Conservation Agriculture for Food Security in Cambodia and the Philippines

by GETS team

SANREM Phase IV Kick-off Meeting
Virginia Tech
May 6, 2010

Cambodia site: from primary forest to non sustainable Cassava cultivation

Plain of Kaev Saenar (Kratie / Mondol Kiri, April 2008)
Conservation
Agriculture for
Food Security in
Cambodia and the
Philippines
by GETS team

SANREM Phase IV Kick-off Meeting
Virginia Tech
May 6, 2010
Strong Partnership of Countries with Flags of Red, White and Blue
31 emails
Cambodia
Numerous emails from Philippines
Send my best regard to Dr. Harry Rea. I have never met him and hope he will visit his programs in Cambodia someday.
Strong Partnership

North Carolina Agricultural and Technical State University
Partners

Dr. Susan Andrews, Soil Quality Team Leader and Ecologist, USDA-Natural Resources Conservation Service East National Tech Support Center, Greensboro, NC, USA,

Dr. Adrian Marc Bolliger, Advisor for Faculty Development, German Development Service (DED) in Cambodia - Embedded DED Advisor at the Faculty of Agronomy, Royal University of Agriculture (RUA), Cambodia

Mr. Stéphane Boulakia, Tropical Agronomist, Direct seed Mulch based Cropping System Specialist, PADAC/CIRAD-Cambodia, Research Unit n°1 DMC, CIRAD-PERSYST, TA B-01/07 Avenue Agropolis, 34 398 Montpellier Cedex

Mr. Stéphane Chabierski, Agronomist, PADAC/CIRAD-Cambodia, Research Unit n°1 DMC, CIRAD-PERSYST, TA B-01/07 Avenue Agropolis, 34 398 Montpellier Cedex,

Dr. Maria Helen F. Dayo, Director, Gender Center, UPLB, Farming Systems and Soil Resources Institute, Agricultural Systems Cluster, College of Agriculture
Partners

*Dr. Victor B. Ella,* Professor, Land and Water Division, Institute of Agricultural Engineering, College of Engineering and Agro-Industrial Technology, University of the Philippines at Los Banos (UPLB), College Laguna,

*Dr. Charles E. Kome,* Soil Scientist, USDA-Natural Resources Conservation Service East National Tech Support Center, Greensboro, NC, USA,

*Mr. Hok Lyda,* Soil Science and Lecturer, Royal University of Agriculture, Cambodia,

*Dr. Agustin Mercado,* Research Officer, Landcare Foundation of the Philippines, Inc., Claveria, Mindanao, Philippines,

*Mr. Kou Phally,* Agronomist, “Projet d’Appui au Développement de l’Agriculture du Cambodge” (PADAC),

*Mr. Chuong Sophal,* Dean, Faculty of Agronomy, RUA, Cambodia,

*Mr. San Sona,* Agronomist, PADAC,

*Dr. Osei Yeboah,* Associate Professor, Department of Agribusiness, Applied Economics and Agriscience Education, North Carolina A&T State University, Greensboro, NC, USA,
Dean and Interim Provost
Alton Thompson
Dr. Osei Yeboah
Zach and Lorna in Costa Rica

Micah building a mud-house in the Philippines
Outline

1. Project Goal
2. ‘McD’ is Conservation Agriculture
3. ‘GETS’ Objectives
4. Methodology
   • Sites
   • Proposed Treatments
5. Current Progress
6. Questions and Discussions
Outline

1. Project Goal
   2. ‘McD’ is Conservation Agriculture
   3. ‘GETS’ Objectives
   4. Methodology
      • Sites
      • Proposed Treatments
   5. Current Progress
   6. Questions and Discussions
Problem: To see is to Believe

Cambodia site: from primary forest to non sustainable Cassava cultivation

Philippines site: a landscape rapidly multiplying every year
Project Goal

To promote **Conservation Agriculture** as a technologically-feasible, economically-viable, environmentally-sustainable and gender-responsive production system for food security of small farm communities in Cambodia and the Philippines.

