

The SANREM Innovation Lab uses science to improve the livelihoods and food security of small farmers in the developing world.



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LETTER FROM THE DIRECTOR

SANREM closes its doors but leaves behind a legacy

As SANREM comes to a close after many fruitful years of research, education, capacity building, and innovation, we are entering a period of reflection and celebration. Over the years, many farmers, students, technicians, researchers, administrators, and other stakeholders have contributed to SANREM's success. Now it is time to recognize SANREM's achievements and thank those who have helped make all our efforts possible.

In May, the SANREM community gathered in Arlington, VA to present program findings and discuss lessons learned. The meeting was enhanced by the cheerful presence of two SANREM-collaborating farmers from Mozambique and the invigorating contribution of the SANREM-funded graduate students who brought high-quality posters that made it very difficult for judges to decide on contest awards.

In June, the 20th anniversary of SANREM in the Philippines was celebrated in beautiful Mindanao. The first SANREM experimental sites were established in 1994 in the Manupali River watershed. As Dr. Constance Neely, former SANREM acting director, mentioned in her speech in Arlington, "SANREM did landscape-level studies before landscape studies were cool."

SANREM has always been open to new initiatives and partnerships. For example, SANREM has teamed with the HORT Innovation Lab to develop a project with women in Siem Reap, Cambodia to grow vegetables with low-cost irrigation and conservation agriculture practices. The original group of 15 women has grown to 46 and is now marketing the vegetables using their own label.

In Ecuador, SANREM has joined forces with

the IPM Innovation Lab to apply conservation agriculture and biological control practices such as reduced tillage, native shrub strips, and Trichoderma and Pseudomonas seed treatments, as well as varieties with horizontal resistance, to benefit potato farmers. Results show that potato yields increased 10%, tuber damage decreased 17%, and net benefit increased 72% with the combined practices.

Numbers for SANREM Phase IV indicate that more than 100 students were supported, over 20,000 farmers and other stakeholders were trained, and in excess of 350 field experiments were conducted—among other activities—in 13 countries.



One of SANREM's main accomplishments has been the design and adaptation of numerous cropping systems that are biophysically suitable, economically feasible, and socially acceptable for site-specific conditions in the focus areas. Indicators and statistics are important, but the legacy of

SANREM will transcend them and endure in the people and farming systems that were touched by the program.

For me, it has been a pleasure and a privilege to share the journey with so many great people who have been part of the SANREM community. All of them, and USAID for the financial support, deserve the credit for the altruistic, passionate, and professionally competent work which has benefited many smallholders in disadvantageous regions of the world.

Kind regards,
Adrian Ares
Director

Feed the Future SANREM Innovation Lab



GLOBAL NEWS



SANREM Innovation Lab works in a wide variety of countries. Recent developments in these nations, especially those that concern international development initiatives, are summarized below:

GLOBAL: Recently released, the Soil Atlas of Africa is meant to raise awareness of the need for improved protection and sustainable management of soil resources in Africa. This will be a comprehensive knowledge base for agriculture professionals, born out of a partnership between the European Union, the African Union, and the FAO.

ECUADOR: In December 2013, the Mission Director for USAID in Ecuador told partners that they would cease working in the country in September of this year. This decision comes from strained ties between the United States and the Ecuadorian government.

GHANA: In April, USAID Ghana released the Indoor Residual Spraying (IRS) program to prevent malaria. The IRS campaign will spray more than 216,000 structures during the 2014 campaign season, starting in the Bunkpurugu-Yunyoo, East Mamprusi, Savelugu-Nanton, and West Mamprusi districts in northern Ghana, protecting nearly 570,000 residents from malaria.

MOZAMBIQUE: The government of Mozambique and the IMF (International Monetary Fund) co-hosted a prominent conference called "Africa Rising: Building to the Future" on May 29-30. The conference was held to bring together policymakers, the private sector, and civil society from sub-Saharan Africa and beyond to discuss the challenges facing the region as it builds upon the strong economic gains made since the 2008 global economic crisis.

