



MS Food Security
& Climate Change

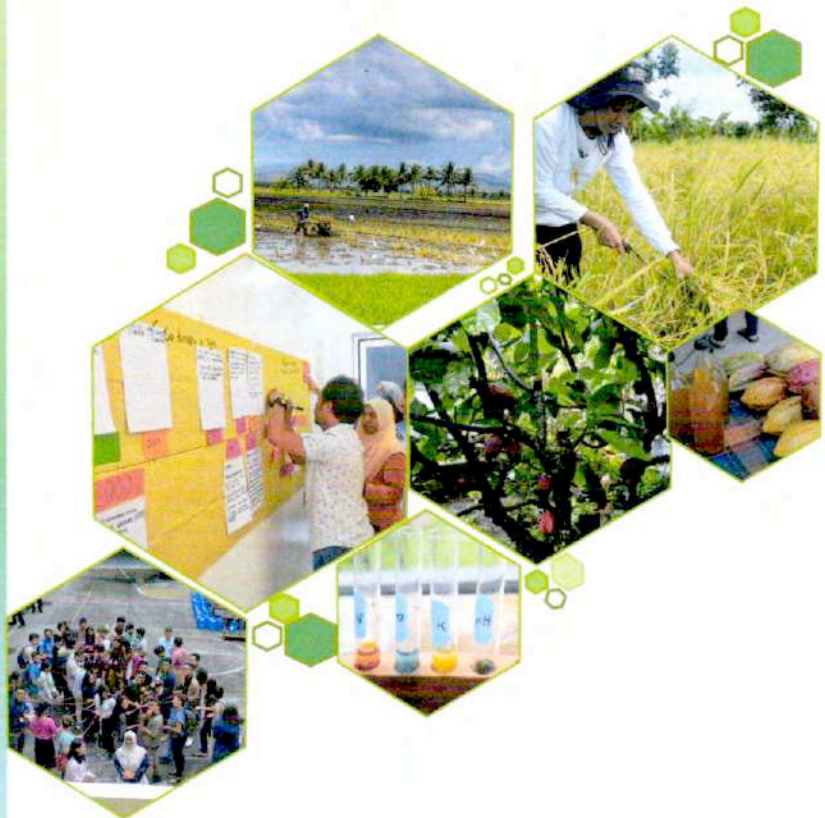
PROJECT REPORT 2019



Assessment of Sustainability in Agriculture Production and Food Processing Systems

Sustainable & Resilient Food Systems in
Vulnerable Areas in the Philippines 2019

15-31 July 2019



Co-funded by the
Erasmus+ Programme
of the European Union



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| | |
|--------|--|
| AMIA | Adaptation and Mitigation Initiative Agriculture |
| BNI | Badang ni San Ignacio |
| DA-RFO | Department of Agriculture-Regional Field Office |
| DRRMC | Disaster Risk Reduction and Management Council and Department of Agriculture |
| FGD | Focus Group Discussion |
| FS | Farming System |
| HVCC | High Value Crop Committee |
| LGU | Local Government Unit |
| OPAG | Office of Provincial Agriculture |
| BFCD | Binanuaanan Farmers Community Development Association |
| RP | Resource Person |
| SARFC | San Ramon-San Agustin Agrarian Reform Cooperative Incorporated |
| TOT | Training of Trainers |





MS Food Security
& Climate Change

SUMMER COURSE 2019 RATIONALE

The Master of Science in Food Security and Climate Change (MS FSCC) Summer Course 2019, is an active learning course to assess the dynamics of change, innovation, and adaptation towards transitions in rural areas. The MS FSCC program is a joint program crafted and offered by member universities of the Southeast Asian University Consortium for Graduate Education in Agriculture and Natural Resources (UC) and is co-funded by the Erasmus+ Programme of the European Union.

This year's summer course was hosted by the University of the Philippines Graduate School and coordinated by the Institute of Crop Science (ICropS, CAFS), University of Natural Resources and Life Sciences (BOKU, Vienna, Austria), Universitas Gadjah Mada (UGM, Yogyakarta, Indonesia) and SEARCA. It was participated by 44 students and 15 faculty members from 17 countries and 15 universities. A training of trainers led by SupAgro Montpellier and Kasetsart University was implemented concurrently with the course to document, review the implementation of the summer course module and develop course guide/module for its future implementation across CUs as part of the MSFSCC curriculum.

The students were able to understand food security, climate change, and sustainability transitions in the global, regional, and local settings through series of lectures, discussions, field exposure, and group works held at SEARCA Auditorium from July 15-18, 2019.

From July 19-30, 2019, participants had an immersion on the field to analyse the sustainability and resilience of rice and cacao food systems in vulnerable areas to climate change in Camarines Sur, Bicol, Philippines.



2019 MS FSCC SUMMER COURSE

- o Active Learning exercise to train students to assess the dynamics of change,
- o Innovation and adaptation to transitions in rural areas

COURSE CREDIT

2 units
Summer school
block course

To assess the diversity
of farming systems
and rural livelihoods

To acquaint students with
theories, methods and practices
to understand and facilitate
transitions in natural resources
management

Develop skills of students to identify
appropriate entry points and the
design of facilitation measures
to accompany complex social,
ecological and economic transitions

To accelerate change and
how changes at practical level
correspond with the relevant
institutions and policies.