Cambodia: MAFF Demonstration Plot, Soybean and Bracharia, October 2009
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6. Questions and Discussions
McD
Southeast Asia
SANREM Team
Definition of Conservation Agriculture
McD

Minimal soil disturbance
McD
Continuous mulch
McD

Diverse species rotation
McD

M - Minimal soil disturbance
C - Continuous mulch
D - Diverse species rotation
Outline

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GETS

I was ‘in a hairline’ not to be here
First try: not funded

‘I barked on the wrong tree’
GETS
Second Try: I need to hear the news
NCA&T GET’S’S funded
GETS

Strategy: Stick to the Cross-cutting objectives of the RAF and ‘bark’ on the right tree
GETS is the Cross-cutting objectives of SANREM
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‘glad this was first’
SANREM 2004 ‘huh!!!’

Identify gendered limitations and advantages that can promote adoption of CAPS, and determine if CAPS will increase labor burden on women
GETS Economics

Identify field-and-farm-level CAPS that will minimize smallholder costs and risks while maximizing benefits and adoption
GETS Technology Networks

Quantify the effectiveness of SANREM-supported farmer groups in training knowledge leaders, in being knowledge transmission points, and in facilitating network connections leading to widespread adoption of CAPS
Assess soil quality and measure crop yield and biomass from CAPS, and compare them with soil quality and crop yield and biomass from conventional plow-based systems.
Gender
Economics
Technology Networks
Soil Quality
SANREM Research Team

USA:
- Dr. Manuel Reyes – North Carolina Agricultural and Technical State University (NCA&T) (mannyreyes@ncrr.com, tel: 336-3347787; fax: 336-3347270)
- Dr. Osei Yeboah – North Carolina Agricultural and Technical State University (NCA&T) (oyeboah@ncat.edu, 336-3347056)

Philippines:
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- Dr. Maria Helen Dayo – University of the Philippines Los Baños (helenfd2002@yahoo.com, +639209108196)
- Dr. Agustin Mercado, Jr. – Landcare Foundation of the Philippines, Inc. (LFPI) (agustin9146@yahoo.com, +639062764780)

Expected Outcomes
- Decreased labor burdens for women, men, and children;
- Improved soil quality rapidly;
- Reduced other production inputs (e.g., machinery wear and tear and fuel costs for tillage);
- Increased agricultural profitability;
- Enhanced resilience to climate change (since CAPS can reduce runoff); and
- Increased residual moisture, minimizing drought during extreme weather events.

Project Period
January 1, 2010 to September 30, 2014

This project was made possible through the support provided by the United States for International Development (USAID) and the generous support of the American people for the Sustainable Agriculture and Natural Resources Management - Collaborative Research Support Program (SANREM-CRSPIP) under terms of Cooperative Agreement Award No. EPPA-00-04-00012-00 to the Office of International Research and Development (OARED) at Virginia Polytechnic Institute and State University (Virginia Tech); and terms of sub-agreement 425966-19070 between Virginia Tech and North Carolina Agricultural and Technical State University (NCA&T).
Background

Degraded landscapes are expanding annually in Southeast Asia. In the Philippines, it is estimated that approximately 36 million people live on less than $2 a day. Rural poverty in upland communities increases pressure on natural resources like forest, soil, and water. These are the last “capital” for the poor and they are rapidly diminishing due to unsustainable management. Such practices reduce agricultural productivity, which in turn heightens food insecurity and exacerbates poverty.

Principles of Conservation Agriculture

- Minimal soil disturbance
- Continuous mulching
- Diverse species rotations

Conservation agriculture (CA) has not established a foothold in Southeast Asia, although there are some promising sustainable agriculture in the region. SANREM in 1994 started developing solutions for arresting soil and water degradation concentrating research in Lantapan, a small farming community in the Philippines. In 1996, the World Agroforestry Centre (ICRAF) and the Agencia Española Cooperacion Internacional (AECD) supported the evolution of the Landcare movement in Claveria, Misamis Oriental. This expanded to other municipalities and provinces in Mindanao and the Visayas, involving more than 10,000 Landcare farmers who are practicing conservation farming, like establishment of natural vegetative filter strips (NVF) along the contour and agroforestry technologies to control soil erosion. The Landcare Foundation of the Philippines, Inc. (LFPI) facilitates the formation and continuation of Landcare groups in many areas in southern Philippines.

Conservation Agriculture Production Systems (CAPS) are tailor-fitted approaches for successful adoption and implementation of CA to specific locations.

This research will show that CA principles and practice of minimal soil disturbance, continuous mulching and diverse species rotations, constitute the best “tool box” to create sustainable permanent cropping systems for annual crop production under wet tropical conditions. These reverse soil degradation, increase crop yield and profits and reduce the labor burden on women.

