research program are: to improve water management and irrigation systems; to minimize soil erosion and improve soil fertility and water holding capacity; to improve food security and the socio-economic conditions in the watershed.

Workshops and Trainings

As with other SANREM programs, the Cape Verde program has been initiated through a series of workshops introducing the principles and cornerstones of the SANREM approach and offering training in participatory research methodologies.

Judith Killen, a writing consultant, facilitated a workshop on *Proposal Development and Marketing* to train potential Cape Verde research partners in developing work plans for the project. Thirty people participated, representing all WARD partners and other national organizations, which included researchers, NGO representatives, extension specialists, and members of farmer cooperatives. This workshop provided participants both essential training in the fundamentals of proposal writing and direct practical experience in order to help them become more effective in competing for international grants programs. During the workshop, participants asked for further training in project design and proposal development. Killen assisted INIDA staff in writing a proposal to be submitted to private foundations to provide an intensive English-training workshop in technical writing and to obtain materials to establish a reference library at the institute.

A *Participatory Monitoring and Evaluation Workshop* was held for both community members and scientists. Thirty-five participants attended, mainly from the WARD institutional partners, such as INIDA, DGASP, INERE, INC, *Animação Rural*, and the farmers' association from the watershed. This workshop provided participants the opportunity to identify measurable indicators which will be used to evaluate the progress of their individual research projects. It also offered training in the process of self-evaluation and in the establishment of an integrated, ongoing evaluation system to coordinate monitoring and reporting procedures amongst research projects.

Graduate Student Training

In the continuing effort to enrich host country resources, 4 students from Cape Verde were selected for placement within M.S. programs at US universities within the SANREM consortium. They began graduate training in September 1994 and have successfully completed their first academic year. The institutions participating include UGA, Auburn University, and VPI. Each student has developed a research proposal and returned to Cape Verde this summer to initiate field work and collect data in the *Água de Gato* watershed. Their projects focus on sustainable agriculture and natural resource management in the watershed and apply participatory methods working with farmers as full partners.

The research projects include analysis of opportunities and constraints to implementing integrated forestry and farming systems; assessment of nutrient status of rainfed crops under various manure fertilization schemes; effect on water use of crops under different cropping strategies; and comparison of traditional irrigation systems with new technologies in vegetable production. At the end of their studies, targeted for August 1996, these students are committed to return to INIDA and DGASP, the principle Cape Verde institutions for agricultural research and development, to continue working in collaboration with the local communities on resource management issues.

Program Highlights-Cape Verde

"After reading the SANREM brochure, I knew that Cape Verde was exactly what they had in mind. Plagued by an almost permanent drought and a tortuous landscape, the practice of agriculture and natural resources management in the islands is a continuous challenge."

-Dr. José Levy, president of the National Institute for Agricultural Research and Development (INIDA)

Landmark Alliance

Some of the fruits of participatory research are already being harvested in Cape Verde. Through their representatives on the SANREM Cape Verde National Coordination Council, the farmers of the *Água de Gato* watershed learned that DGASP was seeking a contractor to initiate an afforestation program in the region. The residents of the watershed had recently participated in the SANREM community self-diagnosis and this activity had reinforced their confidence that they could be equal partners in both research and development endeavors. The

farmers' association, *Associação do Desenvolvimento Communitário*, pursued and was awarded the contract. In addition, a second contract has since been awarded to the association for the construction of wells. This is an historic alliance; never before has a farmers' association in Cape Verde been delegated such responsibilities by a government agency. It is felt that the SANREM workshops and the PLLA experience have given both professionals and farmers an opportunity to view each other with a fresh sense of mutual respect and trust.

New & Ongoing Activities

- an analysis of economic incentives to promote conservation behavior (ACDI, INIDA, *Animação Rural*)
- study of fruit tree production in the watershed (INEA)
- study for the improvement of forage plant production (INIDA)
- study on the maximization and management of the natural & human resources in the watershed (INIDA)
- study of the impact of agro-forestry, water & soil conservation practices on agricultural production & soil erosion (DGASP)

Global Classroom, Local Lessons

In an effort to promote environmental awareness and conservation efforts among the future residents of the watershed, the SANREM CRSP Environmental Education Working Group has linked elementary school classes from across the globe. The 4th and 5th graders of the Vincencia Tavares school in the *Água de Gato* watershed have been corresponding with Mrs. Barbara Sinha's 4th grade class at the Margaret Beeks Elementary School in Blacksburg, Virginia. The project has blossomed into a close relationship between the students and offered many learning opportunities on both shores.

Mrs. Sinha has found it easy to incorporate the project into her curriculum; discussions about Cape Verde have been used as a vehicle to teach geology, geography, meteorology, social studies and environmental science. As part of an enrichment program to study the US colonial period, the students planted an herbal garden with culinary, medicinal, and fragrance herbs that colonialists would have used in their day-to-day life. This offered an additional alliance with the students in Cape Verde who have a garden in which they grow crops for their school lunch program. They also use many different herbs as medicine and sent samples as gifts to their US pen pals. The Cape Verde students have written to their new friends about their difficulties in maintaining the garden because of the lack of water and about life on an archipelago, in a land with a wet and dry season. In return they are learning about a land with four seasons, North American geography, and what 4th grade students in the US study. The students have also exchanged photographs. The two teachers are corresponding, too, and sharing their experiences; both have expressed great satisfaction and continued interest in the project. In particular, they are pleased that the project has offered their students the opportunity to learn directly and personally about people from other countries.

"It let us learn about other cultures... The best thing about it is we get to make friends, even though we don't get to meet them."

-Dylan,
4th grade student

"For many of the children in my fourth grade class, this was their first opportunity to have a pen-pal from another country. We found Cape Verde on the map and discussed its climate and culture. The islands' formation was especially interesting as we had studied geology earlier. Most interesting, though, were the pictures, herbs, and letters that the children sent us. The class was very excited to receive letters especially sent to individual students. Dylan, one of my students, said it was a way "to make new friends with some one you have never met." They also enjoyed seeing letters written in another language and signed by Celestina, Emanuel, and Fernando. Exotic names! From my perspective, I think it is always valuable for children to learn about people from other countries. Once a smiling face...a 'real' person...Celestina or Emanuel becomes a part of our lives....Cape Verde is not so different or so far away."