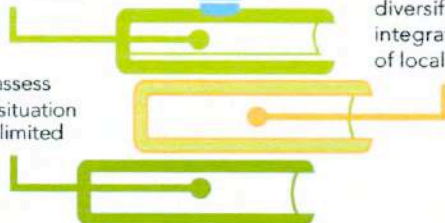
COURSE GOALS

LEARNING OUTCOMES

- o Capacity to formulate proposals for facilitating the adaptation, innovation, transition

- o Capacity to assess the agrarian situation in a given delimited area

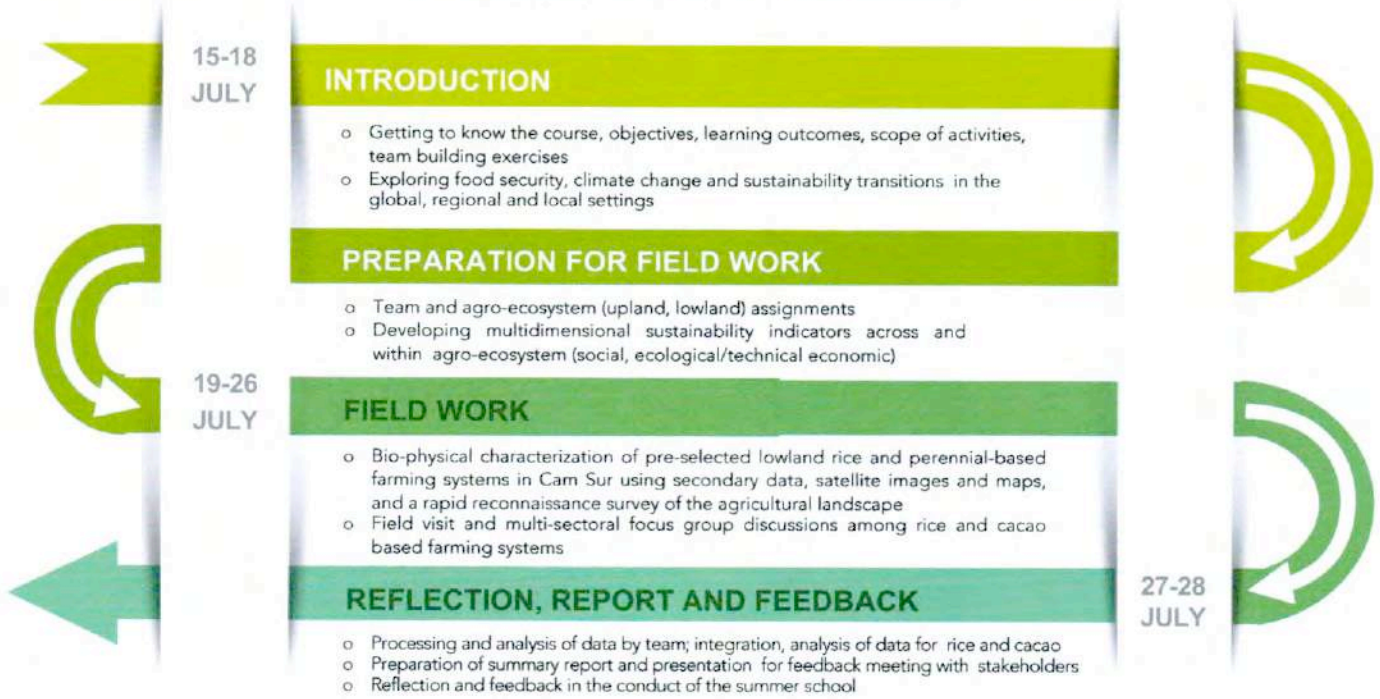
- o Capacity to identify and assess the dynamics of change (innovation, intensification, diversification, market integration) within the diversity of local systems



Students Assessment Criteria

- 40% Group work and presentations
- 15% Attitude at fieldwork
- 20% Report and presentation feedback session
- 25% Individual exam

COURSE PROGRAM



SCHEDULE



Preparatory Activity

FOOD SECURITY & CLIMATE CHANGE COURSE

Sustainable & resilient food systems in vulnerable areas Philippines 2019

Q SEARCH

Home

FSCC in the Philippines

Conceptual framework

Research methods

E-Learning Platform

June- July 2019

UNCATEGORIZED
Discussion 3.2
Research Attitude

UNCATEGORIZED
Discussion 3.1
Research Methods

UNCATEGORIZED
Discussion 2.2
System characteristics

Inter-linkages of Food Security and Climate Change

Multiple dimensions and interlinkages in the agro-food systems (ecological; bio-physical, socio-economic, policy/political)

Agricultural sustainability from a climate change perspective

Bio-physical characterization of study region

LEARNING OUTCOMES

- o Know basics of the agro-food system in the region
- o Understand the linkages between climate change and food security framed by the concept of sustainability
- o Know some of the action research methods that will be used in the field