Project Goal

To promote Conservation Agriculture as a technologically-feasible, economically-viable, environmentally-sustainable and gender-responsive production system that will contribute to food security of small farm communities in the Philippines.

GETS Objectives

1. Gender: Identify gendered limitations and advantages that can promote adoption of CAPS, and determine if CAPS will increase labor burden on women;
2. Economics: Identify field-and-farm-level CAPS that will minimize smallholder costs and risks while maximizing benefits and adoption;
3. Technology network: Quantify the effectiveness of SANREM-supported farmer groups in training knowledge leaders, in being knowledge transmission points, and in facilitating network connections leading to widespread adoption of CAPS; and
4. Soil: Assess soil quality and measure crop yield and biomass from CAPS, and compare them with soil quality and crop yield and biomass from conventional plow-based systems.

Methodology

Research Site

Clavería, Misamis Oriental

Fig. 1 - CREATE Model: “Creation-Research-Extension-Action-Teaching-Education” or the Creation Diffusion Training Method
Outline

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Cambodia
Cambodia SANREM site

1/ Kampong Cham Province - Dambe / Ponhea Krek Districts
   Cassava production area with (very) smallholders

2/ Kampong Cham Province – Chamcar Loeu District
   Divers. crop. Σ (Soy., Corn, Cass.) with various farms types

3/ Battambang Province – Rattanak Mondul District
   Corn (+ Cass.) production area with small /medium farms

3 main Pilot Zones
1 & 2 = PADAC - 2008-2012: 400 to 500 ha pilot extension
3 = PADAC \ SANREM - 2009-2014: 200 ha pilot extension
Philippines SANREM site
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CREATE Concept Model
Slight modification of the create-diffusion model of Séguy and Bouzinac, 2001

Creation - Research - Extension - Action - Teaching - Education
Figure 2. Two main stages of CREATE Model Implementation

**Perpetual "matrix of cropping system" as a representative landscape unit**
- Creation, demonstration and comparative assessment of the cropping systems
- Field laboratory, scientific watch to:
  1) modeling of systems
  2) anticipated environmental impacts
- Living memory of the past, window on possible futures (enlarged choice)
- Technician training by doing

**Externalities collection**
- DMC systems + intro. of multi-species hedgerows
- Replicates of 2 systems (fertility variations)

**Network of reference Farms**

- "Plots"
  - Adjustment & validation of the systems, taking into account
    1) large-scale practices
    2) economical constraints
  - Training of farmers...

**"Real life"**
- Basic contributions to
  - enlarged extension work
  - nuclei of farmer organizations

---

North Carolina Agricultural and Technical State University
Cambodia
CA started in 2004

Start:
• Researcher managed ‘controlled conditions’

2. Farmer managed ‘real life conditions’
Philippines

Start:
Researcher managed ‘controlled conditions’
Treatments

• Conservation Agriculture
• Traditional Practice
Treatments

• t-test statistic
• between groups
experimental design
Philippines

Start:
Researcher managed ‘controlled conditions’
Cambodia
CA started in 2004

Start:
• Researcher managed ‘controlled conditions’

2. Farmer managed ‘real life conditions’
Proposed Treatments Cambodia

Successfully tested CAPS in PADAC sites:
- Corn + *Stylosanthes* (monocropping corn on *stylo* cover) (currently happening)
- Corn + *Stylo* // Cassava + Stylo
- Corn + *Brachiaria ruziziensis* // Soybean + *Stylosanthes*

Traditional practice
Proposed Treatments Cambodia

 Successfully tested CAPS in PADAC sites:

- **Corn + Stylosanthes**
  (monocropping corn on *stylo* cover)
  (currently happening)
- **Corn + Stylo // Cassava + Stylo**
- **Corn + Brachiaria ruziziensis // Soybean + Stylosanthes**

Traditional practice
Proposed Treatments Cambodia

Successfully tested CAPS in PADAC sites:

• Corn + *Stylosanthes* (monocropping corn on *stylo* cover) (currently happening)

• **Corn + *Stylo* // Cassava + *Stylo***

• Corn + *Brachiaria ruziziensis* // Soybean + *Stylosanthes*“

Traditional practice
Cambodia

Year 1

"scattered" rains

heavy rains

Year 2

"scattered" rains

heavy rains

Cassava + Stylo.