KENYA: On May 21, USAID Kenya and the Kenyan government launched a new water distribution system in Embu County. The new Embu Water and Sewerage Company (EWASCO) system will expand water access to an additional 6,000 households and more than 100 schools, clinics, and community buildings in Mbeer and surrounding low-income communities of Embu County. The system also serves as a model for how to transform Kenya's water and sanitation sector with private financing.



SANREM IN CAMBODIA: A Vibrant Community

The tagline for the tourism office calls Cambodia the "Kingdom of Wonder" due to its tropical landscape and numerous ancient temples. But this is not the only reason why the country seems full of wonder.

Today, it is the rapid modernization and development of the nation that makes Cambodia special. USAID says that, "Cambodia [has been] transforming in remarkable ways" since peace was established in the 1990's.

Tens of thousands of Cambodians who fled the country during the violent Khmer Rouge regime have returned, creating a vulnerable state of food security. The Tonle Sap Lake area is known for its fishing population with "floating villages" where citizens live on the water, and encompasses an expanding rural population in the northwest. It is one of the largest inland fishing areas in the world, making it a Feed the Future priority area.

Deforestation occurred rapidly over the last decade as farmers claimed new land, especially in upland regions. Forest clearing using slash-and-burn agriculture ran rampant. Many existing farming techniques used to try to feed the enlarged population cause a serious toll on the region's environment: "In Cambodia, more than 80% of the population lives in rural areas, and their life is based mainly on agricultural activity," noted Rada Kong, SANREM Country Coordinator.

Unsustainable farming practices have left the soil depleted of nutrients, and erosion is a major problem. But SANREM works within a complex partnership between research organizations, government agencies, and farmers that is acting to conserve the soil and scale up agriculture in Cambodia. It is this collaborative, comprehensive spirit that makes the program so effective.

Led in-country by North Carolina A&T University, SANREM's activities in Cambodia work with smallholder farmers in develop-

ing nations by promoting conservation agriculture production systems – called CAPS – a sustainable, cost-effective, and eco-friendly way to farm. Conservation agriculture has transformed farming worldwide with three principles: "The first one is minimize soil disturbance or no more tillage. The second one is continuous mulch wherein you continually provide soil covers, specifically the food for microorganisms, as mulch. The third is diverse [plant] species," said Dr. Manuel Reyes of North Carolina A&T.

SANREM takes a comprehensive approach with field research, support for degree-seeking students, short-term farmer training, and institutional capacity building. With SANREM's management entity headquartered at Virginia Tech, the office is a bridge to collaboration with some of the best scientists worldwide. Through strong partnerships such as France's Centre de coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and the Royal University of Agriculture, the project is making a big impact.

Battambang province, featuring maize, rice, and cassava crop research, illustrates that several aspects of the CAPS approach have been successful. CAPS-treated fields have resulted in consistent increases of soil organic matter. The proof is in the pudding... or the dirt, in this case, where soil from fields under conservation agriculture look visibly healthier than plowed fields, in which degraded soil appears compact and hardened. "The soil loss from the runoff is very significant. A lot of soil surface has been lost every year. We are nearly to the limestone layer on the topsoil," said Kong.



|this is what innovation looks like|



More than just environmentally friendly, CAPS provide social and economic benefits. By eliminating tillage, farmers save time on labor. Cover crops like pigeon pea can provide economic diversity to a farmer's main crop. And, by improving soil quality, SANREM research shows higher yields on CAPS fields than on conventional fields. This results in more income and more food for farmers.

The system works for varying farm sizes and staple crops, though a clear limitation seems to be resources. One farmer from Battambang mentioned that "the project only has a few planters, so during sowing time everyone wants them. When the project is over, there will be no planters, so it will be hard to continue CAPS." More planters and other technologies would make scaling up CAPS activities easier, but farmers struggle to afford these implements.