SESSION 1&2: INTRODUCTION

15 July 2019

Overview of
Summer school
activities, outcomes,
roles and
responsibilities
of students, facilitators,
mentors, resource
persons, local hosts



SESSION 3: Getting to know each other

Setting the scene & getting to
know each other



Session 4 Preparation for the Field Work

15 July 2019



10-minute inputs (petcha-kucha mode) by Resource persons followed by interactive activities

Impacts and Challenges of changing Climate to Food Security

Food security challenges in the midst of climate change and global food system

RP: Mr. Mark Cervantes, FAO

Measurable indicators of the multiple dimensions of food security and their interactions

RP: Dr. Domingo E. Angeles, UPLB

Resilience concerns and indicators in small hold farmers and farming communities amidst climate change and global food system

RP: Dr. Ma. Victoria O. Espaldon, UPLB

Session 5 Ecological Dimension of Agro-ecosystem Assessment

16 July 2019

Hazards posed by climate change on ecology of lowland and upland food systems (focus on soil fertility/degradation and water-management amidst competing uses)

RP: Dr. Jose Nestor M. Garcia, UPLB

Impacts of changing climate and land use, including farming systems and technologies on biodiversity

RP: Dr. Mark Dondi M. Arboleda, UPLB

Climate change and global food system: implications on pests and disease dynamics (focus on rice and cacao)

RP: Dr. Celia DR. Medina, UPLB



Socio-Economic Dimension Session 6

16 July 2019

Demographics of smallhold lowland and upland farmers in SEA and in the Philippines: overcoming the challenges towards sustainability of small family farms

RP: Dr. Virgilio T. Villancio, UPLB

Challenges for integration of smallhold farmers in the global and local food system for inclusive growth (given the diversity of stakeholders interests, consumer preferences and product standards)

RP: Dr. Aileen V. Lapitan, UPLB

Challenges to enhancing farmers resilience and sustainability of smallhold farming systems under climate change

RP: Dr. Arini Utami, UGM



Session 7

16 July 2019

Innovation and Change Processes

Linking the multi dimensions of the agro-food system to sustainability and resilience



Identifying leverage points using net map

Design of INNOVATION

- Recognise the linkages between the systemic dimensions of the agro-food system
- Relate agro-food system thinking to sustainability and resilience
- Realize the complexity of change



Transfer to UPLB interactive activity-identifying multidimensional indicators of sustainability

Session 8

GLOBAL AND LOCAL OUTLOOK for Rice and Cacao Food System



RP: Dr. Glenn B. Gregorio, SEARCA



RP: Dr. Calixto M. Protacio, UPLB

Field Exposure

CACAO Group



fruit-bearing cacao tree

OPTIONS INC.
cacao production and processing venture



processing facility for "tablea" and a small store

AURO CHOCOLATE

Proudly Filipino beyond Bean to Bar



Auro Chocolate is a proudly Filipino, bean-to-bar chocolate company that sustainably sources cocoa beans directly from local farming communities in Davao



LEARNING OUTCOME

Relate the experiences in the excursion to lessons learned on social, ecological and economic dimensions of agro-food systems

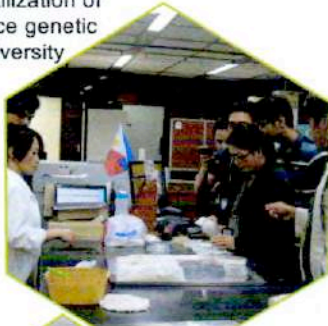
Production
(small and commercial scale)

Marketing
(local and export)



RICE Group

IRRI Genebank-
conservation and utilization of rice genetic diversity



LOS AGros VENTURES INC. (LAVI)



technology-based hybrid seed production

EVG Registered rice producer

warehouse of registered and foundation seeds of inbred rice



Inbred and seed production, milling and retail



LEARNING OUTCOME

Apply sustainability and resilience questions to the empirical experience and develop research questions

✓ Developing multi-dimensional indicators and identifying field tools for Analysis of Agro-food Systems



- ✓ Field methods – characterizing the system
- ✓ Forming expert teams
- ✓ Identifying multi-dimensional indicators of FS sustainability and resilience



Buffer Capacity

- What is your highest education? of lower order education?
- Are you inhibited or resource?
- Do you have health insurance? health? If not, why? Where is family?
- Are you able to accept government subsidies & services in your area?
- How many members of business organizations are in your area?
- How many years of farmer?
- Are you a full-time farmer? or part-time? what kind of income?
- How many of the family work in the field?
- How do you employ your labor force?

SELF-ORGANIZATION

- What is the farming crop do you want? (Production, price, and quality, your family? For? Your family, and what do you get the role?
- Do you rely on the middle man to sell your products? Why is that? Do you want the price to be higher?
- How do you transport your products?
- How do you communicate with other people to help in the field? Do you have any other people? Do you have any other people? Do you have any other people?
- How do you prepare for disaster? (Floods, drought, typhoon, ...)