-Barbara Sinha,
4th grade teacher

COSTA RICA &

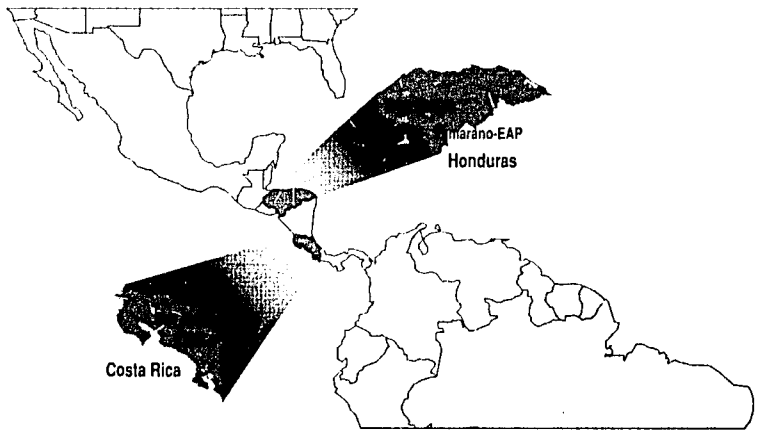
The SANREM CRSP activities in Costa Rica and Honduras are unique among our site programs. In these two Central American countries, the research activities are primarily through an institutional linkage with Escuela Agrícola Panamericana (Zamarano) and EARTH universities. Thus we do not directly have a network of research partners working within a specific watershed and community; our projects, partnerships, and trainings are funneled through these institutions.

EARTH University

ESCUELA DE AGRICULTURA
DE LA REGION TROPICAL HUMEDA
EARTH

Located in the heart of the Americas, in the lush tropical lowlands of Costa Rica, Escuela de Agricultura de la Region Tropical Humeda, or EARTH, is a unique international educational institution. EARTH's mission is to educate young Latin American leaders in sustainable agricultural development and responsible natural resource management for the humid tropics. It is committed to help provide long-term solutions to the complex environmental problems which threaten to destroy the rainforests. The college was established in 1986 through the support of the W. K. Kellogg Foundation, USAID, and a consortium of Latin American agricultural, educational, and governmental institutions. It offers a 4-year Bachelor of Science degree program in agricultural sciences and has facilities to accommodate 400 students who come from rural areas throughout Latin America. Through formal education, community outreach, and applied research, these students are offered a learning program that emphasizes a balance between agricultural production and resource conservation through a philosophy of "learning by doing."

In 1995, the SANREM CRSP and EARTH began a collaborative research project on sustainable agriculture and natural resource management as part of the curriculum for 3rd and 4th year students at the college.



Escuela Agricola Panamerica . . . . .

In the early 1940s, the vision held by a group of educators and scientists led to the transformation of a typical hacienda outside of Tegucigalpa, Honduras into an impressive educational program in tropical agriculture. This institution has blossomed into the Escuela Agrícola Panamericana (EAP). Zamarano, as it is nicknamed, is committed to providing an integrated agricultural education that trains the leaders that Latin America needs in sustainable development, tropical agriculture, agribusiness, natural resources management, and rural development. Its formal education programs include a broad course of study in a 3-year Agrónomo program, a more specialized and advanced Ingeniero Agrónomo program, and a Master of Professional Studies program cosponsored by Cornell University. These learning programs are based on the principles of Pan-Americanism, academic excellence, leadership development, and learning-by-doing. The college's 7000 ha educational farm provides resource management experience in a full range of agroecosystems, from valley floor to forested hillside to cloud forest. Reaching beyond its campus, Zamarano also places a strong commitment on community outreach activities throughout Latin America, including training and technical assistance, extension and consulting, applied research and publishing.

In 1995, the SANREM CRSP and Zamarano began a collaborative research project on sustainable agriculture and natural resource management as part of the curriculum of the Ingeniero Agrónomo program.

Program Highlights-Costa Rica

¿Como se dice Sustainability?

A diverse group of 30 participants gathered at EARTH to attend a SANREM workshop on indicators of sustainability. Indicators of sustainability are measurable conditions, such as water quality, soil quality, plant diversity, or social equity which can be used to evaluate the health and resiliency of an ecosystem or a community. The workshop served as a forum to evaluate the effectiveness of the community assessment, or PLLA, as a tool to identify indigenous and scientific indicators of sustainability. Individuals who had participated in the PLLA's in the Philippines, Burkina Faso, Ecuador, and Cape Verde programs gave an overview of the activities and outcomes of this diagnostic tool at their sites. This cross-site comparison provided an invaluable opportunity to share and document lessons learned from participatory research on sustainable resource management undertaken around the world.

This conference also offered participants a forum to develop terminology in Spanish for the SANREM CRSP core concepts and methodologies, based on the collective experience of site participants from Honduras, Ecuador and Costa Rica, as well as Spanish-speaking participants from US collaborating institutions. Finding that scientific language sometimes conflicts with cultural meanings, the group faced the intricacies of working across different cultures and struggled through the translation process reaching consensus on key issues, terminology, and methodologies.

Based on this workshop, and the subsequent PLLA in the nearby La Argentina watershed, a document entitled "PLLA and Indicators of Sustainability Tool Kit" was developed. This includes a set of training tools to teach participatory concepts and methodologies for developing scientific and indigenous indicators of sustainability. It will be used by EARTH students during internships in different communities throughout Latin America.

La Argentina Community Appraisal

The workshop on indicators of sustainability hosted by EARTH University also served as a forum to introduce the SANREM approach to faculty, students, and local community members. A community-led assessment, or PLLA, was undertaken in the neighboring La Argentina watershed (about 60 km from EARTH) to launch a collaborative research project on sustainable agriculture and natural resource management as part of the curriculum at EARTH. The PLLA helped to define indicators of sustainability themes for student research projects that are now being conducted in the community. A total of 8 research projects, with the participation of 22 students, is being initiated through this program.