There has always been a market in Cambodia for important staples like maize, but a changing nation presents a changing economy. SANREM's site in Siem Reap works to address a different market – that of vegetables grown with sustainable practices. Siem Reap is buoyed by tourism due to its proximity to the famed Angkor Wat, a UNESCO World Heritage site. With thousands of visitors in the city, robust city market stalls and enterprising restaurants present an abundant need for fresh vegetables.

Collaboration with a University of California, Davis-based Innovation Lab called Horticulture CRSP and the NGO ADDA especially helps women farmers, many of whom are widowed due to the Khmer Rouge. They are taught to use CAPS with drip irrigation to improve cabbage, tomatoes, and yard long bean. Organized under collectives with names such as "Peaceful Women" or "Successful Wom-

en," the farmers appreciate the research. "I really like the new techniques for planting vegetables with a cover crop because I don't spend much time weeding," said one Siem Reap farmer. The women of Siem Reap are also given assistance with market access for better prices and more gender equity. A series of workshops taught the women to package their sustainably grown crops and helped them create their own label. Dr. Reyes said with enthusiasm, "It empowers women because they control their yield and they control selling the vegetables."

Moreover, the program is looking towards the future of farming. "Students should study agriculture... I believe agriculture is the science, technology, engineering, and math of human survival," said Dr. Reyes.

The University of Battambang recently worked with SANREM to begin a master's degree program emphasizing conservation agriculture and regularly sends students to do fieldwork on SANREM research sites, like Rechaney Sel, a bachelor's degree candidate studying horticulture. Rechaney grew up on a farm and wants to use her degree to help other farmers produce more. Working with SANREM, Rechaney studies in both the field and the classroom, applying her knowledge with direct research.

At the University of Battambang, the motto is "You are a bridge to brightness." With the Feed the Future SANREM Innovation Lab, that bridge extends all the way to the bright minds at Virginia Tech, closing the gap between oceans and continents to ensure food security worldwide.

SNAPSHOTS: SANREM PROJECTS IN CAMBODIA





TECHNOLOGIES THAT MATTER: Impacting farming in Southeast Asia with SWAT

When most people think of agriculture, they picture farms and fields far away from the influences of technology. Yet there are scores of scientists and researchers using high-tech engineering tools to influence the future of farming.

One of these tools is SWAT, the Soil Water Assessment Tool, which is a public domain tool developed by the USDA and Texas A&M AgriLife Research in order to model the quality and quantity of surface and ground water in soils. This can help to assess the environmental impacts of land use, land management practices, and climate change on soils. In Southeast Asia, there are now thirteen countries in the network that comprises SWAT-SEA, which stands for Soil Water Assessment Tool Southeast Asia. From support at conception to growing pains, SANREM has played a crucial role in promoting the use of this high-tech tool throughout the region, from Japan to Cambodia.

BUILDING A DYNAMIC NETWORK

How can a computer program be useful to smallholder farmers in Southeast Asia? The SWAT works to predict the effect of agricultural and natural resource management decisions on the nearby water, sediment, nutrients, and pesticide yields with reasonable accuracy on large, ungauged river basins. This is a particularly important tool in Southeast Asia, where there are many island nations and aquaculture is extremely important to both the economy and food security. The SWAT model has become popular in part due to being in the public domain (so it is free to use) and because it has the ability to simulate a watershed of any size, from a few hectares to a large continent.

As part of SANREM's Phase III research, SWAT-SEA was formed in 2007 through a SWAT workshop in the Philippines sponsored by SANREM. Since then, training activities have grown and several conferences have been held.

In 2009, the first SWAT conference in Southeast Asia was held in northern Thailand. Hundreds of scientists and agriculturalists traveled to Chiang Mai University for the two-day conference, hailing from Iowa to Indonesia, from Texas to Tehran. SANREM (then known as SANREM CRSP) was one of the primary sponsors, with many SANREM-funded researchers in attendance.

But that was only the beginning. In 2011, a four-day conference was held in Ho Chi Minh City, Vietnam. This time, over 30 abstracts were presented on topics such as soil erosion and stream flow. The conference included training workshops on using SWAT and field trips around the city to discuss agricultural challenges in the region.