Stylo.

Maize + Stylo.

Stylo.
Proposed Treatments Cambodia

Successfully tested CAPS in PADAC sites:

- Corn + *Stylosanthes* (monocropping corn on *stylo* cover) (currently happening)
- Corn + *Stylo* // Cassava + Stylo
- Corn + *Brachiaria ruziziensis* // Soybean + *Stylosanthes*

Traditional practice
Cambodia

Year 1

"scattered" rains

heavy rains


Year 2

"scattered" rains

heavy rains


Stylo.

Maize + Brach.

Brach.

Soybean + Stylo.

Stylo.
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2. ‘McD’ is Conservation Agriculture
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4. Methodology
   • Sites
   • Proposed Treatments
   • Approach on Soil Quality
   • Current Progress
5. Questions and Discussions
Assess soil quality and measure crop yield and biomass from CAPS, and compare them with soil quality and crop yield and biomass from conventional plow-based systems.
Biophysical Sampling in Cambodia

Researcher Controlled plots: 16 sampling spots of 50 m²

• **CAPS:** Biophysical sampling will be conducted in two demonstration farms of 4 ha. Within each of these 2 demonstration farms, 4 sampling spots of 50 m² per demonstration farm will be chosen.

• **Traditional:** Another 8 sampling spots of 50 m² will be chosen from the surrounding plow-based farms.

Real Life: 30 sampling spots of 50 m²

• **CAPS:** 200 one-ha CAPS practicing farms. A subsample of 15 farms from 15 farm households will be randomly chosen.

• **Traditional:** Subsample of 15 one-ha farms from the surrounding plow-based practicing farms from 15 households will be randomly chosen as well for a total of 30 farms.
Philippines

Start: Researcher managed ‘controlled conditions’
Proposed Treatments Philippines

**No Arachis pintoi CAPS:** Y1: Maize-maize-maize with crop residues from the preceding crop left as mulch; Y2: Vegetable-maize-maize with crop residues from the preceding crop left as mulch; Y3: Upland rice-maize with crop residues from the preceding crop left as mulch; Y4: Maize-maize-maize with crop residues from the preceding crop left as mulch; & Y5: Vegetable-maize-maize with crop residues from the preceding crop left as mulch.

**With Arachis pintoi CAPS:** Y1: Maize-maize and crop residues from the preceding crop left as mulch. Maize will be seeded on the *A. pintoi* plot by creating a 10-cm opening using herbicide; Y2: Vegetable-maize-maize and crop residues from the preceding crop left as mulch, managed as maize-maize-maize; Y3: Upland rice-maize and crop residues from the preceding crop left as mulch, managed as maize-maize-maize; Y4: Maize-maize-maize left as mulch; Y5: Vegetable-maize-maize with crop residues from the preceding crop left as mulch, managed as maize-maize-maize.

**Traditional practice:** Y1: Maize-maize; Y2: Vegetable-maize-maize; Y3: Upland rice-maize; Y4: Maize-maize; and Y5: Vegetable-maize-maize.
Cover crop (perennial peanut Indonesia)
Cover crop (perennial peanut, Philippines)
Arachis Pintoi (Vietnam)
Arachis pintoi study

SANREM studies in the Philippines and Vietnam (Mercado, 2009, and Ha, 2009) found that some vegetables grew well in between strips of *Arachis pintoi*, especially the *tall* kind.
Biophysical Sampling in the Philippines

Researcher Controlled plots: 30 sampling spots of 50 m²

• **CAPS 1 without *Arachis pintoi***: Biophysical sampling will be conducted in five demonstration farms of 1000 m². Within each of these farms, a sampling spot of 50 m² per demonstration farm will be chosen.

• **CAPS 2 with *Arachis pintoi***: Biophysical sampling will be conducted in five demonstration farms of 1000 m². Within each of these farms, a sampling spot of 50 m² per demonstration farm will be chosen.

• **Traditional**: Biophysical sampling will be conducted in five demonstration farms of 1000 m². Within each of these farms, a sampling spot of 50 m² per demonstration farm will be chosen.
What will be measured in the 50 m² spots? Y0, Y2, & Y4

- Infiltration rates
- Soil bulk density
- Soil carbon
- Soil nutrient levels
- Water stable aggregates
- Soil water content
What will else will be measured?