LEARNING AND ADAPTATION

- Have you attended extension courses before? (if so, how many times?)
- Have you attended in farm field school area? (if so, how many times?)
- Are you comfortable for cooperation with the other farmers in your community?
- Do you think the extension is for you to improve the farm income?
- Are you aware of any threats? If you have any, what are they? (e.g., climate change, pest, etc.)
- How do you manage your resources? (e.g., water, soil, etc.)
- How do you manage your resources? (e.g., water, soil, etc.)
- How do you manage your resources? (e.g., water, soil, etc.)



From the inputs by resource persons, the students listed potential multi-dimensional indicators of sustainability and resilience

FIELD METHODS



Bio-physical characterization - use of secondary data (maps, diagrams); use of soil test kit and rapid test for soil texture



RP: Prof. Patrick M. Rocamora, UPLB



Participatory tools for data gathering and analysis

RP: Dr. Ma. Lourdes Edaño, UPLB

DEPLOYMENT TO CAMARINES SUR

In the entry meeting, Provincial Governor's Office through the Agriculture Office, expressed their full support to strengthen the partnership with the participants of the MS FSCC Summer Course.



Entry Meeting with
Local Hosts



Inputs from the RESOURCE PERSONS



Engr. Merlyn Jean A. Plaza
OPAG, Province of Cam Sur



Ms. Zippora Zuñiega
DRRMC-Cam Sur



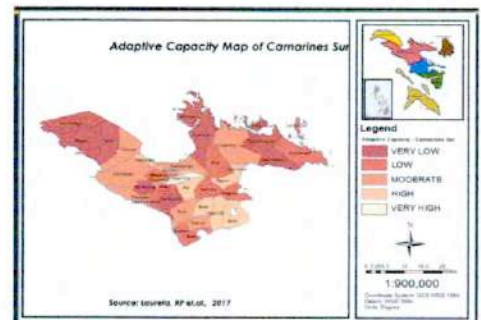
Mr. Renato Acasio
HVC-Officer, DA-Reg 5



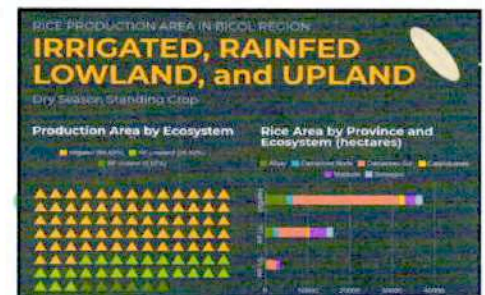
Mr. Lorenzo L. Alvina,
AMIA, DA-Reg 5

- 1** Profile and Vision for the Agriculture Sector of Cam Sur
- 2** Programs and challenges to attain sustainable and resilient farming communities despite the vulnerability of Cam Sur to climate related hazards.
- 3** High Value Crops Program in Rice and Cacao in Bicol Region and Cam Sur
- 4** Vulnerability of lowland and upland agro eco-systems to climate hazards in Cam Sur

Interactive Discussion



Climate Vulnerability Assessment of Camarines Sur



The discussion focused on the four natural hazards in Cam Sur : typhoon, flooding, drought, and landslide. The province tops among the list of the most susceptible to natural disasters in Bicol Region. To combat these, a proactive disaster risk reduction management programme and strategies was crafted and is being implemented in the province.

Most Common and Best Varieties of Cacao

Forastero
The most common green cacao in Forastero and it accounts for 50% of the world's cocoa supply. It is much harder and less susceptible to diseases. Forastero cacao has large-calibrated beans and is mostly used to give richness to chocolate bars. It is often blended with higher quality cacao.

Trinitario
Trinitario is a natural hybrid biological state resulting from cross-pollination. Trinitario combines the best of the two other main varieties, the hardness and high yield of Forastero, and the refined taste of Criollo.

Criollo
Only 5% of the world's production is Criollo. It is particularly difficult to grow as it is vulnerable to a variety of environmental threats. The beans have a white to pinkish-rosy and thin papery structure, so it is often blended with other cacao.

DAMAGE TO AGRICULTURE

Overview of Field Activities in Cam Sur



SESSION 16-17

Ocular survey

Description/impression on the agricultural landscape of Cam Sur particularly on lowland and upland agroecosystems of rice and cacao, respectively



Courtesy call and key informant interviews with local government officials



Vision of local executives for sustainable and resilient Cam Sur's agriculture focus on cacao and rice industries

SESSION 18



Focus group discussions with various stakeholders and farmer groups and associations

Data gathering- historical timeline to identify drivers of change and understand why farmers do what they do; seasonal calendar to know livelihood sources and cropping calendar; netmap to understand the linkages among various components and stakeholders and identify leverage point for change



o Ecological characterization through transect walk of community, rapid soil analysis through feel and soil test kit methods



Field Exposure and 2 night homestay with farm families



o Social and economic data gathering- through case studies of four households per team experiential learning of farm, processing, and marketing activities

SESSION 19-21



data inputting, processing and analysis by team, by crop-based and across farming system (FS)