Student Research—Learning by Doing

Undergraduate students, enrolled at EARTH, are implementing community-based participatory research projects in the neighboring La Argentina watershed which reflect the SANREM cornerstones and methodologies. Built on the information gathered from the La Argentina community assessment, these research plans were developed as course projects by senior-level students taking part in the innovative curriculum that has developed from the collaborative SANREM/EARTH program. EARTH researchers, in collaboration with scientists from Iowa State University and the University of Wisconsin, have provided technical and field support for these students. On-farm participatory research projects include: a study on phosphorous as an indicator of sustainability in different cropping systems; development of organic fertilizers suitable for medicinal plants and heart of palm production; water quality study in Dos Novillos River; evaluation of the nutrient requirements of medicinal plants; evaluation of biological indicators (soil invertebrates and weeds) to measure soil quality under different cropping practices; testing solar drier design and construction for medicinal plants; and a study of indigenous assessments of pasture quality.

Program Highlights-Honduras

Students Learn While Helping

Building on SANREM principles and methodologies, Zamarano has developed an innovative curriculum for the college's Ingeniero Agrónomo program. Interdisciplinary teams of student researchers are working collectively with local communities on participatory research projects to address sustainable agriculture and natural resource issues.

In the "Lempira Project," communities in northwest Honduras have been identified in which various forms of participatory rural appraisals have already been applied as part of on-going Zamarano extension work. Using the information generated from these community assessments, 4th year students are designing participatory research projects to identify and test indicators of sustainable resource use helpful to both scientists and indigenous communities. Student research projects planned within the La Lima community include: analysis of water usage in both domestic and agricultural activities, evaluation of the health and nutritional conditions, characterization of the agricultural (maize-bean) production systems, and a study of the role of women in the management of natural resources.

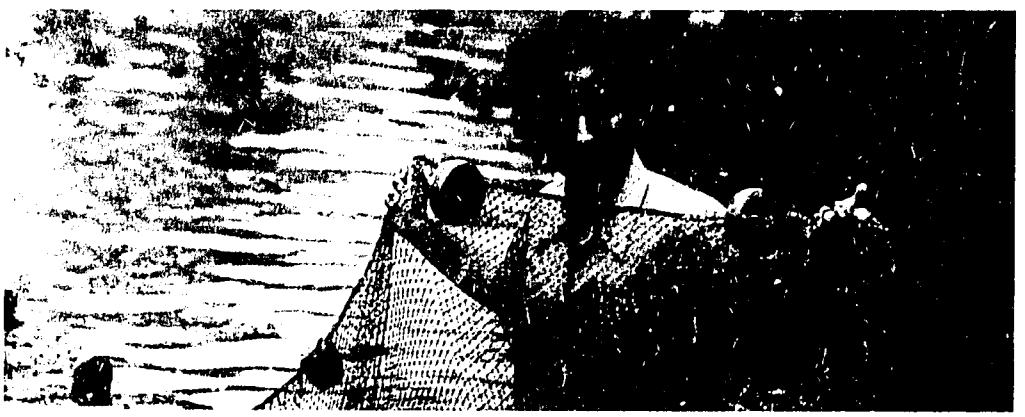
Watershed Surveying Made Easy

The development of indicators of sustainability requires the collection of baseline data in order to allow investigators to measure change in a specific condition.

There are few existing data sources presently available that supply adequate information for the management of small rural watersheds. These watersheds are predominantly the types of upland basins used as sources of potable water for remote rural communities. Addressing this need, Zamarano has undertaken research to acquire baseline data in order to monitor water supplies and water quality in these small rural watersheds.

A set of surveying techniques have been developed by Zamorano investigators to provide basic information on the physical characteristics of a watershed—determination of boundaries, water flow measurements, and land-use mapping. These techniques require no special skills and only simple equipment and have been tested in the field at Zamorano, and within the communities of La Lima and Candelaria with non-technical surveying teams. The techniques are currently being incorporated into an illustrated, Spanish-language manual which is designed to be used by community members with only basic reading and mathematical skills.

A series of workshops was hosted by Zamarano to train NGO *paratecnicos*, extension agents, community educators, and farmers in surveying techniques, mapping, and watershed management principles. This work is in collaboration with COCEPRADIL, an Honduran NGO which comprises a tightly-knit consortium of regional water committees working with 82 rural communities on potable water supply development and management, rural sanitation, and agricultural improvement.



Through collaborative projects with the SANREM CRSP, students at host country universities are gaining hands-on experience in participatory research methodologies. One of the projects designed by students at EARP is a study of the role of women in the management of natural resources.

GLOBAL ACTIVITIES

The environmental and resource issues addressed by the SANREM CRSP are not bounded by barriers of nationality, culture, geography, or climate.

Therefore, one of the overriding goals of the program is to step beyond the individual research projects at host-country sites by sponsoring regional and global activities that promote research on issues of sustainability, a broader information exchange, and increased educational and training opportunities. International conferences and regional trainings bring together diverse groups to learn from their common and varied experiences and increase people's understanding of global environmental issues. Individual training for both US and international students, who then return to their home countries, strengthens the capabilities and enriches the resources of institutions. In these ways, the SANREM CRSP hopes to multiply its impacts and foster truly self-sustaining changes.

Lower photo: Participation personified—Researchers and community volunteers from water quality monitoring programs across the globe gathered together in Alabama, June 1995. Left to right: Bill Deutsch (Auburn Univ.), Allison Busby (Alabama Water Watch), Janet Deutsch, Dick Bronson (Pres., Lake Martin Lake Watch), Marianne Bronson, Jim Orprecio (IIPI/Philippines), Hugo Valdebenito (USFQ, SANREM Ecuador NCC Chair), Ananias (Jojo) Altomera (President, Tigbantay Wabig, SANREM Philippine Water Watch).

TRAINING

Long-term Training— Graduate Students

Training students through hands-on participatory research in sustainable natural resource management sows seeds of change throughout the world. This investment in human resources is essential to cultivating long-term, institutional change. Twenty-three full-time and 14 part-time Ph.D. and M.S. students representing 12 countries have been involved in conducting research at all the SANREM CRSP sites. Additionally, the program has enhanced undergraduate training through the support of 9 senior thesis projects applying participatory research methods by students representing 7 Latin American countries at EARTH and Zamarano universities. An undergraduate student exchange program has also been established between EARTH University, UGA, and the University of Wisconsin. In addition, the SANREM CRSP offered an educational module in international agricultural and natural resource issues to 4 US high school minority students during a summer program in agricultural research.