More recently, the group has been expanding to other tech tools in order to reach out and connect with other researchers and agriculturalists, using the Google Groups tool to collectively troubleshoot problems with SWAT as well as sharing news and successes. A forum post in September 2013, for example, shared a software package created by the Hanoi University of Agriculture that translates the SWAT tool into Vietnamese, allowing more access to the tool for students and faculty that are natives to Vietnam.

THE FUTURE OF SUSTAINABILITY

It's been all about outreach with the Southeast Asian component of SWAT, with multiple partners and nations coming together to learn more about the model. At the third international conference in June 2013, the World Association of Soil and Water Conservation (WASWAC) produced the conference jointly with SANREM, the U.S. Department of Agriculture (USDA), Texas A&M, North Carolina A&T, and many others. Researchers and students came from 13 Asian countries for the discussion, which culminated in a two-day excursion in Indonesia to examine a site where SWAT had been used to its full potential.

The rapid growth of the program has led to the new name SWAT-SEEA, to reflect both Southeast and East Asia since more countries, such as Japan and Malaysia, keep coming on board. Technology has been used as a web, connecting people to share knowledge across distant corners of the world. When it came to the SWAT model in Southeast Asia, SANREM activities were the catalyst to outreach, education, and development efforts, providing the spark that was needed to get the fire going.



ANNUAL MEETING HIGHLIGHTS: Decades of Research

On May 19-21, dozens of researchers, students, faculty, farmers, and partners from all around the world gathered in Arlington, VA at the Marriott Crystal Gateway for the 2014 SANREM Annual Meeting. As this was the final meeting for the program, the discussion centered around final outputs, highlighting 20 years of research looking towards a sustainable future. Highlights of the meeting included a session with smallholder farmers who came all the way from Mozambique, a panel with graduate students, and an adventure into Washington, D.C., to see a Nationals baseball game. During a formal dinner, Constance Neely and Keith Moore, longtime veterans of the program and present during different phases of the SANREM CRSP and SANREM Innovation Lab, gave a presentation on the long history of the program, which began at the University of Georgia in 1994 and transferred to Virginia Tech in 2004. A highlight video and moments of the conference will be available to view on the SANREM YouTube channel. A photo gallery from the meeting is available on the right of this page. >>



NEW TOOL FOR FARMERS SAVES LABOR

In developing countries, programs like SANREM have been introducing conservation agriculture, a set of techniques that, like magic, can transform the soil over time to get more food from farming without degrading the environment.

But more than magic is needed to make this happen, and the problem that the Feed the Future researchers kept coming up against was the same. Farmers were eager to implement conservation agriculture and saw the benefits, but there weren't enough farming tools to make it easily accessible.

The science of CAPS holds that its three principles of minimum tillage, crop rotation, and year-round soil cover can be implemented in various climates and might be especially helpful in developing nations. In fact, SANREM works to implement conservation agriculture systems in over a dozen countries. Yet without adequate technology, smallholders often don't have enough time and resources to implement the system on a broader scale.

SANREM researchers in Kenya and Uganda wanted to change that by widening access to mechanization to smallholders across Africa. So they decided to design a tool themselves. It's called the MFI, which is short for Multi-Functional Implement. The acronym holds a simple meaning: The MFI can per-

form a variety of functions like ripping, chiseling, and weeding all at once. The tool is animal-drawn, and the farmer using it can switch applications quickly and safely.



Jay Norton of the University of Wyoming is the principal investigator for the project, and his team tested the MFI extensively with smallholders in Kenya and Uganda, taking in their feedback on drafts for the implement. So far, farmers are happy with what they see.