Assessment to answer the research question

SESSION 22-23

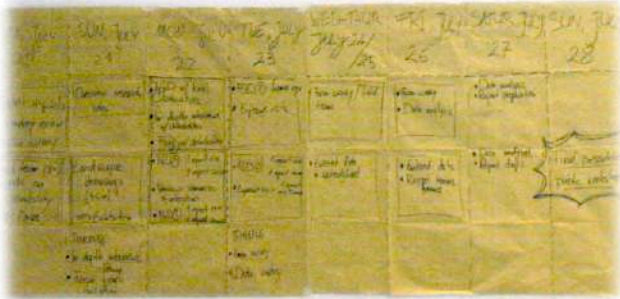
Preparations for community feedback meeting and closing program for fieldwork

Multi-media presentation materials posters-integrated reports by crop and typology of production system



Details of these activities follow

TIMELINE



The students drew the general landscape of their research site from the top of Mt. Isarog, Ocampo overlooking the rest of the Camarines Sur province. The students observed the ridge-to-reef landscape of Cam Sur that enabled them to have a holistic view of the problems and challenges, as well as the solutions, of rice and cacao production in the area.



LANDSCAPE ANALYSIS



Cross visit to farms and farmers' association provided the participants a glimpse of the rice and cacao agroecosystems under Camarines Sur setting.



Roadside survey of lowland and upland agroecosystems, provided the participants a glimpse of the rice and cacao production under Camarines Sur setting.



Cacao group
Badang ni Ignacio
San Fernando, Camarines Sur



Rice Group
SARFC
Bula, Camarines Sur



During the ocular visit, some students visited the irrigation facility which is operated by the San Ramon-San Agustin Agrarian Reform Cooperative Incorporated (SARFC) at Bula, Camarines Sur.

The students were brought to the drying facility of the cooperative where the harvested *palay* are being dried, cleaned and sacked before bringing it to the millers and traders.

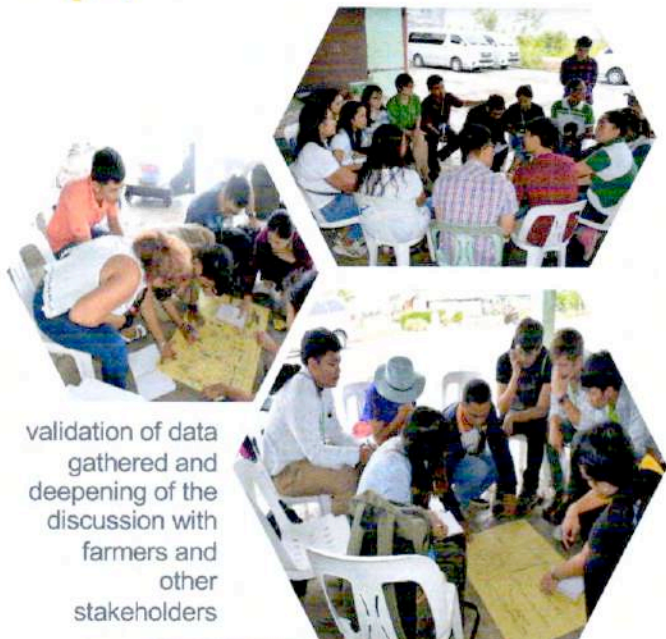


PARALLEL ASSESSMENT OF THE TWO GROUPS

Session 18-21



RICE Group



validation of data gathered and deepening of the discussion with farmers and other stakeholders



The timeline of agriculture in the community was facilitated by the students to identify drivers of change- events, programmes and people who contributed to "why the existing farming systems is as it is".

FGD with the Local Municipal Officials (i.e. Municipal Mayor, Municipal Agriculturist and other LGU Barangay officials).

CACAO GROUP



Sectoral FGD in the cacao agricultural value chain



Participatory Rural Appraisal Tools



Seasonal diagram to identify sources of livelihood and cropping calendar of farmers

NET MAP

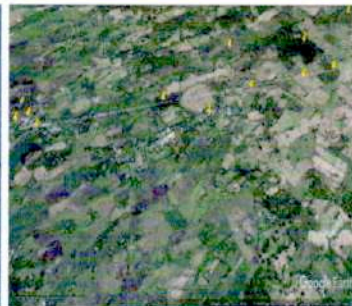
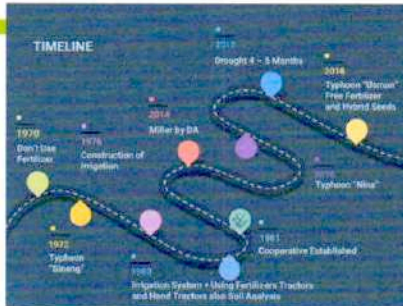


transect walk right after the focus group discussion with farmers sectoral representatives to experience the topography, cropping systems, biodiversity farm resources and limitations

TRANSECT WALK



SEASONAL CALENDAR



NET MAP

SEASONAL CALENDAR

HISTORICAL TIMELINE

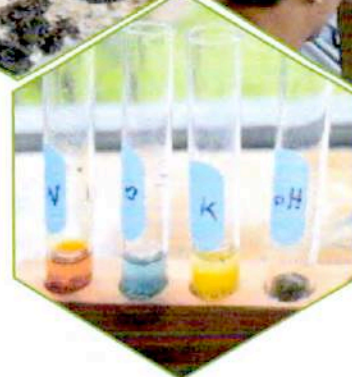
TRANSECT MAP



In Brgy. San Ramon and Brgy. San Agustin, rice farmers practice asynchronous planting wherein each fields vary in planting dates. Students observed fields in various stages of growth, under land preparation, newly planted, vegetative, reproductive and at harvest stages. Students were able to experience manual harvesting in one of the respondent's field.



interview with the farmers and also applied the net map (network map) on the farmer level



Students analyzing samples using the soil test kit

FIELD WORK HOMESTAY

Session 19-21



Students experienced grafting of cacao seedlings, planting, pruning, harvesting, and product processing.