Short-term Training— Workshops

A workshop on *The Role of Geographic Information Systems in Developing and Transferring Sustainable Agriculture Technologies in the Tropics* was held at the Asian Institute of Technology in Bangkok, Thailand, from February 20 to March 7, 1995 and was attended by an enthusiastic group of 28 people from a dozen Southeast Asian countries. The participants, few of whom had any previous GIS experience, received training in the theoretical aspects of GIS as well in the computer skills required to use the methodology. These skills were applied in analyzing data sets brought by each participant from their respective countries. The SANREM CRSP collaborated with other international programs and centers, such as ICRISAT and IRRI in sponsoring this event, with the additional contributions of AVRDC, ICRAF, and NASA.

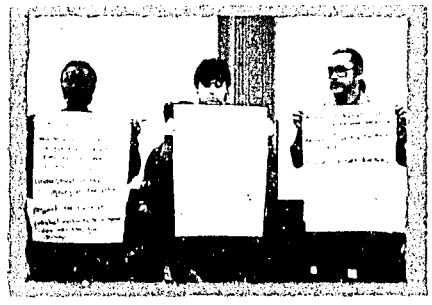
A Different View of the World

Margery Sendze is a young woman from Cameroon who has recently completed a Masters Degree in Journalism at UGA. Her participation in a SANREM CRSP project in Burkina Faso enabled her to gain not only valuable professional experience but also a new outlook on the purpose of her work. In her own words:

"When I first went to Burkina Faso with the SANREM CRSP, what I really wanted was a good story to write up and I was hoping the farmers would cooperate and I would get what I needed for my work. After living in the village and getting to know people, I became more concerned about how the work we came there to do would benefit them, I wanted to be able to leave something behind that had a positive impact on their everyday life. When we left I knew we did, we had provided an opportunity for people to be truly involved in the project and we all learned something together. It made me feel very good inside."

Workshops & Conferences

Building on the momentum from the 1994 e-mail conference, a *Conference and Workshop on Indicators of Sustainability* was held in Rosslyn, VA, from July 29 to August 5, 1994. It brought together about 100 experts representing 76 organizations, including the World Bank, USAID, IFPRI, FAO, UNDP, and SANREM. During the conference 26 speakers and 23 poster presenters shared experiences and perspectives on sustainability issues from a range of scientific disciplines and relevant to a variety of ecological and sociocultural settings. The workshop provided a forum for the development of guidelines for the identification, assessment, and testing of indicators that build on local knowledge and conditions but also allow for cross-site comparison. A handbook outlining the guidelines is being finalized.



A SANREM CRSP sponsored meeting entitled *Towards Sustainability Revisited* was held in Atlanta, GA on Sept. 29-30, 1994. It brought together representatives of USAID, NAS, universities, and NGOs to discuss the evolution of the concept of sustainable agriculture since the publication of the 1989 NRC report "Towards Sustainability". The document guided the development of current USAID programs, including the SANREM CRSP. The meeting aimed at identifying any new ideas which should be incorporated into program objectives and offered the opportunity to report on and assess the progress of the SANREM CRSP program. The panel endorsed the program's commitment to a collaborative, participatory approach, anticipating its cost-effectiveness in the long-run.

A *Workshop on Participatory Collaborative Research Methodologies* took place at Tuskegee University in Tuskegee, AL, on June 27-30, 1995. The event was jointly organized by the PVO University Center and the End-User Gender Working Group. It gathered about 70 people from 18 countries in a highly interactive program that enabled them to share perspectives from a variety of fields of participatory practice, including agricultural and natural resource management, community development, health and disability issues, and urban research. The gathering provided an opportunity for a fruitful comparison and integration of US-focused and international experiences and for the identification of and reflection on common dilemmas, such as how to assess levels of participation, how to ensure true representation, and how to engage in the research process in ways that are acceptable to both scientific circles and local communities.

"This differed from other meetings because it was more participatory, there was an open sharing of experiences, it was not just academic. It stressed practical experience. It was not just an elite group of scientists talking to the rest of us practitioners, but there was mutual sharing, where everyone was at the same level. There was a sense of learning from experience. I thought there was an excellent atmosphere, a genuine interest, among a diversity of people, all concerned about the same issues, that is you genuinely involve people in solving problems they face."

-Jim DeVries, HPI
(*Workshop on Participatory Collaborative Research Methodologies*, Tuskegee University)

Global Monitoring & Evaluation

The SANREM CRSP is an ambitious and long-term program. An extensive documentation protocol is necessary to successfully manage and monitor its world-wide array of research projects. In the program, reporting is viewed as a tool for self-improvement, rather than as an institutional requirement by our donor organization. The Global Monitoring and Evaluation committee was formed to oversee technical reporting, process documentation, and participatory monitoring and evaluation. The committee has devised a new quarterly reporting system which better addresses the documentation of process, accomplishments, and impacts for each of our research projects. In addition, an evaluation staff person has now been hired at each site to supervise monitoring and help work plan partners with reporting requirements.

To monitor both short-term accomplishments and long-term changes, the program has adopted a classification system to recognize and document impacts and progress toward impacts. Hierarchical classification identifies accomplishments as progressive steps toward impacts. These stages are: 1) changes in people's involvement and reaction; 2) changes in knowledge, attitudes, skills, or aspirations; and 3) changes in practice, including adoption of the SANREM CRSP methodologies.

Since the SANREM CRSP is attempting to implement innovative methodologies in its approach to research, documentation of the process is of utmost importance. Issues such as participation, partnership, opportunities, impacts, insights, points of weakness and strength, and lessons learned must be documented. Process documentation allows for regular reflection on the working process and highlights lessons learned which can be built upon to improve future endeavors.

Workshops on self-monitoring and evaluation bring together work plan partners from research, government, NGOs, and communities. These trainings provide participants with the tools to monitor the progress and assess the impacts of their research activities. This helps all stakeholders in the program to first identify their expectations and then to develop measurable and meaningful indicators of success which will allow them to assess their progress toward those goals. This process enables participants to systematize their experience, reflect on and evaluate results, and then plan for future opportunities.