• Yield
• Biomass
• Others
Outline

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   • **Approach on Gender**
5. Current Progress
6. Questions and Discussions
Identify gendered limitations and advantages that can promote adoption of CAPS, and determine if CAPS will increase labor burden on women.
Gender

- The baseline survey stage, the team will conduct a participatory rapid rural appraisal.
- Structured Household Survey and key informant interviews, focused group discussion and documentation and analysis will be used in combination.
- Random Instant Sample measurement will be used to determine time use or time allocation of women and men in CAPS. A gender responsive CAPS development plan will be formulated.
- The sample population is households from the 2 x 15 farms in Cambodia and 3 x 10 farms in the Philippines.
Outline

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   • **Approach on E - Osei**
5. Current Progress
6. Questions and Discussions
GETS Economics

Identify field-and-farm-level CAPS that will minimize smallholder costs and risks while maximizing benefits and adoption.
1. Key Farm Household Demographics

Household members
Gender
Age
Education
Number Students
Number of Active in Agriculture
2. Livelihood System

A. KEY FARMING SYSTEM CHARACTERISTICS

Agriculture Production Unit - Land
Forestry Production/Use on unit controlled land
Livestock production/Use
Access to physical assets/technology (1=yes; 0=no)
Natural Assets
Family Unit Social/Financial Assets (1=yes; 0=no)
Access to common property resources? (1=yes; 0=no)
Importance of non-staple agriculture contributions to livelihoods?
Overall wealth classification of family unit
3. STAPLE CROP PRODUCTION

STAPLE CROP PRODUCTION SYSTEM

Family unit staple utilization

_____ % consumed; _____% sold; _____% carryover/seed; _____% losses

Climatic and edaphic conditions

Pests and Diseases

Production risks
### 3. STAPLE CROP PRODUCTION SYSTEM

<table>
<thead>
<tr>
<th>Gender Responsibility</th>
<th>Land Preparation</th>
<th>Planting/replanting</th>
<th>Fertilization</th>
<th>1st Weeding</th>
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<td>Method</td>
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<td>Labor</td>
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<td>Other Input cost</td>
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<tr>
<td>Credit</td>
<td>North Carolina Agricultural and Technical State University</td>
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</tbody>
</table>
4. KNOWLEDGE AND USE OF CAPS PRACTICES

Does anyone in the family unit practice minimum tillage for any crop?

Does anyone in the family unit use ground cover for any crop cycle?

Does anyone in the family unit practice regular crop rotations on any parcel?
Off-Farm Services

- Extension agent
- Other service providers
- Input/Output market actors
- Financial institution
Methodology

Provide descriptive statistics of variables for period 0 and period 4 and determine the level of changes.

Apply statistical tools to determine the significance of the changes.

Optimization of net returns using any optimization software like linear programming or General Algebraic Model Software (GAMS).
Methodology

Estimating the small-holders’ adoption rates

Adoption behavioral model where farmers respond individually and differently to innovation

\[ Y_i = \beta_i X_i + U_i \]

Where:

- \( Y_i = 1 \) if a choice is made and zero otherwise
- \( Y_i = 1 \) if \( X_i \) is greater than or equal to a critical value \( X^* \) (\( Y = 1 \) if \( X_i \geq X^* \))
- \( Y_i = 0 \) if \( X_i \) is greater than or equal to a critical value \( X^* \) (\( Y = 1 \) if \( X_i < X^* \))
Methodology

Extent of use of technology

Acceptability index (AI)

\[ AI = \left( \frac{F_1}{F_2} \right) \times \left( \frac{AL_1}{AL_2} \right) \times 100 \]

Where:

- \( F_1 \) = number of sample farmers adopted CAPS
- \( F_2 \) = total number of sample farmers
- \( AL_1 \) = total land committed to CAPS
- \( AL_2 \) = total land operated by the whole sample
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GETS Technology Networks

Quantify the effectiveness of SANREM-supported farmer groups in training knowledge leaders, in being knowledge transmission points, and in facilitating network connections leading to widespread adoption of CAPS
Cambodia

- Farmer group (FG) still to be formed
- FG will be provided:
  - Access to credit – local bank – subsidy through PADAC
  - Access to machinery
  - Access to training and extension
  - Access to other services
  - Contract no-tillage machinery
Philippines

• Farmer group (FG) already formed – Landcare Foundation of the Philippines, Inc

• Some FG members will be provided:
  » Subsidy for CA practicing farmers
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Cambodia