Grafting



Planting



Pruning



Harvesting



cacao product processing



Soil Testing



FIELD WORK HOMESTAY

Session 19-21



Homestay with farm families provided the students the opportunity to experience the Filipino culture and day-to-day activities in the farm.

REPORT PREPARATIONS

Session 22

Mentors helping and equipping students in preparing for their big day as they will be presenting their output to the stakeholders



Discussion and preparation for the talk show



After the days spent in the field, the students come together to consolidate what they have gathered in the field and prepared the report. Some consolidated the soil test results, others made posters about their community, and a video, process documentation. In the end, the most important learning is going through the process of thinking, organizing, communicating and building camaraderie



Feed Back Meeting with the COMMUNITY

Session 23



Officials from UPLB, SEARCA, MSFSCC and LGUs, gave messages



Overview of Rice and Cacao Production in Camarines Sur

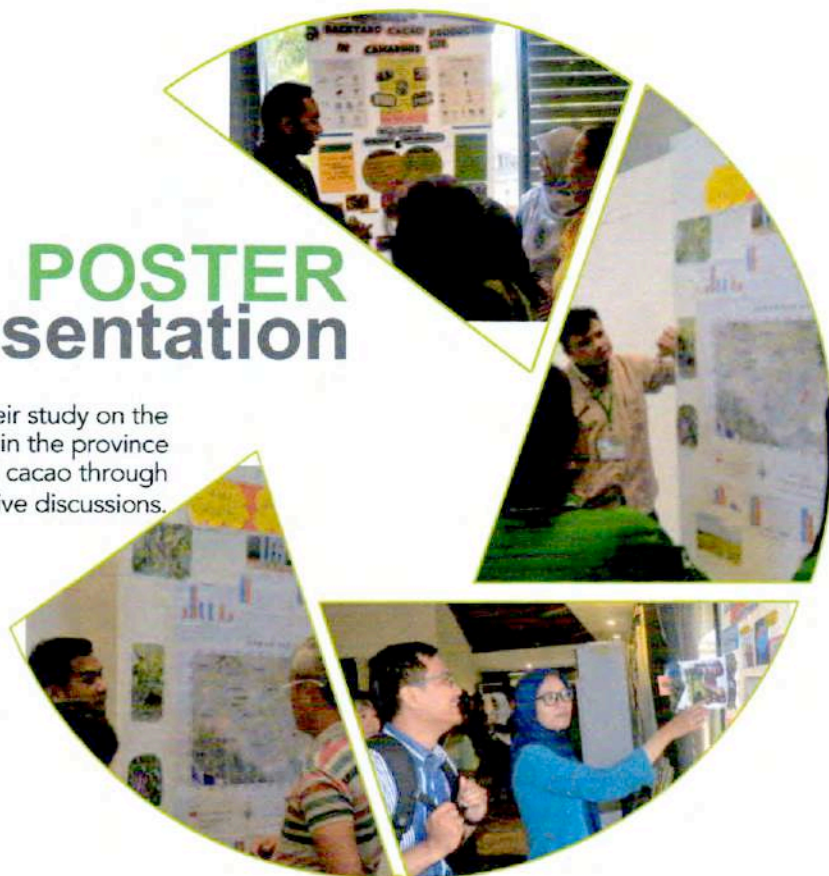
130 participated in the community feedback meeting

Feed Back Meeting with the COMMUNITY

Session 23

POSTER Presentation

The students presented the results of their study on the sustainability and resilience of food systems in the province of Cam Sur focusing on rice and cacao through posters and interactive discussions.



PECUARIA ORGANIC RICE FARMING

Timeline:

- 1991: PDCI was registered
- 1993: PDCI pioneered in organic rice
- 2005: PDCI was registered
- 2007: certified by OCCP
- 2010: shift from white to black and red rice; block and red rice representative

Strengthening sustainability and building resilience in PECUARIA:

- Expand production and marketing
- Create irrigation system
- Attain more certifications
- Secure land titles