Workshops

Self-monitoring and evaluation are an integral part of the participatory approach to research. A *Participatory Monitoring and Evaluation Workshop*, held in the Philippines on November 9-12, 1994, brought together 28 participants representing various work plans and communities involved in the SANREM Philippines program to discuss and define systematic monitoring procedures. A set of indicators was agreed upon to evaluate the progress of research projects in attaining both the objectives and impacts of program activities. The event was facilitated by Jennifer Shumaker and Jerry Aaker of HPI.

A *Work Plan Integration and Monitoring and Evaluation Workshop* was held in Ouagadougou, Burkina Faso, on May 15-19, 1995 and was facilitated by Jim Rugh of Community Based Evaluations. The objective of the workshop was to integrate research activities and establish a systematic procedure for participatory monitoring and evaluation. About 85 participants, representing the various work plans, research institutions, USAID, NGOs, and the Donsin community, attended a plenary session devoted to presentation and discussion of the data requirements and specific objectives of each research project. A field trip brought all attending Burkinabe and US work plan leaders to Donsin to present their plans to the community and listen to their suggestions for the relevant indicators of progress and impact. Researchers also worked together to develop a coordinated schedule for field work and a common questionnaire that will enable them to obtain needed baseline data without duplicating efforts and taxing villagers' time and patience.

External Evaluation Panel

An External Evaluation Panel (EEP) review of the SANREM CRSP took place in December 1994 as part of a mid-term evaluation process. The panel, composed of Les Swindale of ICRISAT, Susanna Hecht of UC, Robert Herdt of the Rockefeller Foundation, and Thurman Grove of NCSU, held a series of meetings with representatives of the SANREM CRSP management team, partner institutions, and working groups. A team from the EEP traveled to the Philippines for an on-site visit and evaluation of activities and research currently being implemented. Based on their findings, the EEP made recommendations for streamlining organizational structure and procedures and strengthening the program's ability to meet its research objectives and deliver high quality scientific data. These recommendations are being incorporated into this year's program and future plans.

COMMUNICATIONS PROGRAM

The SANREM CRSP is now coordinating research projects in Central and South America, Southeast Asia, and Africa with a consortium of investigators that includes universities throughout North America. Clearly, communications is vital to the success of this program. Our methodology adds an additional dimension to our information exchange and educational needs. An international research program based on equal participation of local people from a wide variety of cultures, host country institutions, and researchers from many disciplines gathers together a diverse audience and requires us to develop a full repertoire of communication and educational tools.

In order to successfully meet this need, the SANREM CRSP commissioned the development of strategic plans for communication and outreach programs from Manning Selvage and Lee, a private public relations firm in Atlanta, and from a class of graduate students in public relations at the College of Journalism, UGA. Both consulting teams advised the program to develop a full-fledged Information and Communications Office. This year, the SANREM CRSP Management Office hired a Communications Coordinator to improve the program's educational and outreach activities, publications, and internal reports. The SANREM CRSP communications program now includes a wide array of publications.

LAST Update is a quarterly newsletter produced by the Communications Office that reports on the world-wide network of SANREM activities. This publication contains articles to update a broad readership on current SANREM research projects and results, recent conferences, sustainability and resource management issues, as well as invited editorials. It is written for a diverse audience from our researchers to the general public.

SANREM e-mail News is a bimonthly electronic supplement produced by the Communications Office that provides up-to-date summaries of SANREM activities and travel plans of researchers going to the research sites.

Ecolinks is a semi-annual newsletter produced by the PVO University Center that contains in-depth articles on SANREM site and global activities. It is written in a non-technical, popular style appropriate for its diverse audience of field-level collaborators, such as development workers, community-based grassroots groups, NGOs, and other host country partners. The newsletter is translated into French and Spanish for our African and Latin American sites.

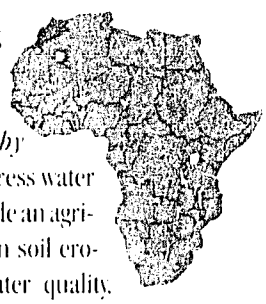
In light of our foundation in the farmer-back-to farmer model, site newsletters are now produced by SANREM Site Coordinators in the Philippines and Ecuador to maintain host country and local community communications.

Our quarterly and annual reports compiled and produced by the Communications Office provide an exhaustive documentation on every stage of the SANREM CRSP process as it unfolds both locally and globally. This material is a valuable resource for future efforts that seek to replicate the program's innovative approach and methodologies.

Numerous other publications projects are planned to further diversify our communications and education efforts, so that we may better reach a broader audience in both the US and our host countries.

New Opportunities

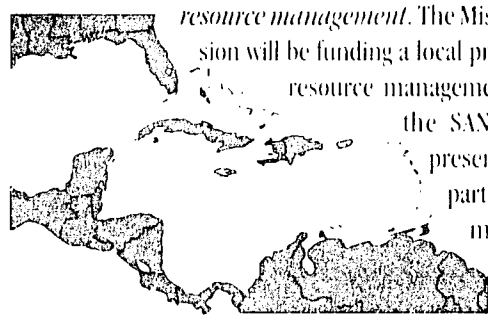
As we complete three years of work in implementing our "core" sites, we also face new and exciting opportunities for growth and for leveraging additional support. We are actively engaged in *a regional natural resource management program in West Africa* which brings together all USAID-funded CRSPs with operations in West Africa. This "Inter-CRSP" collaboration is aimed at enhancing technology development and transfer for improved natural resource management in the Sahel. A workshop is to be held in Niamey, Niger, 18-22 September, 1995 to plan the strategy. Support is being provided by USAID Niger and the Africa Bureau.