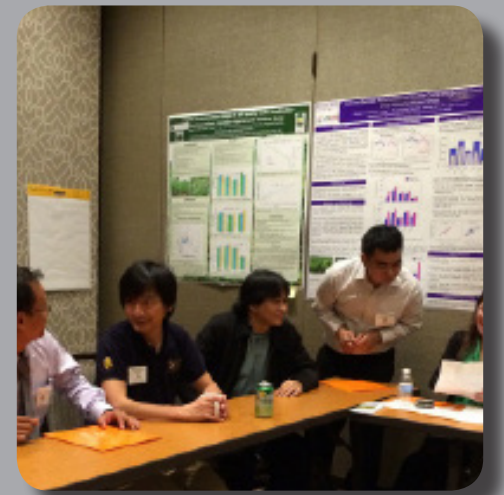
The MFI can increase efficiency, reduce labor, decrease costs, and help maintain soil health – as well as help to implement conservation agriculture on a larger scale. The tool can be used easily by both male and female farmers and with a variety of animals to pull it. This versatility is a key element to the design.

Input from smallholders has tweaked the initial design considerably, and their comments are still being sought in testing. Norton and his team have showcased the MFI in several meetings and conferences, and they assembled 10 MFI units in Northern Ghana using parts shipped from the United States.

Access to adequate technology can be a hurdle for smallholder farmers trying to increase their use of sustainable practices. With more development and research on the MFI, a tool made by and for smallholders, farmers are getting a step closer to the full potential of conservation agriculture.



HIGHLIGHTS 2014 SANREM ANNUAL MEETING



SANREM SPOTLIGHT

The SANREM Spotlight profiles a staff member associated with SANREM's work.

CHRISTINA BRANNAN, PROGRAM COORDINATOR

Q: What brought you to SANREM?

A: After getting my graduate degree, I decided I needed to do something different after 12 years in state/local government. A good friend of mine suggested that with my knowledge, I would be great at working with federal grants. She said it would be similar to previous experiences but offer me variety and challenges. I had some experience with grant work, so it was an easy transition for me. When I was interviewed, it was actually because I applied as the financial coordinator for the Senegal project, but circumstances worked out that I received an offer to work with SANREM instead. I remember being worried because, at the time, I wasn't as familiar with the SANREM project, but some quick research alleviated my concern immediately. I've never regretted the decision!

Q: What's your favorite part of the job?

A: The variety, in every sense of the term. I get to work with a variety of different people with different educational backgrounds. I get to learn about different cultures and languages. No day is ever the same or ever goes as planned, which keeps things from getting stagnant. I have a short attention span, and I am prone to boredom. I have never had a problem with that here because everything is so dynamic. There is always something new to learn or some challenge I get to try to figure out.

Q: What do you consider your special skills?

A: I do have an ability that I think is fun. I can write with my left hand nearly as well as with my right, but anything I write with my left hand is completely backwards (as in a mirror image). It really drove my teachers crazy when I would turn in my penmanship homework backwards. It made them madder when I would hold it up to the light and show them through the back of the paper that it was completely correct. Ironically, I can only write backwards with my left hand, so if I ever learned to write a language like Arabic I would have to be a lefty!

Q: If you could sit down to talk to anyone living or dead, who would it be?

A: I would probably pick the current Dali Lama. I don't pretend that I know too much about his life or his teachings, but there is something about him that I just find so fascinating. With all of the troubles he has had to endure and being exiled from his own country, I have yet to hear him say anything negative or even take a photo where he didn't have a smile. Usually, he is wearing this huge, heartwarming grin. Anyone who consistently shows that much peace, despite often being surrounded by chaos, has something that I want to learn about.

Q: What brings you the most joy?

A: Hearing my father really laugh at something. My dad is my best friend and favorite person in the whole world. I love to hear his funny stories, even the ones I've heard so often that I can repeat them. He calls me every day and the conversation almost always starts with, "Wanna hear something funny?" It instantly makes my day better. But there are those rare occasions when we are together and something strikes him as so funny that he has a full on belly laugh. It's the kind of laugh where you can barely stop laughing long enough to take a gulp of air to breathe. It is that moment, as his face is red and scrunched up and his eyes are watering from laughter, that I experience absolute bliss.



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SANREM INNOVATION LAB

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