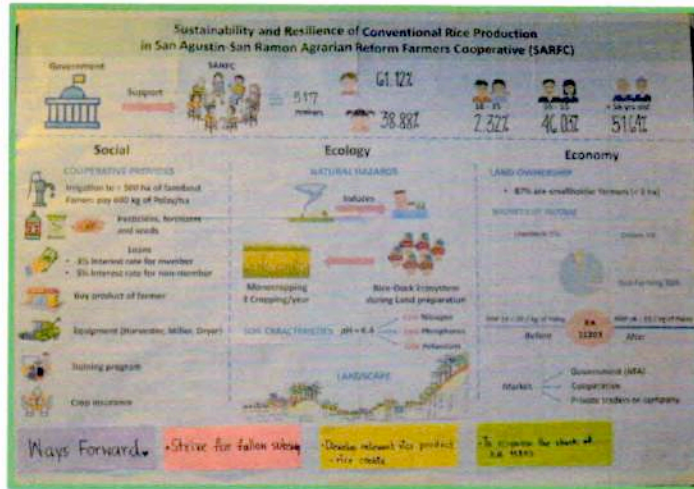
PECUARIA Organic RICE Farming

The formation of PDCI made a big impact in the region, the conversion from inorganic to organic production. From it, farmers have gained market strength by producing a niche product (organic heirloom rice), that buffers them from the low price of white rice. In addition, the cooperative have developed a business of organic inputs including organic fertilizer, rice and seeds.

Feed Back Meeting with the COMMUNITY

Session 23

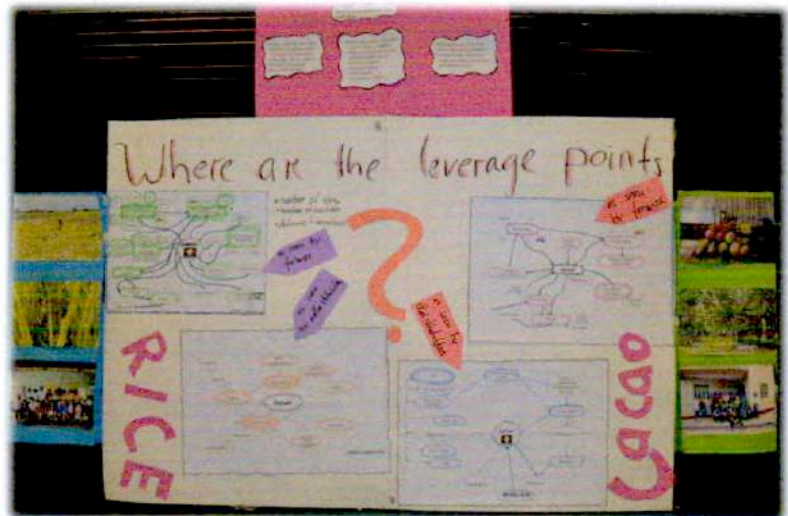
Sustainability & Resilience of rice farmers enhanced by the active San Agustin-San Ramon Reform Farmers Cooperative (SARFC)



Through the Farmer's Cooperative (SARFC), farmers have year-round access to irrigation and can easily source their farm inputs through their linkage with input providers and sell their produce directly to the cooperative, who links with reputable traders. SARFC collaborates with the local government to provide support on relevant trainings and technical assistance.

Where are the LEVERAGE points ?

Rice and cacao have distinct leverage points. The cooperatives and government agencies and organizations provide services to farmers which ease their rice production system through technical support, inputs and other resources. Cacao production is more in the hands of the private sector with support from the government limited to training and initial plating materials



SOIL ANALYSIS

Rice fields have loam to clay type of soil. Soil N and P levels are generally low. Soil K levels are sufficient in areas practicing organic method but insufficient in areas practicing conventional method. Soil pH ranges from 6.0 to 7.2.

Feed Back Meeting with the COMMUNITY

Session 23



Building Resilience & Sustainability of Backyard CACAO Production in Camarines Sur

There is an increasing demand of cacao beans and other cacao products, hence, the municipality of San Fernando launched the programme on planting one million trees.

The diversification of crops and integration of livestock, poultry and fisheries help farmers buffer their farming systems from shocks.

The ageing farmers in the community and limited involvement of the youth in farming activities makes the system vulnerable. To enhance resiliency, engagement and participation of needs to be encouraged

Potential of COMMERCIALIZATION CACAO Production in Camarines Sur

A forecast of worldwide decline of cacao supply by 2050 provides an opportunity for Philippines to reach international market. To achieve this goal, continuing training and farmers' adoption of technological innovations are needed.



Feed Back Meeting with the COMMUNITY

Session 23

Building the cacao and rice-based farming system resiliency is the key towards food security attainment and adaptation to climate change in Camarines Sur.

Farmers appreciated the holistic assessment of their farming systems, widening their perspectives and opening up to change and innovations



Community participants and homestay hosts expressed their appreciation for their involvement in the study.



“The true success of this summer course is one of you can come back to the community and help them improve their lives”
-Dr. Poon (MS FSCC, 2019)



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Narrative

Description of 2019 Summer Course Activities

The province of Camarines Sur, Bicol Region is one of the most vulnerable to climate change but is a model of having a robust and proactive disaster risk reduction management Program (DRRM). The hilly, rolling to plains landscape surrounding the foothills of Mt. Isarog, a national park with an area of 10,112 ha highest elevation of 1966 masl level diversified farming systems, ranging from monocropping to intensive multiple cropping systems including agroforestry on the midslope, sugarcane, corn on the downslope and groundnuts and vegetables on the lower slopes and irrigated and rainfed rice on the lowlands downslope, while aquaculture and municipal fisheries are important sources of livelihood of the coastal communities of Calabanga on other side of Mt. Isarog. Sharing the same Stratavolcano, parts of which are being developed into an eco-tourism site for its forests, waterfalls and hiking, the communities surrounding Mt. Isarog will benefit from the study how sustainable their current farming systems are, given the risks of a changing climate, community demographics, government policies and anticipated land-use changes. The proposed research areas the MSFSCC summer course participants can undertake include the following:

- Assessing the dynamics of innovation and transformation of the rice-based farming systems and its future under the rice liberalization law.
- Assessing the farm level sustainability and resilience of expanding area of cacao (*Theobroma cacao* L.) as a component of farming systems in Camarines Sur.