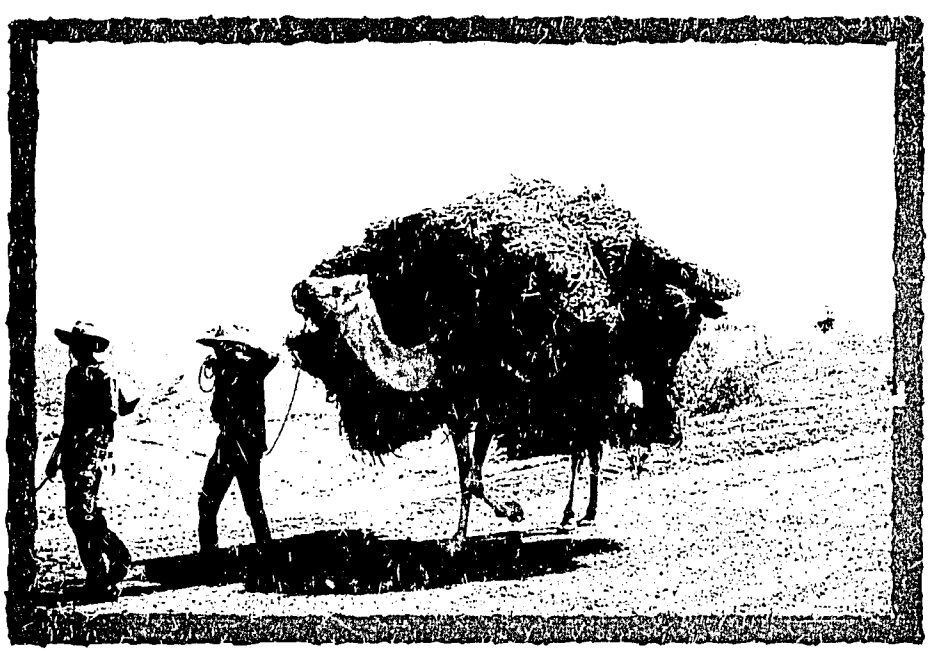
We are also working on building collaboration to participate in a large program entitled *"Water Resources Sustainability" funded by USAID/Morocco*. The project will address water issues from many sectors. It will include an agricultural component that will focus on soil erosion control to improve surface water quality, which offers an excellent opportunity for collaboration with the SANREM CRSP. We have developed linkages with Moroccan institutions and are building relationships with various U.S. organizations interested in participating in the project. A "Request for Proposals" for the project will be available in Fall 1995.

We have been invited by USAID Peru to make a presentation about the SANREM CRSP and initiate discussions with local NGOs opportunities for *participatory watershed management in Peru*. This could lead to a small-scale activity in this country.

We were invited recently by USAID Haiti to visit several government agencies in *Haiti* to discuss *participatory approaches to natural resource management*. The Mission will be funding a local project in natural resource management and wanted the SANREM CRSP to present the benefits of participatory methodologies to the collaborating agencies. The relationships developed could lead to the participation of the SANREM CRSP in the project when it is implemented.



All of these opportunities and requests point to a vigorous and healthy program with a reputation of having "something to offer" to development programs around the world.



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Itong, R. "Local and Scientific Knowledge of Insects and Diseases in the Upper Manupali: Report of a Workshop." The Exchange (IIPI quarterly newsletter), forthcoming.

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PRESENTATIONS

Balakrishnan, R. et al. "Analysis of Gender Differences in User Collaborative Participatory Research." Paper presented at the Workshop on Participatory Collaborative Research Methodologies, Tuskegee University, Tuskegee, Alabama, June 26-30, 1995.

Banaynal, R. "Community Participatory Action for Resource Management." Paper prepared for the Alternative to Slash and Burn Regional Planning Workshop, Bogor, Indonesia, June 5-9, 1995 and presented at the Mindanao Advisory Council Meeting and Workshop of the Foundation for Philippine Eagle (FPE), Cagayan de Oro City, Philippines, June 15-17, 1995.

Bonner, J. and J., Lewis. "Participatory Approach to Sustainable Agriculture and Natural Resource Management in the Subtropics." Poster presentation at the AAAS Annual Meetings, Atlanta, Georgia, February 16-20, 1995.

Buenavista, G., I. Coxhead, W. Deutsch, C. Flora, C. Neely, V. Nazarea, and L. West. "Integrating Biological and Social Scientists for Sustainability in the Tropics" an Interdisciplinary Symposium presented at the Annual Meeting of the American Society of Agronomy, Seattle, Oregon, November 14, 1994.

Dar, W. and T. Pajaro. "Watershed Case Study: Philippines." Paper presented at the Workshop on the Role of GIS in Developing and Transferring Sustainable Agriculture Technologies in the Tropics, Bangkok, Thailand, February 20-March 7, 1995.

Deutsch, W. and A. Altomera. "A SANREM Experience: The Community-Based Water Quality Monitoring and Education Program in Lantapan, Bukidnon Province, Philippines." Paper presented at the Workshop on Participatory Collaborative Research Methodologies, Tuskegee University, Tuskegee, Alabama, June 26-30, 1995.

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Hargrove, W. "Challenge of Sustainability: an Agricultural Scientist's Viewpoint on the Problems of 'Scaling up'." Paper presented at the Conference on Agroecosystems, Southern Extension and Experiment Station Directors, Pinehurst, North Carolina, April 5-6, 1995.

Mabbayu, P. and L. Sareno. "Priming Project of SANREM CRSP/Philippines: a Participatory and Systems Approach towards the Design and Implementation of Sustainable Farm Options." Paper presented at the Asia Farming Systems Association Symposium, Manila, Philippines, November 1-10, 1994.