- Kick-off meeting done
- Researched controlled demonstration plots established
- Real life plots experimental design has been completed and 27 households with total area of 45 ha agreed to partner with researchers
- Baseline soil samples and measurement in 50 m² spots were completed
- Proposal of monitoring soil quality in SANREM/PADAC plots (Battambang) and PADAC plots (Kampong Cham) got funded
Philippines
WELCOME PARTICIPANTS

SANREM CRSP

Kick-off Meeting

Conservation Agriculture for Food Security in the Philippines

Claveria, Misamis Oriental
April 26, 2010

North Carolina Agricultural and Technical State University
## Philippines Kick-off Meeting

100 attended

<table>
<thead>
<tr>
<th>Gender</th>
<th>Private</th>
<th>NOMIARC</th>
<th>Reg'l Field Unit(RFU)</th>
<th>ICRAF</th>
<th>LFPI</th>
<th>Syngenta Phils</th>
<th>Provincial Agricultural Office-Mis Or</th>
<th>Agricultural Technicians</th>
<th>Students</th>
<th>Faculty</th>
<th>Faculty-students(PhD)</th>
<th>TOTAL</th>
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<td>Male</td>
<td>4</td>
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<td><strong>Municipal Agricultural Office-Claveria MOSCAT</strong></td>
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SANREM Research Team

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Project Period

January 1, 2010 to September 30, 2014

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Background

Degraded landscapes are expanding annually in Southeast Asia. In the Philippines, it is estimated that approximately 36 million people live on less than $2 a day. Rural poverty in upland communities increases pressure on natural resources like forest, soil, and water. These are the last “capital” for the poor and they are rapidly diminishing due to non-sustainable management. Such practices reduce agricultural productivity, which in turn heightens food insecurity and exacerbates poverty.

Principles of Conservation Agriculture
- Minimal soil disturbance
- Continuous mulching
- Diverse species rotations

Conservation agriculture (CA) has not established a foothold in Southeast Asia, although there are some promising sustainable agriculture in the region. SANREM in 1994 started developing solutions for arresting soil and water degradation concentrating research in Lantapan, a small farming community in the Philippines. In 1996, the World Agroforestry Centre (ICRAF) and the Agencia Española Cooperacion Internacional (AECI) supported the evolution of the Landcare movement in Claveria, Misamis Oriental. This expanded to other municipalities and provinces in Mindanao and the Visayas, involving more than 10,000 Landcare farmers who are practicing conservation farming, like establishment of natural vegetative filter strips (NVFS) along the contour and agroforestry technologies to control soil erosion. The Landcare Foundation of the Philippines, Inc. (LFPI) facilitates the formation and continuation of Landcare groups in many areas in southern Philippines.

Conservation Agriculture Production Systems (CAPS) are tailor-fitted approaches for successful adoption and implementation of CA to specific locations.

This research will show that CA principles and practice of minimal soil disturbance, continuous mulching and diverse species rotations, constitute the best “tool box” to create sustainable permanent cropping systems for annual crop production under wet tropical conditions. These reverse soil degradation, increase crop yield and profits and reduce the labor burden on women.

Project Goal

To promote Conservation Agriculture as a technologically-feasible, economically-viable, environmentally-sustainable and gender-responsive production system that will contribute to food security of small farm communities in the Philippines.

GETS Objectives

1. **Gender**: Identify gendered limitations and advantages that can promote adoption of CAPS, and determine if CAPS will increase labor burden on women;
2. **Economics**: Identify field-and-farm-level CAPS that will minimize smallholder costs and risks while maximizing benefits and adoption;
3. **Technology network**: Quantify the effectiveness of SANREM-supported farmer groups in training knowledge leaders, in being knowledge transmission points, and in facilitating network connections leading to widespread adoption of CAPS; and
4. **Soil**: Assess soil quality and measure crop yield and biomass from CAPS, and compare them with soil quality and crop yield and biomass from conventional plow-based systems.

Research Site

Claveria, Misamis Oriental

Methodology

Fig. 1 - CREATE Model: “Creation-Research-Extension-Action-Teaching-Education” or the Creation Diffusion Training Method
Potential Research Sites
Outline

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2. ‘McD’ is Conservation Agriculture
3. ‘GETS’ Objectives
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5. Current Progress
6. Questions and Discussions
Questions