Assessing the farm level sustainability and resilience of expanding area of cacao (*Theobroma cacao* L.) as a component of farming systems in Camarines Sur

The Department of Agriculture (DA) through the High Value Commercial crops (HVCC) program has been aggressively promoting cacao production in the Bicol region, including Camarines Sur. Targeting to intercrop with cacao at least 10% of the more than 240,000 hectares of coconut areas, DA is optimistic that by providing local farmers with the latest production technology will be a step towards making the region a major producer of this high-value crop, giving farmers an intercrop that can give an additional income of up to Php 60,000 per cropping season. This expansion of cacao across agroecosystems, ranging from backyard to commercial scale, supported by local and national policies and programs for provision of seedlings, technical trainings on production and post-production technologies, processing facilities, market assistance and crop insurance. Moreover it should increase the chances of increasing income and alleviating poverty of farmers traditionally relying only income of a single crop such as coconut. But while the future of cacao in the world market is on the upswing, with the continuing expansion of premium chocolate sales, comprising 25% of the market and generating US\$ 4.5 billion in sales yearly, the Philippines in 2013 produced only 6,000 tons of cacao, and imports about 30,000 t yr⁻¹. The expansion program in Bicol is expected to contribute to the national target of planting 500 M trees and reach a production of 100,000 t by 2020. Preliminary visit to cacao farms and key informant interviews of farmers, traders and processors, however suggests that the aggressive expansion of cacao production, was not always accompanied by good management practices at the farm level, that limits the crop from achieving its potential yield and the farmers from getting the benefits they hope for. The still low and unreliable volume and mixed quality produce, particularly from small farms pose marketing concerns that may constrain farmers from better taking care of their crop. It is deemed that incorporation of cacao may possibly enhance the resiliency and sustainability of agricultural production in Camarines Sur.

Assessing the dynamics of innovation and transformation of the rice-based farming systems and its future under the rice liberalization law.

The Bicol region ranked 6th in rice production in the Philippines in 2016, inspite of the challenges posed by its vulnerability to various climate related hazards. The good performance of the rice sector was attributed to the implementation of High Yielding Technology Adoption and Rice Productivity Enhancement Program that encouraged farmers to shift from certified seeds to hybrid seeds and practice of precision fertilization and utilization of soil ameliorants in the Bicol Region (Report on Regional Economic Developments in the Philippines. BSP. 2016). The adverse impact of typhoon Nina which affected a total of 86,620 hectares of agricultural lands was quickly mitigated by hastening harvest of palay and immediate rehabilitation of the damaged farm areas by the DA (<http://nro5.neda.gov.ph/neda-region-5-statement-on-the-bicol-economy-in-2017>).

Indeed, the provincial government of Camarines Sur takes pride in its success to being a top producer of the country's staple food, ranking 4th top rice producer in 2018. But while the provincial policy is on modernization of the rice sector, there are municipalities like Ocampo which promotes the development of organic sustainable agriculture, creating the Ocampo Organic Stakeholders Council and providing funds for the operation thereof (Municipal Ordinance No. 14-006). Rice is not only a staple food, but a part of the Filipinos' culture and heritage. The Philippines remains to be the largest importer of rice despite the efforts of the government towards rice self-sufficiency. Imported rice is cheaper than locally produced rice due to the higher cost of production. Quantitative restriction (QR) on rice allows the government to limit the volume of rice that could be imported by the Philippines each year. It is intended to protect local rice producers from the adverse effects of cheap rice imports. This price gap stems from the difference in the cost of palay production in the Philippines which is 90% higher (PhP 12.4/kg), compared with Vietnam (PhP 6.53/kg) (Moya, 2016).

With the lifting of the QR on rice and the enactment of the Rice Import and Export Liberalization Law (Republic Act 11203) import restrictions on rice is replaced with 40% tariff. This is envisioned to make the price of rice affordable for all and raise funds from import tariff which will be used to fund programs to help farmers such as mass irrigation, rice storage and research initiatives. A PhP10 B rice competitiveness enhancement fund will also be a source of direct financial assistance to farmers tilling two hectares and below in the form of "compensation" for projected losses due to rice liberalization. Local rice producers, however, have warned that the new law would kill the Philippine rice industry.

The proposed research study will assess the resiliency and sustainability of different rice production systems (conventional irrigated inbred and hybrid, and organic inbred or specialty/heirloom cultivars) in Camarines Sur under changing climate and new rice liberalization policy.



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