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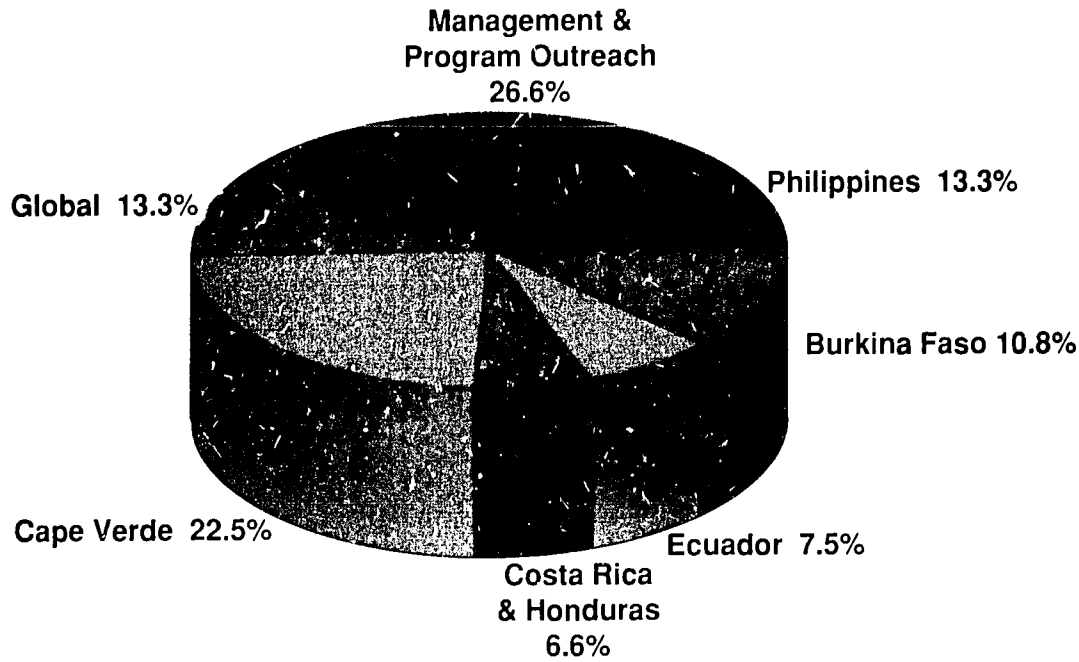
Prain, G. "Landscape and Lifescape Approaches to Sustainable Agriculture and Natural Resource Management." Paper presented at the Farming System Commodity Program Review, PCARRD, Los Baños, Laguna, Philippines, 21-22, 1995.

Serrano, R. "PCARRD Experience in Linking with Local Government Units: Focus on SANREM CRSP/Philippines." Paper presented at the Workshop on Local Government Units, National Agriculture and Resource Research and Development Network Linkage, PCARRD, Los Baños, Laguna, Philippines, May 3, 1995.

Serrano, R. "The Sustainable Agriculture and National Resource Management Collaborative Research Support Program (SANREM CRSP) and Use of Indicators of Sustainability." Paper presented at the Expert Consultation on NARS Vision towards Future Challenges and Opportunities for Sustained and Enhanced Productivity and Food Security in the Asia Region, PCARRD, Los Baños, Laguna, Philippines, November 22-24, 1995.

Silva-Barbeau, I. "Human Nutrition Issues: Links to Sustainable Agriculture and Natural Resource Management Policy." Paper presented at the Conference on Innovations and Partnership: Working with Natural Resource Management, Gender, and Local Communities in the Tropics. Gainesville, Florida, March 30-April 1, 1995.

FINANCIAL SUMMARY



YEAR 3 FUNDING ALLOCATION BY SITE

Management & Program Outreach	741,059
Philippines	369,932
Burkina Faso	300,625
Ecuador	209,771
Costa Rica and Honduras	183,628
Cape Verde	627,269
Global	$353,139
	2,785,423

Management & Program Outreach: The activities of the Management Entity, Board of Directors, Global Technical Committee and External Evaluation Panel, with additional activities such as Information Outreach, Field Mission Support, Training Workshops and Conferences for cross-cutting issues represented 26% of SANREM CRSP funding in Year 3.

Philippines: Costs associated with site logistics and field research participatory projects represented 13.3% of SANREM CRSP funds in Year 3.

Burkina Faso: Costs associated with site logistics and training in participatory methodologies represented 10.8% of SANREM CRSP funds in Year 3.

Ecuador, Costa Rica and Honduras: Costs associated with start-up site logistics and training in participatory methodologies represented 7.5% and 6.6%, respectively, of SANREM CRSP funds in Year 3.

Cape Verde: In Year 3, SANREM CRSP received a buy-in from the USAID mission in Cape Verde to implement a project for training in research and development. Costs associated with these activities represented 22.5% of SANREM CRSP funds.

Global: 12.7% of SANREM CRSP funds were allocated to the US institutions for assistance in conducting research at the host country sites in Year 3.

Committee Memberships

BOARD OF DIRECTORS

Gerald Arkin	UGA
James Bonner	USAID
S. K. DeDatta	VPI
Dennis Garrity	ICRAF
Robert Gurevich	PVO Center (Chair)
William Hargrove	UGA
Suchet Louis	Tuskegee U.
Constance Neely	UGA
NITIEMA Ambroise	PPI
Ken Shapiro	U. Wisconsin
Eduardo Sotomayor	HPI

GLOBAL TECHNICAL COMMITTEE

James Bonner	USAID
Walt Butcher	Washington State U.
Ron Carroll	UGA
William Dar	PCARRD
Bill Deutsch	Auburn U.
Jim DeVries	HPI
Cornelia Flora	Iowa State U. (Chair)
William Hargrove	UGA
Ed Kanemasu	UGA
José Levy	INIDA
Kevin McSweeney	U. Wisconsin
David Midmore	AVRDC
Ralph Montee	PVO Center
Constance Neely	UGA
NGANDU Mudiayi	Tuskegee U.
Jess Reed	U. Wisconsin
Robert Rhoades	UGA
SEREME Paco	INERA
Irma Silva-Barbeau	Silva Associates, Inc.
David Swift	Colorado State U.
Hugo Valdebenito	USFQ

SITE FACILITATORS

Bill Deutsch	Philippines
Kevin McSweeney	Costa Rica Honduras
NGANDU Mudiayi	Burkina Faso
Robert Rhoades	Ecuador
Irma Silva-Barbeau	Cape Verde

SITE COORDINATORS

Hector Ballesteros	SANREM Ecuador
Gladys Buenavista	SANREM Philippines
Dennis del Castillo	SANREM Cape Verde
Michael Lee	SANREM Honduras, EAP
MILLOGO Laurent	SANREM Burkina Faso
B. K. Singh	SANREM Costa Rica, EARTH

EXTERNAL EVALUATION PANEL

Thurman Grove	No. Carolina State U.
Susanna Hecht	U. California
Robert Herdt	Rockefeller Foundation
Leslie Swindale	ICRISAT (Chair)

BURKINA FASO NCC

OUSMANE Idrissa	U. Ouagadougou, IDR
HIMA Seydo	Farmer CAC
Christian Lefebvre	PPI
MILLOGO Laurent	SANREM Burkina Faso
NITIEMA Ambroise	PPI
OUADBA Jean-Marie	IRBET
SAWADOGO Daouda	Préfet de Boulsa
SEREME Paco	INERA (Chair)
YODA Lucien	SPET Boulsa

BURKINA FASO CAC

HIMA Seydou	Farmer(Chair)
HIMA Soumaïla	Farmer
SAWADOGO Boukaré	Farmer
SAWADOGO Safiata	Farmer, Human Nutrition
SAWADOGO Salamata	Farmer, Human Nutrition
ZABRE Kouka	Farmer
ZIDOUEMBA Hado	Farmer, Forestry
ZIDOUEMBA Salam	Farmer, Animal Science

CAPE VERDE NCC

Dennis del Castillo	SANREM Cape Verde
João de Deus Fonseca	DGASP
Steve Dosh	USAID
Tom Gardiner	ACDI
José Levy	INIDA (Chair)
João O. Mendes	INIDA
Maria F. F. Mendes	Farmers' Association
Emanuel Pereira	DGASP
Flugencio L. Tavares	Farmers' Association

ECUADOR NCC

Carlos Ayala	Farmers' Representative
Hector Ballesteros	SANREM Ecuador
Fernando Larrea	HPI
Juan Pablo Muñoz	Terra Nueva
Luis Penaherrera	UCE y Zootecnia
Galo Ramón Valarezo	COMUNIDEC
Arsenio Recalde	Farmers' Representative
Jorge Recharte	FLACSO
Xavier Silva	CDC
Eduardo Sotomayor	HPI
Hugo Valdebenito	USFQ (Chair)

PHILIPPINES NCC

Ronelo Alvarez	DILG
Romy Banaynal	NECI
Gladys Buenavista	SANREM Philippines
William Dar	PCARRD (Chair)
Angelo Josue	CMU
Jim Orprecio	HPI
Teddy Pajaro	Mayor of Lantapan
Lealyn Ramos	DA, NOMIARC
Greg Reyes	DNR
Agnes Rola	UPLB
Rogelio Serrano	PCARRD
V. Pal Singh	IRRI
Tony Sumbalan	Office of the Governor
Glicerio Tan	SHMSI
Mariliza Ticsay-Ruscoe	UPLB

PHILIPPINES CAC

Ronelo Alvarez	DILG (Chair)
Alfredo Anudon	Igorot Tribal Sector
Recto Canda	Vegetable Farmer Sector
Ernie Devibar	Youth Sector
Jeremias Endrina	Barangay Council
Ireneo Endrina	Religious Sector
Conrado Gunayan	Farmers' Sector
Hermie Nalzaro	Farmers' Federation
Judith Pensahan	Health Worker Sector
Felix Ponferrada	Cooperative Sector
Ermilinda Rivas	Business Sector
Victoria Rubin	Women Sector
Teofilo Sabaon	Tala-andig Tribal Sector
Adolino Saway	Tala-andig Tribal Sector
Ellie Yam-oc	Education Sector
Olympia Zaportiza	Rural Womens' Sector

ACRONYMS

ACDI	Agricultural Cooperative Development International
AFTA	ASEAN Free Trade Area
AVRDC	Asian Vegetable Research and Development Center
BDC	Barangay Development Council
BSWM	Bureau of Soil and Water Management
CAC	Community Advisory Council
CDC	Centro de Datos para la Conservacion
CIP	International Potato Center
CIP/UPWARD	International Potato Center/User's Perspective with Agricultural Research and Development
CMU	Central Mindanao University
COCEPRADIL	Central Committee Pro-Water and the Integrated Development of Lempira
COMUNIDEC	Sistemas de Investigacion y Desarrollo Comunitario
CRSP	Collaborative Research Support Program (USAID)
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DGASP	Directorate General for Agriculture, Silviculture, & Animal Husbandry
DILG	Department of Internal and Local Governments
DNR	Department of Natural Resources
EAP	Escuela Agricola Panamerica - Zamorano
EARTH	Escuela de Agricultura de la Region Tropical Humeda
EEP	External Evaluation Panel
EPA	Environmental Protection Agency (USA)
FAO	Foreign Agriculture Organization
FLACSO	Facultad Latinoamericana de Ciencias Sociales
FPE	Foundation for the Philippine Eagle
GATT	General Agreement on Tariffs and Trade
GIS	Geographic Information Service
HPI	Heifer Project International
HRM	(Center for) Holistic Resource Management
ICRAF	International Council for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDR	Institute for Rural Development
IFPRI	International Food Policy Research Institute
INC	Instituto National das Cooperativos
INERA	Institute for Agricultural Research and Study
INERF	National Institute for Rural Engineering and Forestry
INFA	Instituto Nacional do Fomento Agro-Pecuávio
INIDA	National Institute for Agricultural Research and Development
IPM	Integrated Pest Management
IRBET	Institute for Tropical Ecology and Biology Research
IRRI	International Rice Research Institute
masl	meters above sea level
MSU	Mindanao State University
NAPACOR	National Power Company
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NCC	National Coordinating Council
NCSU	North Carolina State University
NECI	Network for Environment Concerns, Incorporated
NGO	Non-Governmental Organization
NOMIARC	Northern Mindanao Agriculture Research Center
NRC	National Research Council
PCARRD	Philippine Council for Agriculture, Forestry, and Natural Resource Research and Development
PLLA	Participatory Landscape-Lifescape Appr usal
PPI	Plan International (Planned Parenthood International)
PVO University Center	Center for PVO University Collaboration in Development
RFP	Request for Proposals
RIMCU	Research in Mindanao Culture
SANREM CRSP	Sustainable Agriculture and Natural Resource Management Collaborative Research Su; rt Program
SHAISI	San Herminiglido Agro-Industrial School Foundation
SPET	Ministry of Environment and Tourism
SUBIR	Sustainable Utilization of Biological Resources
TPS	True Potato Seed
UCE	Universidad Central de Ecuador
UGA	University of Georgia
UNDP	United Nations Development Program
UPLB	University of the Philippines at Los Baños
UPWARD	User's Perspective with Agricultural Research and Development
USAID	United States Agency for International Development
USFQ	Universidad San Francisco de Quito
VPI	Virginia Polytechnic Institute and State University
WARD	Watershed and Applied Research Development Project
WCU	Western Carolina University
WSU	Washington State University